PALL

FEASIBILITY STUDY REPORT

PALL CORPORATION
30 SEA CLIFF AVENUE
GLEN COVE, NEW YORK

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FEASIBILITY STUDY REPORT

PALL CORPORATION
30 SEA CLIFF AVENUE
GLEN COVE, NEW YORK

1.0 INTRODUCTION

This Feasibility Study Report (FS) presents the development, screening, and recommendation of treatment alternatives for Pall Corporation's (Pall's) 30 Sea Cliff Avenue facility located in the City of Glen Cove, Nassau County, New York. The treatment alternatives were developed based on the findings of investigation activities performed during the Phase I and Phase II Remedial Investigations (RIs) at the site. All work completed was performed pursuant to the Order on Consent between Pall and the NYSDEC (Order on Consent No. WI-0831-98-11) and is subject to all terms, conditions, and requirements of that Order.

The Pall property is listed by the New York State Department of Environmental Conservation (NYSDEC) as a Class 2 Inactive Hazardous Waste Disposal Site (NYSDEC Site No. 1-30-053B). The NYSDEC has also listed the August Thomsen property located at 36 Sea Cliff Avenue as part of the Pall Inactive Hazardous Waste Disposal Site. A site location map and a site plan are presented in Figures 1-1 and 1-2, respectively. The terms "site" or "property," when used to describe the subject facilities shall include, and be limited to, the 30 and 36 Sea Cliff Avenue properties, unless the text specifically refers to the Pall property or the August Thomsen property.

1.1 Purpose and Objectives

The FS was designed to meet the objectives outlined in NYSDEC Technical and Administrative Guideline No. 4025, Guidelines for Remedial Investigation/Feasibility Studies (NYSDEC TAGM 4025, March 31, 1989), NYSDEC Technical and Administrative Guideline No. 4030, Selection of Remedial Actions at Inactive Hazardous Waste Sites (NYSDEC TAGM 4030, May 15, 1990), and United States Environmental Protection Agency (USEPA) Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (USEPA, October 1988).

Specifically, this FS has been designed to meet the following objectives:

- Evaluate existing site data;
- Complete a preliminary screening of possible remedial alternatives for implementation at the site;
- Complete a detailed evaluation of alternatives that pass the screening criteria using the following NYSDEC evaluation criteria:
    i. Compliance with New York Standards, Criteria, and Guidelines (SCGs);
    ii. Protection of human health and the environment;
    iii. Short-term effectiveness;
    iv. Long-term effectiveness and permanence;
    v. Reduction of toxicity, mobility, and volume;
    vi. Implementability; and
    vii. Cost;
- Perform a comparative analyses of remedial alternatives considered for implementation;
- Recommend an alternative for implementation at the site and develop realistic cleanup objectives that are consistent with NYSDEC program requirements and site-specific issues, limitations, and constraints; and
- Provide a preliminary conceptual design for the recommended alternative and determine additional studies (if any) required prior to finalization of the remedial alternative.

1.2 Site Location and Description

The Pall facility is located at 30 Sea Cliff Avenue (Section 21, Block H. Lot 37), approximately 1/8 mile west of Route 107 and directly south-southeast of the Carney Street Well Field. The property is bordered on the northwest by the August Thomsen portion of the site (36 Sea Cliff Avenue, Section 21, Block H, Lot 320), the northeast by a City of Glen Cove Daycare Center, the south by Sea Cliff Avenue, the east by Route 107, and on the west by the Associated Draperies Facility. Photocircuits Corporation and the Pass and Seymour site, both listed Class 2 Inactive Hazardous Waste Disposal Sites, are located to the south across Sea Cliff Avenue. Areas surrounding the site consist primarily of industrial facilities with some residential areas located approximately 1 to 2 miles north, south, east, and west of the site.

The topography of the site is relatively flat with a gentle slope from the southwest corner (grade elevation of approximately 87 feet above mean sea level, msl) toward the northeast corner of the site (grade elevation approximately 83 feet above msl). The majority of the site is paved and has been since the 1950's. East and west of the site, the topography rises to elevations of 160 to 180 feet above msl. Glen Cove Creek is situated parallel to the west side of the site and runs from the southwest corner, through the western boundary of the site, to the northwest corner. The streambed is present at about 3 to 4 feet below the finished grade. Glen Cove Creek is dry the majority of the time, but the Creek has reportedly flooded in the past during storm events, thereby causing much of the Pall and August Thomsen properties to receive floodwaters from the Creek. The Creek flows from the south toward the north when sufficient water is present to sustain flow.

Groundwater flows predominantly from southeast to northwest across the site. However, local groundwater elevation variations imply that there may also be an east-west component of the groundwater flow direction along Glen Cove Creek. Based on the predominant groundwater flow direction, properties south of Sea Cliff Avenue are located hydrogeologically upgradient of the Pall Corporation site.

1.2.1 Current Site Operations

Pall currently is not conducting any operations at the 30 Sea Cliff Avenue site. Since October 15, 1999, Tweezerman, Inc. (Tweezerman) has rented space in the Pall building and uses the space for shipping, receiving, and limited repair of personal care tools (tweezers, nail clippers, haircutting scissors, etc.).

The August Thomsen building currently is the location of a pastry bags production and assembly facility.

1.2.2 Site Ownership and Operational History

The site is located in the Sea Cliff Industrial Area, an area that has been the location of industrial processes from the 1940s to the present. Pall has operated at the site since the early 1950s, at various points performing manufacturing and related functions at the site. Chemicals that had been historically used at the facility and/or stored in the former drum storage area included, lubricating oils, alcohols, solvents, hydrochloric acid, sodium hydroxide, dimethyl acetamide (DMAC), PVDF resin, and very small quantities of specialty chemicals. In 1958, Pall constructed what is now the August Thomsen building. From 1958 until 1971, this building was used by Pall's subsidiary, Glen Components, Inc., as a precision machine shop manufacturing parts for Pall's other divisions. Chlorinated solvents[1] were used at the site until approximately 1971 at which time their use was discontinued[2].

1.3 Immediately Adjacent Properties

Figure 1-1 provides an overview of the Sea Cliff Avenue industrial area and the relative locations of the Pall site and the adjacent properties.

The **Photocircuits Corporation** site is located at 31 Sea Cliff Avenue (the south side of Sea Cliff Avenue) across the street from the Pall facility. The site is the location of multiple buildings where Photocircuits conducts its operations which reportedly include printed circuit board manufacturing, machining, metal plating and finishing, and wastewater treatment / chemical recovery. Previous environmental investigations have established that chemicals, including chlorinated VOCs, have been released into the environment at the Photocircuits site and the site is currently a Class 2 Inactive Hazardous Waste Disposal Site (Site No. 1-30-009). The Photocircuits property, including the chemical storage and chemical recovery areas, are hydrogeologically upgradient of the Pall site.

The **Pass and Seymour site** is located south of the Pall facility and immediately west of the Photocircuits site. The site was constructed by Slater Electric in 1959 and was operated for more than 20 years by Slater. Thereafter, Pass and Seymour occupied the site and used it as the location for a manufacturing operation. Previous environmental investigations have established that chemicals, including chlorinated VOCs, have been released into the environment at the Pass and Seymour site and the site is currently a Class 2 Inactive Hazardous Waste Disposal Site (Site No. 1-30-053A). The Pass and Seymour site may be hydrogeologically upgradient of the Pall facility[3].The **Associated Draperies** site is located at 40 Sea Cliff Avenue, immediately to the west

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[1] For the purposes of this report, chlorinated solvents and chlorinated VOCs shall mean tetrachloroethene, Trichloroethene, and their respective degradation products. Freons, while technically chlorinated solvents, shall be discussed independently in this report.

[2] Some chlorinated solvents may have been purchased for use at the facility after 1971 for lab research and development purposes. However, these purchases were infrequent and only consisted of very small quantities.

[3] The presence of Glen Cove Creek makes determination of the groundwater flow direction complex to evaluate under certain conditions. Glen Cove Creek may serve as a barrier minimizing flow from the Pass and Seymour site toward, and across, the Pall site. However, the majority of data available support the position that the Pass and Seymour site is located hydrogeologically upgradient of the Pall site.

of the Pall facility on the western side of Glen Cove Creek. The site was formerly owned and operated by HMS Machine Shop, who reportedly conducted machining operations at the site and reportedly used a variety of chlorinated solvents in their operations.

The **Carney Street Well Field** property is located immediately north of the Pall site. This site currently is the location of a day care center, a City of Glen Cove Water Department operations center, and an Emergency Medical Services (EMS) garage. The Carney Street Well Field properties are located hydrogeologically downgradient of the Pall, Photocircuits, and Pass and Seymour sites.

Additional information regarding the environmental history of the immediately adjacent properties is available in the references.

1.4 Neighboring Community

The neighboring communities beyond the properties immediately bordering the Pall site are a mix of industrial, commercial, and residential properties. Industrial properties are located primarily within a ½ mile radius of the site with the majority of sites to the northeast. Commercial properties (e.g., deli's, offices, etc.) are located to the east along the Arterial Highway and Glen Cove Road. Residential properties are located further from the site to the south, east, west, and north.

1.5 Overview of FS Report

This FS report has been divided into six (6) primary sections.

Section 1, Introduction, provides an overview of the FS Report, a brief history of environmental studies performed at the site, and a general site description. Detailed information on past environmental studies is included in the references.

Section 2, Physical Setting of the Study Area provides a more detailed description of the regional and site-specific geology and hydrogeology that impacts contaminant fate and transport and remedy selection.

Section 3, Nature and Extent of Contamination presents a summary of soil, groundwater, and surface water data obtained at the site and a discussion of possible source areas. Additional information regarding the nature and extent of adverse environmental impacts, and the fate and transport of contaminants is provided in the July 2000, Phase II RI Report.

Section 4, Development and Screening of Remedial Alternatives identifies and screens remedial alternatives based on the following: (1) the contaminants and exposure pathways, (2) remedial action objectives and (3) the technical applicability of alternatives.

Section 5, Detailed Analysis of Remedial Alternatives presents a detailed analysis of remedial alternatives, subsequent to screening, assessing each alternative against the following seven evaluation criteria: (1) short-term impacts and effectiveness, (2) long-term effectiveness and permanence, (3) reduction of toxicity, mobility, or volume, (4) implementability, (5) compliance with Standards, Criteria, and Guidelines (SCGs), (6) overall protection of human health and environment; and, (7) cost.

Section 6, Conclusions and Recommendations summarizes the analyses presented in the previous sections and makes recommendations for future activities.

2.0 PHYSICAL SETTING OF REMEDIATION AREA

This section of the FS Report provides an overview of the Sea Cliff Avenue Industrial Area. Additional information is provided in the references.

2.1 Regional Setting & Land Use

The area immediately surrounding the Pall site is predominantly comprised of industrial and commercial facilities. Residential communities lie approximately 1 to 2 miles from the Pall site in all directions.

Although a formal well survey was not performed during the RI, it is believed that all facilities within a 1-mile radius of the subject property are connected to the municipal water supply system and that private wells are not used for potable water. Industrial water supply and diffusion wells have operated, and may continue to operate in the Sea Cliff Industrial Area. The nearest surface waters, other than Glen Cove Creek, are predominantly located upgradient and to the west of the site or far to the north.

2.2 Site Topography and Features

The Pall site is relatively flat and is almost entirely covered by asphalt except for small planting areas at the front (south) of the facility, along the eastern border, and immediately adjacent to Glen Cove Creek. There are two main structures on the site and several small sheds formerly used for the small-scale storage of chemicals or other products near the rear (north) of the Pall building. There are no other major surface obstructions on the subject property. The site is accessed from Sea Cliff Avenue via two roadways, one on each side (east and west) of the Pall building.

The site contains numerous underground utilities including gas mains, electric service, water mains, and sanitary and process wastewater disposal lines via the municipal sewer system. There are no storm drains located on the subject property. An on-site supply well is present along the western side of the property. However, the well has been inactive for at least the last several years. No additional information is available regarding the construction details of the former supply well. The former supply well was reportedly used for non-contact cooling water. After completing the cooling loop, non-contact cooling waters were discharged to the municipal sewer system. There are no injection wells active on the Pall property.

Adjacent to the north of the Pall site is the Carney Street wellfield property. This wellfield is currently inactive. Additional information regarding the supply well system and Carney Street monitoring well network is provided in the Phase II Remedial Investigation (RI) Report (ESI, 7/2000).

2.3 Regional and Site Geology

The geologic unit directly underlying the subject site, the Upper Glacial Aquifer, ranges from 260 to 440 feet in thickness, and consists of sandy and silty glacial till deposits grading downwards to finer sands and gravels. This unit is characterized by two distinct zones. The upper zone (commonly 110 – 140 feet thick) consists of sandy and silty till deposits, and the lower zone (150 – 300 feet thick) consists of fine to medium sands grading to fine to coarse sands and fine gravels. The lower zone of this unit also contains thin, discontinuous lenses of silt and clay. Separating the Upper Glacial Aquifer from the Port Washington Aquifer beneath, are the silts and clays of the Port Washington Confining Unit. This unit is continuous, and is related to the Gardiner's Clay present on the south side of Long Island. The Port Washington Aquifer, a local member of the Magothy Formation, is characterized by Cretaceous deltaic sediments consisting of fine to medium sand and is interbedded with clay and sandy clay of moderate permeability and silt and clay of low to very low permeability. The basal 50 to 200 feet may commonly contain coarse sand and gravel. The Lloyd aquifer, which lies immediately above solid bedrock, is approximately 0 - 550 feet thick, and is found 200 - 1,800 feet below the surface. It contains fine to coarse sand and gravel with a clayey matrix with some layers of silty or solid clay.

Data obtained from site soil boring logs were used to generate several geologic cross-sections across the site to better understand the local soil types and their influence on contaminant transport and fate. Additional information is available in the Phase II RI Report.

2.4 Regional and Local Hydrogeology Overview

Regionally (within and near the Sea Cliff Industrial Area), groundwater flows predominantly toward the north, northwest. The same generalized groundwater flow direction is present across the Pall site. Groundwater was encountered onsite at depths ranging generally from 2 to 7 feet below grade surface (bgs). The hydraulic conductivity in the shallow onsite sand zone (less than 20 feet deep) ranged from 5×10^{-4} to 4×10^{-2} centimeters per second (cm/sec). The hydraulic conductivity in the shallow-to-intermediate soils zone (approximately 26 feet BLS) ranged from 9×10^{-5} to 7×10^{-3} cm/sec. One intermediate well measurement (MW6P; 65 feet BLS) indicated a measured conductivity of 6×10^{-5} cm/sec.

Additional discussion of the local and site-specific hydrogeology and its influence on the contaminant distribution at the site is presented in the Phase II RI Report.

3.0 NATURE AND EXTENT OF SITE CONTAMINATION

This section of the FS Report summarizes the findings of the remedial investigations that have been completed at the site. A more thorough description of sample collection procedures and data collected are provided in the Phase II RI Report[4].

3.1 Soil Characterization Summary

The soil and vadose zone investigations performed as part of the remedial investigations were completed in several phases. The results of the Phase I RI soil investigation performed by the NYSDEC are summarized in Table 3-1 through Table 3-5[5]. The soil boring sample locations are shown in Figure 3-1. The primary contaminants of concern (chlorinated VOCs) were either not detected, or if detected, were detected at levels significantly below their respective RSCOs in all samples. Only one sample (SGB-30, 10' to 12' bgs, 2,300 ug/kg xylenes) indicated the presence of any VOCs exceeding NYSDEC Recommended Soil Cleanup Objectives (RSCOs). This soil sample was collected from below the water table and may have been impacted by local groundwater quality near the sample location. Total Organic Carbon (TOC) concentrations in site soils ranged from a low of 777 mg/kg at DGB-3A (7 ft bgs) to a high of greater than 16,000 mg/kg at SGB-30 (11-12 ft bgs)[6].

Eight (8) locations were sampled during the first part of the Phase II soil investigation. The locations and analytical results for these eight borings are summarized in Table 3-6 and on Figure 3-2. Only two parameters were detected at concentrations exceeding their respective RSCOs. 1,2-Dichloroethene was detected at 1,000 ug/kg in sample SB-5 (3'-4' bgs) and at 400 ug/kg in sample SB-7 (3'-4' bgs). The RSCO for 1,2-Dichloroethene is 300 ug/kg. No parameters in deeper soil samples exceeded the RSCOs demonstrating that the impacts in these areas were limited to shallow soils. M/P-Xylene was detected at a concentration of 2,600 ug/kg at SB-1 (8.5' - 9.5' bgs), which exceeds the RSCO of 1,200 ug/kg for xylenes. Since shallow soils at SB-

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[4] New York State standards and guidelines are referenced throughout the text for comparison to samples collected during the RI. The most common standards discussed in the text are the "Recommended Soil Cleanup Objectives" identified in NYSDEC Technical and Administrative Guidance Memorandum (TAGM) HWR-40-4046 (NYSDEC, 1/94) and the Class GA Groundwater Quality Standards identified in the NYSDEC Division of Water Technical and Operational Series (TOGS) 1.1.1 (NYSDEC, 6/98).

[5] The description of the Phase I RI is based upon the text of the "Preliminary Focused Remedial Investigation Data Report" prepared on behalf of the NYSDEC by GZA and TAMS. References to the Phase I RI or the data therein are not intended to imply Pall Corporation's acceptance of the data or conclusions.

[6] The laboratory reported TOC as >16,000 mg/kg in sample SGB-30. 16,000 mg/kg is the maximum range for the 10 mg sample collected by TAMS and GZA.

1 did not contain any parameters at concentrations exceeding their respective RSCOs and the deeper sample was collected from below the water table, the xylenes detected at SB-1 may be the result of groundwater interference. During the second phase of the Phase II RI, a comprehensive grid-sampling program was established for the SB-5 and SB-7 areas. Several additional soil samples were collected in strategic locations near SB-1. The results of the grid-sampling program for the SB-5 and SB-7 areas, and the additional sampling conducted during the SVE pilot test[7] near the SB-5 area are presented in Tables 3-7 (SB-5 Area), 3-7A (SB-5 Pilot Test Sample Results) and 3-8 (SB-7 Area). Only one sample location (5-SB-15, 0' - 4' bgs, 950 mg/kg PCE and the associated pilot test progress sample collected at the same location, CONF-2, 0-4' bgs, 210 mg/kg) contained VOCs at concentrations exceeding their respective RSCOs (see Figures 3-3, 3-3A, and 3-4). This area is currently being addressed as part of a soil vapor extraction (SVE) pilot test program. The horizontal and vertical extent of the elevated concentrations was well delineated on all sides after completion of follow-up sampling as part of a pilot test program (see Figure 3-3A) and the area of elevated concentration was confined to approximately a 10' x 15' area.

The extensive soil investigation performed during the Phase I- and Phase II RIs, and during the pilot test, demonstrated that all possible soil areas of concern have been investigated and delineated. When SVE pilot test data indicate that the soil at 5-SB-15 has been addressed to the greatest extent practical based upon field screening data, confirmatory soil sampling will be completed with NYSDEC oversight. Upon completion of confirmatory sampling indicating that the 5-SB-15 area has been remediated, no other soil, investigation, delineation, or remediation will be warranted at the site.

3.2 Summary of Groundwater Flow Studies

Numerous groundwater flow studies have been completed at the Pall site and throughout the Sea Cliff Avenue Industrial area. The references provide details of the studies performed. The results from these studies show the following:

- The depth to groundwater across the Pall site is approximately 2 to 7 feet bgs, is highly variable, and is influenced by storm events. Glen Cove Creek appears to have a minimal influence on the regional groundwater flow direction under non-

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[7] Due to a misunderstanding related to scheduling, the NYSDEC was not present during the additional delineation sampling performed as part of the SVE pilot test.

storm conditions[8] (NCDPW, 6/90)

- Regional groundwater flows toward the northwest with a consistent west to northwest horizontal flow direction south of Sea Cliff Avenue, and northerly flow near Glen Cove Creek.

- Regionally, deep potentiometric head elevation data has indicated that deep groundwater flows in a west-northwest horizontal flow direction at Sea Cliff Avenue bending toward a northwesterly direction northwest of Sea Cliff Avenue. Historically, during the summer months when industrial and air conditioning pumpage from area supply wells was at its greatest, consistent downward gradients were observed.

- The groundwater flow direction across the site in shallow wells indicated flow from the south-southeast across the site to the northwest. The groundwater flow direction in the intermediate and deep groundwater zones is also similar to the shallow groundwater flow direction. Properties south and east of Sea Cliff Avenue are hydrogeologically upgradient of the Pall facility and any groundwater contamination originating south and east of Sea Cliff Avenue would flow across the Pall property.

- Historical pumping at the Carney Street wellfield impacted the localized groundwater flow direction by drawing groundwater downward and toward the wellfield north of the site during pumping periods. Groundwater modeling has predicted that groundwater in the shallow, intermediate, and deep zones upgradient of the Pall site would be drawn downward and across the Pall property from south to north-northwest as a result of historical wellfield pumping.

- The horizontal gradients across the site were estimated to be about 0.010 ft/ft near the north and south property lines in the shallow groundwater with a lower gradient of about 0.005 ft/ft present across the middle of the site in the shallow groundwater. In the intermediate groundwater, the horizontal gradient was uniform across the site at approximately 0.010 ft/ft. In the southern, deep groundwater, the horizontal gradient was approximately 0.010 ft/ft while at the northern end of the property, the deep horizontal gradient was only about 0.003 ft/ft.

- Groundwater elevation and flow data are consistent with the current distribution of the contaminants of concern in the shallow, intermediate, and deep, upgradient and downgradient wells across the site and the known historical pumpage at the Carney Street Well field property. The current distribution of contaminants across

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[8] See Nassau County Dept. of Public Works, Aquifer Segment Study, June 1990 for additional information.

the site is consistent with the site geology, the horizontal and vertical movement of groundwater across the site, and at least a partial contribution from a historic, upgradient source.

Recent groundwater elevation data is presented in Table 3-9. Potentiometric surface maps for the most recent gauging events of the shallow, intermediate, and deep groundwater zones are indicated in Figure 3-6 through 3-11.

A more comprehensive discussion of the groundwater flow direction and its influence on the distribution of contaminants in the subsurface is provided in the Phase II RI Report.

3.3 Groundwater Quality Summary

Several historic groundwater investigations have been completed at the site to evaluate groundwater quality. Each of these is described in detail in the Phase II RI Report. The most recent groundwater monitoring well sampling events, documenting current site conditions, are summarized in this section.

To assess groundwater quality, a series of shallow, intermediate, and deep groundwater monitoring wells have been installed at the site. The on-site well locations are shown in Figure 3-12. In general, each well cluster consists of a shallow well screened from approximately 5 to 15 feet bgs, an intermediate well screened from approximately 45 to 55 feet bgs, and a deep well screened from approximately 90 to 100 feet bgs.

Two major groundwater sampling events were performed during the Phase II RI (April 1999 and January 2000). An additional groundwater sampling event was completed at the request of the NYSDEC as part of this Feasibility Study (December 2000). Groundwater quality data from the April 1999 sampling event are summarized in Tables 3-10 (shallow wells), 3-11 (intermediate wells), and 3-12 (deep wells). The results of the January 2000 sampling event are summarized in Table 3-13 (shallow groundwater), Table 3-14 (intermediate groundwater), and Table 3-15 (deep groundwater). The results of the December 2000 sampling event are summarized in Table 3-16 (shallow groundwater), Table 3-17 (intermediate groundwater), and Table 3-18 (deep groundwater).

The following is a summary of the groundwater quality investigation results:

- April 1999: In the shallow groundwater table, the highest concentrations of VOCs were detected in well MW-5P at the northeastern property line where PCE (110 ug/l), TCE (230 ug/l), cis-12DCE (3,600 ug/l), and Vinyl Chloride (250 ug/l) were detected (see Figure 3-13). The high values of DCE and vinyl chloride are indicative of a significantly aged plume.

- April 1999: In the intermediate wells, the highest concentrations of VOCs were detected upgradient in MW-6P where 51 ug/l of PCE, 150 ug/l of TCE, 920 ug/l of cis-12DCE, and 68 ug/l of vinyl chloride were detected (see Figure 3-14). The chlorinated VOCs of concern were detected at concentrations greater in an upgradient, intermediate well (MW-6P) than in any of the downgradient intermediate wells.

- April 1999: In the deep well samples, concentrations upgradient (at MW-6D) and downgradient were generally on the same order of magnitude with the highest concentrations detected at MW-6PD upgradient and at MW-5PD, MW-10PD, and MW-2AD downgradient. Concentrations in the deep groundwater at the site at these wells ranged from 8 to 54 ug/l PCE, 53 to 270 ug/l TCE, 3 to 25 ug/l 111TCA, 58 to 242 ug/l 12DCE, and <10 to 26 ug/l Vinyl Chloride (See Figure 3-15).

- January 2000: After the January 2000 sampling event was completed, it was determined that the City of Glen Cove had performed a pump test at the Carney Street well field at the same time as the January 2000 sampling event. Since some of the wells were sampled before pumping and some of the wells were sampled during and after pumping at Carney Street, the January 2000 data is difficult to interpret.

- January 2000: The highest concentrations of contaminants in the shallow groundwater were located at the downgradient property line along the north side of the site. All results from the January 2000 sampling event for the shallow groundwater were on the same order of magnitude as the April 1999 data. Concentrations for the primary compounds of concern decreased in MW-5P from April 1999 to January 2000 while concentrations in MW-10PS increased slightly over the same time interval (see Figure 3-16)

- January 2000: The highest concentrations of chlorinated VOCs in intermediate groundwater samples occurred at MW-12PI and MW-10PI where 12DCE was detected at 82 ug/l and 350 ug/l, respectively. Vinyl chloride was detected at 6 ug/l at MW-12PI and 38 ug/l at MW-10P (see Figure 3-17). PCE and TCE were also detected in the intermediate groundwater with the highest concentrations of PCE detected at MW-12PI (1,700 ug/l) and the highest concentrations of TCE detected at MW-2AI (330 ug/l).

- January 2000: In the deep wells, the concentrations in the upgradient well at MW-6PD increased an order of magnitude from the prior April 1999 sampling event. In addition, the concentrations at one of the downgradient deep wells (MW-5) also increased significantly (typically an order of magnitude). PCE and TCE concentrations were higher at downgradient wells than at upgradient wells.

However, the fact that 12DCE and vinyl chloride concentrations (the primary degradation products of PCE and TCE) were on the same order of magnitude at the upgradient wells (250 ug/l DCE and 16 ug/l VC) and downgradient wells (210 ug/l DCE and 36 ug/l VC) suggests linkage between the historic releases upgradient and the current downgradient plume (See Figure 3-18).

- The Phase II RI also evaluated the presence of Freons in the groundwater. As indicated in Figures 3-16 and 3-19, the highest levels of Freons were detected at shallow wells MW-12PS, MW-10PS, and MW-2A with lower levels also detected at MW-4P. Freons were not detected in shallow, upgradient wells. In the intermediate groundwater, the highest concentrations of Freons were detected in MW-4PI and MW-2A. Freons were detected in several deeper wells, but the levels of Freons present were significantly lower (typically 1 to 2 order of magnitude) than in the shallow and intermediate wells.

- December 2000: The third round of groundwater samples was collected to evaluate inconsistencies between the first two rounds of data. Since the first round of data (April 1999) and the third round of data (December 2000) were collected during non-pumping conditions at Carney Street, they are more indicative of "static" groundwater conditions. In addition, the December 2000 data also provides some insight into what impact historical pumping at Carney Street may have had on plume migration because it provides data indicating post-pumping (albeit brief) conditions in the aquifer.

- December 2000: The highest concentrations of contaminants in the shallow groundwater were located at the downgradient property line along the north side of the site. All results from the December 2000 sampling event for the shallow groundwater were on the same order of magnitude as the April 1999 data and the January 2000 data (see Figure 3-19)

- December 2000: The highest concentrations of chlorinated VOCs in intermediate groundwater samples occurred at MW-10PI and MW-11PI where 12DCE was detected at 2,400 ug/l and 580 ug/l, respectively (see Figure 3-20). Vinyl chloride was detected at 50 ug/l at MW-10PI and 22 ug/l at MW-11P, but was present at similar concentrations upgradient in wells MW-6P (39 ug/l) and MW-13PI (26 ug/l). PCE and TCE were also detected in the intermediate groundwater with the highest concentrations of PCE detected at MW-10PI (1,400 ug/l) and the highest concentrations of TCE detected in MW-11PI (770 ug/l). Lower, but still elevated, concentrations of PCE and TCE were also detected in upgradient monitoring wells.

- December 2000: The highest levels of VOCs in the deep groundwater were detected in the upgradient monitoring wells at MW-14 PCD and MW-6PD (1,2DCE at 1,600 ug/l in MW-14PCD and 1,700 ug/l in MW-6PD). Upgradient12DCE levels were an order of magnitude higher than downgradient

> levels and total VOCs were on the same order of magnitude upgradient and downgradient. PCE and TCE were also detected both upgradient and downgradient with the highest levels of PCE present at MW-5PD (260 ug/l) and the highest levels of TCE at MW-12PD (420 ug/l). Upgradient levels of TCE were slightly lower, but on the same order of magnitude as the downgradient results (180 ug/l at MW-13PD). Upgradient PCE levels were also elevated (22 ug/l at MW-15PD). See Figure 3-21.

The presence of the highest levels of VOCs upgradient in the deep groundwater during the April 1999 and December 2000 sampling events indicates that deep groundwater contamination underlying the Pall / August Thomsen property is at least partially, the result of a historic (and possibly current) upgradient source. Furthermore, the fact that contaminant concentrations in the deep groundwater across the site (i.e., both in upgradient and downgradient wells) increased significantly after even brief pumpage at Carney Street during the January 2000 Carney Street pump test (Compare April 1999 to January 2000 and December 2000 sample results) suggests that model results predicting that pumping at Carney Street "drags" contaminants downward and across the Pall site from the south toward the north are generally reliable.

The presence of PCE and TCE upgradient and principal PCE and TCE daughter products (12DCE and Vinyl Chloride) both upgradient and downgradient in the intermediate zone, considered in conjunction with the April 1999 intermediate groundwater results indicating the highest levels of VOCs at the upgradient property line, demonstrates that the presence of contaminants on the Pall / August Thomsen site in the intermediate groundwater is at least partially the result of a historic upgradient source.

Additional discussion regarding the distribution of contaminants in groundwater across the site and the travel of contaminants from off-site sources as a function of time is provided in the Phase II RI Report.

4.0 DEVELOPMENT AND SCREENING OF REMEDIAL ALTERNATIVES

Using the data obtained from the remedial investigations, a preliminary screening of remedial alternatives was completed. The initial screening of alternatives was designed to quickly eliminate inappropriate technologies so that the remainder of the FS could focus on technologies that are, based upon experience, and documented successes, more likely to lead to cost-effective remediation of the site. The following sections briefly describe the technologies considered during the preliminary screening of alternatives.

4.1 Design Basis

The first step of technology screening is the development of an accurate and consistent design basis. This is necessary to ensure that technology selection remains unbiased and results in the selection of a technically appropriate and cost-effective remedial approach. The following design basis was used for the completion of technology screening:

Primary VOC Contaminants:	Tetrachloroethene (PCE); Trichloroethene (TCE); 1,1,1-Trichloroethane (TCA); 1,2-Dichloroethene (12DCE); and vinyl chloride
Secondary VOC Contaminants:	1,1-Dichloroethane (11DCA); Xylenes; and, Freons
Inorganics, SVOCs:	No remediation warranted; however, SVOCs must be accounted for in the remedial design of the VOC systems to prevent fouling and minimize downtime.
Soil Contamination:	Soil contamination is negligible. Except for SB-5 Pilot Test Area, no sample locations contained any parameters above RSCOs. All necessary soil contamination is being addressed by SVE technology pilot testing at SB-5.
Separate Phase Contamination:	Not applicable
Dissolved Phase Contamination:	Groundwater impacts in the shallow (less than 20 feet below grade), intermediate (20 to 60 feet below grade), and deep groundwater (greater than 60 feet below grade). On-site plumes are linked to upgradient plumes and any remedial actions must be coordinated with upgradient, off-site remedial actions. Groundwater impacts are at least partially the result of an upgradient source.

Delineation Summary - Soils:	*SB-5 Area Only*: limited to small area near soil sample 5-SB-15, depth limited to 4 feet below grade. Maximum concentration of 950 mg/kg PCE, but samples adjacent to 5-SB-15 all contained PCE and other VOCs at levels well below RSCOs.
Delineation Summary – GW:	*Shallow:* Highest levels of chlorinated VOCs at northern property lines near monitoring wells MW-5PS, MW-10PS, MW-11PS, and MW-12PS. Lower levels of VOCs also present at other upgradient and downgradient monitoring wells. Freons near MW-10PS, MW-12PS, and MW-2A. *Intermediate:* Highest levels of chlorinated VOCs at southern property line near MW-6P and MW-13PI and at northern property line near MW-2AI, MW-10PI, MW-11PI, and MW-12PI. Lower levels of VOCs also present at other upgradient and downgradient monitoring wells. Freons near MW-4PI, MW-10PI, and MW-2AI. A probable source of intermediate contamination is upgradient of the Pall property. *Deep:* Highest levels of chlorinated VOCs at southern property line near MW-6PD and MW-14PCD. Lower levels at northern property line near MW-5PD and MW-10PD and other upgradient and downgradient monitoring wells. A source of deep contamination is upgradient of Pall property. (See Phase II RI Report for more complete description of contaminant distribution)
Geology / Soils:	The western side of the Pall site consists primarily of sand and gravelly sands with silty sands. However, a substantial clayey sand lens approximately 5 to 15 feet thick is present from approximately 30 feet below grade at MW-13PD to about 60 feet below grade at MW-11PD. A second sand and clay layer is also present throughout the entire northeast side of the site at a depth of approximately 85 feet bgs. This sand and clay layer is approximately 4 feet thick near MW-5PD and MW-11PD but thins out to only a fraction of a foot at MW-6PD.

	The vast majority of the north section of the site consists primarily of sands from just below grade to about 100 feet below grade.
Hydrogeology:	Groundwater is typically present approximately 2 to 7 feet below grade; however, the water table elevation is highly variable with storm events. Groundwater flows predominantly from the southeast toward the northwest in the shallow, intermediate, and deep groundwater zones. The horizontal gradient across the site is approximately 0.005 ft/ft to 0.010 ft/ft.
Remediation Timeframe:	A reasonable time frame is considered to mean the completion of field remediation activities in less than 5 years. Cost-effective remedies completing field remediation in less than 3 years will be considered preferred remedies.
Utilities / Subsurface Obstructions:	Electrical service and natural gas service is available on-site, although system upgrades may be required for specific remedies. The facility is connected to the municipal sewer system. An out of service water supply well exists on-site for potential use, if necessary. City water is also available on-site. All subsurface utilities must be identified prior to work.
Surface Obstructions:	Other than the primary Pall and August Thomsen buildings, there are no significant surface obstructions impacting selection of a remedy.
Air and Water Discharges:	May be possible for the selected remedy; however, specific terms would have to be negotiated with regulatory agencies.
Hours of Operation:	Remedial systems may operate 24 hours per day, seven days per week; Variable duty cycles may be used depending upon specific remedy implemented (i.e., pulsing may be used when technically appropriate).
Site / Neighborhood Constraints:	Noise minimization may be required. Systems must adhere to building codes and local ordinances. Any remediation systems must consider neighboring property usage.

Regulatory Program:	It is assumed that remedial actions are to be completed under the NYSDEC Inactive Hazardous Waste Disposal Site Program for the purposes of this FS.
Standards, Criteria & Guidelines:	The selected remedy must meet State SCGs unless a SCG waiver is applied for and obtained. Impacts from upgradient sources must be considered in determining applicable SCGs.
Treatment Hierarchy:	The selected remedy should consider the NYSDEC and USEPA "Hierarchy of Remedial Technologies" from the most preferable to the least preferable: 1. Destruction, on-site or off-site; 2. Separation / Treatment, on-site or off-site; 3. Solidification / Chemical Fixation, on-site or off-site; 4. Control and isolation, on-site or off-site.

4.2 Preliminary Screening of Alternatives

The preliminary screening of alternatives is designed solely to eliminate technologies that are not technically appropriate for the contaminants of concern at the site or the site-specific geology and hydrogeology. At the Pall site, the primary contaminants of concern are chlorinated VOCs. The primary media to be remediated is groundwater. Using these constraints, several databases and data sources (EPA REACHIT information database, EPA Risk Reduction Environmental Laboratory [RREL], EPA Vendor Information System for Innovative Treatment Technologies, [VISITT], EPA Alternative Treatment Technology Information Center [ATTIC], etc.) were reviewed to quickly eliminate technologies and combinations of technologies that have not proven effective for remediation of VOCs in groundwater at similar sites (e.g., physical filtration, reverse osmosis, electro-kinetics, etc.).

All technologies *specifically* designed for inorganics treatment or pesticides treatments were eliminated from consideration. Because the contaminants at the site warranting remediation are limited to dissolved-phase VOCs, all remedies *focusing* on soil remediation[9] or separate phase hydrocarbon (SPH) recovery were also eliminated during the preliminary screening process.

After considering solely the types of contaminants and the media of concern, the following remedial technologies remained for a more detailed evaluation:

- No Action (monitored natural attenuation with site controls)
- Air Sparging (with Soil Vapor Extraction);
- Bioremediation;
- Chemical Treatment / Oxidation;
- Groundwater Extraction and Treatment (pump and treat);
- Soil Flushing / Soil Washing; and,
- Thermal Desorption

Based upon our experience at sites contaminated with chlorinated solvents, two of the remedies listed above were eliminated because they are not likely to be effective when costs, remedial timeframes, and liabilities were considered. Bioremediation (i.e., passive bioremediation) was eliminated during the initial screening phase because it is primarily used for non-chlorinated VOCs that are readily biodegraded. For the primary contaminants of concern, aerobic biodegradation without significant energy input (i.e., as in the case of air sparging) is typically not very effective and requires long remediation times (typically greater than 5 years). Anaerobic biodegradation was not considered as part of this FS due to cost, health and safety concerns, and limited, proven, full-scale success for the contaminants of concern. It should be noted that other sites in the vicinity of the Pall site are considering the use of bioremediation as a remedial alternative to address similar chemicals of concern in a similar subsurface environment. Pall will review the results of studies being completed by others to determine if bioremediation should be re-considered in detail later.

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[9] Soil remediation at 5-SB-15 has already been initiated as part of a pilot test program for Soil Vapor Extraction. No additional soil remediation is warranted based upon the findings in the remedial investigations. However, soil remedies such as SVE may be considered during the evaluation of groundwater remedies where appropriate (e.g., SVE is commonly used with air sparging to capture vapors generated during sparging).

The other potential remedy that was eliminated was soil flushing / soil washing. Although soil flushing / soil washing could be technically effective, it would require significant water treatment and chemical injection equipment. The necessary groundwater recovery networks required for this remedy have been demonstrated to be very expensive relative to the other applicable technologies. Furthermore, the liabilities associated with solvent addition as part of soil washing makes this remedy unattractive.

Upon completion of preliminary remedy screening, the following remedial technologies were evaluated in detail as part of this FS:

- No Action (monitored natural attenuation with site controls)
- Air Sparging (with Soil Vapor Extraction);
- Chemical Treatment / Oxidation;
- Groundwater Extraction and Treatment (pump and treat); and,
- Thermal Desorption.

5.0 DETAILED ANALYSIS OF REMEDIAL ALTERNATIVES

The technologies that passed the preliminary technology screening were evaluated in detail to select the most cost-effective remedy that meets the design basis and the NYSDEC evaluation criteria. The following presents a detailed evaluation of the remedies potentially applicable at the Pall site.

5.1 Evaluation Criteria

Several key evaluation criteria were considered in the selection of the most appropriate remedial approach. These criteria were selected based upon review of USEPA and NYSDEC guidance documents, most notably NYSDEC Technical and Administrative Guidance Memorandum No. 4030, "Selection of Remedial Actions at Inactive Hazardous Waste Sites," May 15, 1990, as amended. A brief description of the key evaluation criteria used in the completion of this FS follows.

5.1.1 Compliance with New York SCGs

One of the key evaluation criteria is compliance with NYS Standards, Criteria, and Guidelines (SCGs). These SCGs are essentially the State equivalent of Applicable or Relevant and Appropriate Requirements (ARARs) under the federal CERCLA program.

The following key SCGs have been identified for this project:

- NYSDEC Class GA Groundwater Quality Standards
- NYSDEC Drinking Water Standards
- NYSDEC Recommended Soil Cleanup Objectives (TAGM 4046)
- 6 NYCRR Parts 200 through 203, Prevention and Control of Air Contamination and Air Pollution Regulations – Plus Emission Specific Requirements as applicable in 6 NYCRR Parts 205 through250.
- 6 NYCRR Parts 256, 257 and 287, Air Quality Classification and Standards, Air Quality Area Classifications.
- 6 NYCRR Parts 360 through 376, Solid and Hazardous Waste Regulations,
- 6 NYCRR Part 375, Inactive Hazardous Waste Disposal Site Remedial Program
- 6 NYCRR Parts 595 through 599, Chemical Bulk Storage Regulations

- 6 NYCRR Parts 700 through 706, Classes and Standards of Quality and Purity (Water Resources)
- 6 NYCRR Parts 750 through 758, State Pollutant Discharge Elimination System Regulations
- City of Glen Cove Sewer Ordinances
- Nassau County Article XI
- Nassau County Fire Ordinance – Article III
- New York State and City of Glen Cove Building Codes.

It should be noted that additional SCGs may be considered during remedial design and some of the SCGs listed above may be determined not to be applicable once the final remedy is selected and designed.

5.1.2 Protection of Human Health and the Environment

Protection of human health and the environment is the single most important criterion considered during the FS. However, this criterion is often inherent in the other criteria being considered (i.e., compliance with RSCOs is protective of human health and the environment because of the work that was done in the development of the RSCOs) and is therefore not directly considered as a stand-alone item. Protection of human health and the environment will be considered through comparison of likely cleanup objectives to SCGs, identification of potential receptors, and evaluation of possible residual soil and/or groundwater contaminant levels following remediation utilizing the remedy being evaluated.

5.1.3 Short-Term Effectiveness

Short-term effectiveness is a measure of how rapidly the remedy will be protective of human health and the environment through near-term reduction of the toxicity, mobility, or volume of the contaminants of concern. For the purposes of this FS, short-term effectiveness will be considered the construction and start-up period (approximately 6 months). Key issues to be considered during the short-term effectiveness evaluation include protection of site workers during remedy implementation, protection of the neighboring community, and study to insure that the implemented remedy does not cause any adverse environmental impacts.

5.1.4 Long-Term Effectiveness and Permanence

Long-term effectiveness is a measure of the remedy's ability to protect human health and the environment for a longer period following the initial construction and start-up period (i.e., the permanence of the remedy). Long-term effectiveness includes several distinct phases: (1) the operation and maintenance period during which the remedy is still being implemented (approximately 1 to 5 years for most technologies); (2) post-shutdown period before post-closure monitoring is completed during which contaminant rebound is carefully monitored (typically about 3 to 6 months); and, (3) and the post closure period which typically includes approximately 1 to 2 years of monitoring to ensure that contaminant concentrations are not adversely impacting human health and the environment. Each of these phases will be considered in the long-term effectiveness evaluation.

Key issues to be considered during each phase of the long-term effectiveness evaluation include the magnitude of residual risk, the adequacy of controls that can be implemented to properly manage residual contaminants, and the reliability of any systems put in place to manage residual contaminants.

Permanence is essentially used to ensure that any remedial approach will result in a permanent (*not* temporary) reduction in the volume, toxicity, and/or mobility of contaminants. A key parameter used to evaluate permanence is "rebound." Rebound is considered an increase in contaminant concentrations after an initial decrease is observed following implementation of a remedy. Although most contaminant remedial approaches result in some level of rebound, an unusually high level of rebound may indicate that the implemented remedy only results in a temporary reduction of toxicity, mobility or volume – not a long-term, permanent reduction. In this event, the remedy would evaluate poorly for permanence. Conversely, a relatively small rebound would be indicative of a technology that would evaluate well for permanence.

5.1.5 Reduction of Toxicity, Mobility, and Volume

Reduction of toxicity, mobility, and volume is the most basic means of monitoring whether the selected remedy is working or not. This criterion is evaluated in conjunction with the NYSDEC's hierarchy of remedial technologies so that destructive and treatment based remedies are given precedence over isolation and migration control based remedies.

Key issues considered during the reduction of toxicity, mobility, and volume evaluation include estimates of the amount of hazardous material that are destroyed or treated, an evaluation of contaminant fate and reductions in mobility, and identification of the nature and quantity of residuals that will remain after remedy implementation.

5.1.6 Implementability

Perhaps the most subjective criterion to be evaluated is implementability. Implementability is directly linked to the cost evaluation (i.e., almost all remedies can be implemented if budgets are unlimited, but very few remedies can be implemented at reasonable costs). Implementability includes several key elements:

- *Technical Feasibility:* An evaluation of technical difficulties associated with construction, operation, and maintenance of the remedy. Technical feasibility includes a detailed evaluation of site constraints, utility constraints, time to implement the remedy, the impact upon normal site operations, and the ability to effectively monitor the performance of the remedy.
- *Administrative Feasibility:* Ability to coordinate with various regulatory agencies and community groups to meet project objectives. This includes the ability to obtain necessary permits, the ability to pass community reviews, timeliness of regulatory agency responses to project demands, etc.
- *Availability of Services or Materials:* This is essentially a subset of technical feasibility because the availability of properly skilled workmen or specialized equipment or materials directly impacts technical feasibility. Union issues and labor actions may be considered as part of this aspect of the evaluation.

5.1.7 Cost

The cost evaluation was completed for all remedies that were still considered applicable after the preliminary screening. The cost evaluation includes capital costs (direct and indirect), operation and maintenance costs, future capital costs, and costs of future land use. Costs developed during the FS are intended to provide realistic estimates that are slightly conservative (typically, accuracy range of +/-20%). In some instances, the development of costs with this level of accuracy may not be possible without bench-scale testing or pilot studies. If this is the case for any of the remedies considered, it will be specifically noted in the text of this FS report.

Final FS costs will be presented on a present worth basis using a reasonable discount rate. At the request of the NYSDEC, a discount rate equivalent to 5% after inflation was used to determine the present worth of the alternative being evaluated. However, this may not provide realistic results when compared to other investment options that may be considered at the site. For remedies where this differential may be significant (i.e., remedies with long durations), alternative discount rates may be considered in the evaluation.

5.2 Detailed Remedy Evaluation

The following sections summarize the detailed evaluation of the alternatives that passed preliminary screening criteria. Table 5-1 summarizes the evaluation of each of the criterion considered and should be used in conjunction with the text discussion presented in the following sections.

With regard to protection of human health and the environment, this FS will utilize default NYSDEC soil and groundwater cleanup objectives (RSCOs for soil and Class GA Groundwater Quality Standards for groundwater) to evaluate protection of human health and the environment. It is assumed that compliance with conservative, NYSDEC default quality standards and guidelines will ensure protection of human health and the environment.

5.2.1 No Action / Site Controls (Alternative 1)

The "No Action / Site Controls" (NA/SC) remedy is included in the FS to evaluate the benefits and drawbacks of performing no active remediation. Evaluation of this alternative is required under the National Contingency Plan (NCP) for sites regulated by the USEPA and is highly recommended for all sites that may require remediation.

At the Pall site, the NA/SC alternative evaluated (Alternative 1) assumes no active soil or groundwater remediation at the site and continued groundwater monitoring for approximately thirty (30) years[10]. This NA/SC scenario is worthy of consideration because the Phase II RI demonstrated a significant off-site, upgradient source that impacts the quality of groundwater currently underlying the Pall and August Thomsen properties.

A detailed evaluation of the NA/SC alternative was completed using the criteria identified in Section 5.1.1 through 5.1.7. The NA/SC scenario would be compliant with SCGs for soil because all samples results would be within applicable RSCOs after the pilot test in the SB-5 area is completed. However, initially NA/SC Alternative 1 would not be compliant with SCGs for groundwater because this remedial alternative would result in groundwater residual

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[10] No active soil remediation in the NA/SC section and throughout this report is intended to mean no active soil remediation other than that already being performed as part of the SB-5 area pilot test.

concentrations exceeding NYSDEC Class GA Groundwater Quality Standards in the shallow, intermediate, and deep groundwater. In all likelihood, a waiver of at least one SCG would be required to implement the NA/SC scenario. Moreover, the nature of the primary contaminants of concern indicates that natural attenuation without enhancements may be very slow. Consequently, short-term protection of human health and the environment is not addressed and long-term protection of human health and the environment may not be achievable with a stand-alone NA/SC alternative unless controls limiting the possibility of direct exposure are implemented.

The NA/SC scenarios will result in a reduction of toxicity and volume through natural attenuation; however, mobility would not be directly addressed and the process would be very slow given the half-lives of the chlorinated VOCs of concern. In the short-term, the NA/SC alternative would not be effective, and long-term effectiveness would be highly dependent upon upgradient remedial effectiveness.

Of all the remedies, the NA/SC remedy would be the easiest to implement from a technical feasibility perspective because of the limited site disruptions and engineering requirements. Administrative implementability would likely be more difficult because of the need to interact with local citizen's groups, the upgradient responsible parties, and downgradient receptors including the City of Glen Cove who is responsible for the Carney Street public supply wells. It will be necessary to focus on technical issues and data, rather than potential incorrect perceptions, in order to implement the NA/SC alternative from the perspective of administrative implementability.

The costs to implement No Action / Site Controls Alternative 1, assuming thirty (30 years of annual groundwater monitoring, the inclusion of site controls such as deed restrictions on groundwater usage, and discussions with upgradient PRPs, the City of Glen Cove, and concerned citizens regarding implementation are estimated at approximately $678,000 (or $542,000 to $814,000 assuming plus or minus 20% accuracy in this estimate). A breakdown of the major components of the cost estimate is provided in Table 5-2.

After consideration of all factors, NA/SC Alternative 1 is not recommended for implementation at the site.

5.2.2 Air Sparging / Soil Vapor Extraction for Groundwater (Alternative 2)

5.2.2.1 Description of Alternative 2

AS/SVE consists of two related remedies: air sparging which is primarily a groundwater remedy that will address dissolved phase contaminants, and soil vapor extraction which will capture vapors generated during air sparging while at the same time remediate residual soil impacts, if any, in the remediation area. At the Pall site, the primary objective of the SVE system will be to capture sparge vapors. AS/SVE typically consists of a series of air sparge wells screened approximately 5 to 10 feet below the bottom of the saturated interval to be remediated. Air is injected into the aquifer through the air sparge well. As the air enters the saturated zone, it creates numerous microchannels wherein the air contacts the contaminated groundwater and the contaminants adsorbed to saturated zone soils. The injected air results in remediation of the VOCs by two principal mechanisms: (1) mechanical and chemical stripping of VOCs through volatilization, and (2) the stimulation of bioremediation in-situ because of the increased oxygen levels. At the Pall site, volatilization will be the initial driving mechanism for remediation with bioremediation increasing with time. The volatilized contaminants will then rise through the saturated zone following the path of least resistance and ultimately enter the unsaturated zone. Once in the unsaturated zone, the VOC rich vapors are captured by soil vapor extraction wells that induce a vacuum in the subsurface. The VOC rich vapor is then transported above ground within the SVE piping system and treated before discharge of treated vapors to the atmosphere in accordance with applicable regulations.

In order to evaluate SVE technology at the site, a pilot test was completed in the SB-5 area. Results of the pilot test have indicated that SVE is technically effective at the site for the chemicals of concern. Concentrations of PCE in soil at the pilot test area have been reduced by more than 70% within 6 months of the start of pilot testing. However, there were difficulties in maintaining the SVE system due to the large volume of water entrainment and the fluctuating water table following storm events. After significant storm events, the water table often rises several feet above the already shallow, "typical" water level of about 5 feet below grade. This rise in the water table has caused the pilot test, horizontal SVE well to become inundated with water, which, as a result, has caused the SVE system to flood the phase separator. If SVE were to be implemented full-scale, a thorough evaluation of the water separation and treatment system would have to be completed to automate water treatment and discharge. Essentially, the SVE system would have to contain provisions to be operated as if it were a dual phase, vacuum extraction system during high water table periods.

The specific AS/SVE alternative evaluated as part of this FS (Alternative 2) includes shallow and intermediate groundwater remediation using AS/SVE at areas where the highest groundwater concentrations were identified during the RI and a sparge barrier at the downgradient property line to prevent off-site migration of contaminants. Upon completion of the remedy for shallow and intermediate groundwater by Pall, and the successful conclusion of remedial actions eliminating sources of contamination in the upgradient shallow, intermediate, and deep groundwater zones by upgradient responsible parties, Pall will evaluate the need for further active or passive remedial actions, including such actions as may be necessary to address any contamination remaining in the deep groundwater zone on its property. The details for any future actions would have to be developed in coordination with the NYSDEC and upgradient responsible parties[11]. This scenario was developed to address several key issues identified during the Phase II RI. The Phase II RI indicated a significant upgradient plume migrating onto and across the Pall property.

The sparge barrier at the north property line serves several purposes: (1) it would allow treatment of all impacted shallow and intermediate groundwater flowing across the Pall site regardless of source area; (2) it would be located at on-site areas of elevated concentrations identified during the RI (i.e., MW-5, MW-10, MW-2A, etc.); and, (3) it would ensure that no contaminants above acceptable levels will migrate off the Pall site. In addition to the sparge barrier, a smaller related sparge system(s) will be installed to address areas of elevated VOC and Freon concentrations located near MW-12. By combining the local, elevated concentration area sparge systems with the downgradient sparge barrier system, a comprehensive AS/SVE remedy has been developed as Alternative 2.

A conceptual layout of the AS/SVE system evaluated as Alternative No. 2 is presented in figure 5-1A. A schematic showing the major elements of the conceptual system evaluated is provided in Figure 5-1B. Forty-six (46) air sparge wells were assumed based upon a spacing of approximately 20 feet. This spacing was selected based upon "typical" air sparging radii of influence between 10 and 15 feet in the geologic and hydrogeologic conditions present at the site. Each well would be installed to a depth of approximately 65 feet bgs with a two-foot screen from 63 to 65 feet bgs. Injection pressures would be approximately 25 to 30 psig to achieve "breakout" and overcome the water head above the screened interval. Typical flow rates would be in the range of 10 to 15 cfm per sparge well, assuming a 100% duty cycle. However, pilot testing (or a phased start-up) would be recommended to optimize sparge system pressures and flow rates. Thirty-two of the air sparge wells would be used for the sparge barrier system (which would include the elevated concentration areas at MW-5P and MW-10PS). The remaining air

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[11] Costs for the upgradient remediation programs and the monitoring program for deep groundwater in this alternative and all other alternatives evaluated in this FS, are not included because the details of the upgradient remediation program would have to be coordinated with upgradient responsible parties and the NYSDEC.

sparge wells would be used for localized remediation near MW-11PS and MW-12PS to reduce local concentrations before "polishing" remediation at the downgradient sparge barrier.

Vapors generated as the result of air sparging would be captured for off-gas control using a series of nine (9), horizontal SVE wells totaling approximately 430 linear feet of well (assumed design flow of 75 to 125 cfm per 10 feet of screen under a 100% duty cycle). Each SVE well would be installed approximately 1 foot above the historic high water table during non-storm events. During storm events, the SVE wells would likely be under the water table and the SVE system would essentially be run as a small-scale DPHVE system until the water table recedes. All mechanical equipment would be located within the existing metal drum storage building (now vacated). Off-gas treatment was assumed to be vapor phase, granular activated carbon (GAC) for the purposes of this FS. Entrained water would be treated using liquid phase GAC prior to discharge.

5.2.2.2 *Evaluation of Alternative 2*

As shown in Table 5-1, the AS/SVE Alternative favorably satisfies the individual evaluation criteria. AS/SVE is capable of meeting SCGs and if designed properly, will minimize residual concentrations of contaminants following system shutdown. By complying with SCGs, Alternative 2 is inherently protective of human health and the environment. However, the vapor capture system would have to be properly designed to ensure that fugitive emissions do not escape into areas where people perform activities, most notably the Day Care Center immediately north of the property. Additional SVE wells should be considered near the Day Care Center to protect sensitive receptors. In addition, any mechanical equipment to be located on-site should be secured to prevent tampering or accidents from occurring. An existing fence is in place to keep personnel and children at the Day care Center from entering the Pall property. If these factors are considered during the detailed design phase of the project, protection of human health and the environment would be realized.

The combination of local elevated concentration area remediation and the sparge barrier system proposed would result in the reduction of toxicity, mobility, and volume. The primary benefit of the AS/SVE Alternative 2 is the effectiveness. AS/SVE has been proven effective at thousands of sites nationwide where similar contaminants and geologic conditions are present. In the short-term, AS/SVE typically results in immediate contaminant concentration decreases during the first few months of operation. It is a safe remedy to construct and operate if designed properly. Long-term effectiveness is also well documented. Typical AS/SVE systems are designed with an effective radius of influence that will meet cleanup objectives within a 1 to 3 year timeframe as was identified in the design basis. Although rebound may occur with AS/SVE systems, rebound is typically more likely at BTEX sites than it is for chlorinated VOC sites. Even if rebound were to occur, restarting the system would typically reduce rebound concentrations effectively so that the remedy would also be a permanent remedy. AS/SVE would be effective for chlorinated VOCs and Freons.

AS/SVE would be easily implemented at the Pall site because the areas of concern to be addressed do not have any significant surface or utility obstructions. One key concern at the site is the shallow depth to water and the possibility of water entrainment in the SVE system. This issue would be addressed through the installation of horizontal wells and automation of the water handling system during the design phase. Data necessary to design the SVE aspects of the AS/SVE remedy are currently being obtained and evaluated as part of the SB-5 area pilot test. To date, the initial data supports the use of this remedy; however, the amount of water entrainment has proven to be a significant operational concern.

Costs for the implementation of Alternative 2 are summarized in Table 5-3. As indicated in the table, the total remediation cost is estimated at $3.13 million. This estimate includes a 15% contingency fee built into the base cost. Assuming accuracy in the estimate of +/-20%, costs for implementation of Alternative 2 are projected to be in the range of $2.50 million to $3.76 million.

Capital costs including construction, equipment, structures, utility upgrades, design, permits, and start-up costs were estimated to be approximately $1.20 million. Annual O&M costs including operating labor, materials, equipment repairs, energy and utility costs, waste disposal, analytical fees, engineering oversight, and reporting were estimated at $535,000 per year. To remain conservative, a three-year O&M period was assumed. Using this assumption and accounting for the time value of money, total O&M costs for the three year period were projected to be approximately $1.53 million dollars. It is possible that the O&M period could be reduced to 2 years or less through aggressive design and operation. This cost estimate includes quarterly status reports and annual groundwater monitoring at selected wells throughout the O&M period.

Based upon the evaluation of all criteria, Alternative No. 2 should receive consideration for implementation as a contingent remedy if in-situ chemical oxidation pilot testing is not successful. Pilot testing would likely be required for the air sparging aspects of the remedy prior to full-scale implementation.

5.2.3 Chemical Treatment / Oxidation for Groundwater (Alternative 3)

5.2.3.1 Description of Alternative 3

Chemical oxidation consists of a broad range of technologies that essentially detoxify contaminants and reduce total contaminant mass through an oxidation reaction. The oxidation reaction can be carried out either *in-situ* or above ground. For the purposes of this FS, the oxidation technologies considered are limited to *in-situ* chemical oxidation approaches. Organic wastes that have successfully been treated by chemical oxidation include phenols, chlorinated organics, amines, and cyanide compounds. The compounds of concern at the Pall site (chlorinated organics) have been remediated successfully at the bench-, pilot-, and full-scale levels using chemical oxidation, thereby making this technology a reasonable and proven one.

The most common oxidizing agents used for *in-situ* chemical oxidation include the following:

- Hydrogen Peroxide (e.g., Fenton's Reaction)
- Ozone (or to a lesser degree, Dissolved Oxygen)
- Potassium or Sodium Permanganate (i.e., Permanganate), and
- Sodium Hypochlorite

The remedial scenario developed for detailed evaluation as part of this FS is based upon the use of permanganate as the oxidizing agent because it can be handled safely, and is likely to be effective based upon the literature and site-specific treatability studies. Oxidation using either sodium permanganate and / or potassium permanganate is relatively cost-effective and it can rapidly complete remediation *in-situ* if adequate contact and mixing takes place in the subsurface. Pilot testing in the field would be required to address the effectiveness of in-situ mixing. Furthermore, permanganate injection can be monitored effectively and inexpensively relative to other remediation technologies. It should be noted that the general approach presented herein could also be implemented using hydrogen peroxide as the oxidation agent in the presence of an iron catalyst (i.e., Fenton's Reaction) as has been implemented at other, similar sites.

At the Pall site, permanganate injection would be completed in the shallow and intermediate groundwater through a series of injection wells that would be located immediately upgradient of elevated concentration areas near MW-5P, MW-10PS, MW-2A, MW-11PS, and MW-12PS. The wells would be screened so that oxidizing agent injection would be distributed throughout the water table at depths ranging from a few feet below grade to approximately 55 feet bgs.

Approximately 40 injection wells (20 shallow and 20 intermediate), spaced roughly 25 feet apart were assumed for this scenario. However, the final well layout and number of wells would be completed duringthe detailed design phase of the remediation project. Upon completion of the remedy for shallow and intermediate groundwater by Pall, and the successful conclusion of remedial actions eliminating sources of contamination in the upgradient shallow, intermediate, and deep groundwater zones by upgradient responsible parties, Pall will evaluate the need for further active or passive remedial actions, including such actions as may be necessary to address any contamination remaining in the deep groundwater zone on its property. The details for any future actions would have to be developed in coordination with the NYSDEC and upgradient responsible parties.

The layout used for the basis of Alternative No. 3 is presented in Figure 5-2A. A schematic showing the major process elements is provided in Figure 5-2B. In addition to the permanganate injection wells, five (5) additional monitoring points were included in the remedial scenario to better assess the effectiveness of oxidation than with only the existing monitoring well network. No active remediation would be included under this scenario for deep groundwater because of the elevated concentration in upgradient wells and the confirmation of an upgradient source of deep groundwater impacts.

Permanganate injection events would be performed periodically, as necessary, to initiate the oxidation reaction. For the purposes of this FS, it is assumed that four (4) injection events at each well over a one (1) year to two (2) period would be required to meet remedial objectives. Treatability testing has indicated that permanganate dosing on the order of 1 to 2 ug/l would meet remedial objectives if adequate mixing *in-situ* is achieved. Site-specific, pilot tests would be necessary to determine the ideal volume and concentration of permanganate solution required in the field; the ability to achieve effective mixing in the shallow and intermediate groundwater; the total mass of oxidizing agent required; the number of injection events necessary; and, the time required to meet remedial objectives. The design of a proper pilot test, if this remedy were to be selected for implementation, would be submitted as after treatability tests are completed in the form of a Permanganate Injection, Pilot Test Work Plan

Like the AS/SVE remedy, permanganate injection would essentially create an oxidation barrier at the downgradient property line. Alternative No. 3 would therefore provide the same benefits as the AS/SVE remedy alternative evaluated as Alternative No. 2:

- It would allow treatment of impacted shallow and intermediate groundwater flowing across the Pall site regardless of source area;

- It would be located consistent with on-site areas of elevated concentrations identified at the site (i.e., MW-5, MW-10, MW-2A, etc.);
- It would ensure that no contaminants above acceptable levels would migrate off the Pall site in the shallow and intermediate groundwater zones;
- It would address deep groundwater contamination resulting from upgradient sources through Natural Attenuation that will be coordinated with upgradient responsible parties;
- It is an approach that allows energy and costs to be focused on protection of human health and the environment downgradient of the Pall site where potential receptors are located

5.2.3.2 Evaluation of Alternative 3

As indicated in Table 5-1, ***in-situ*** chemical oxidation (and specifically permanganate injection) ranked well in all evaluation criteria considered. ***In-situ*** chemical oxidation would be capable of meeting SCGs and, if designed properly, would minimize residual concentrations of contaminants following completion of remediation. By complying with SCGs, Alternative 3 would be inherently protective of human health and the environment. Due to the relatively rapid remediation timeframes, short-term protection of human health (particularly in the vicinity of the neighboring Day Care Center) would be considered relatively high. Proper oxidant handling at the Pall facility during remedy implementation would be considered a fundamental objective to prevent any adverse impacts at the neighboring Day Care Center. Preliminary review of oxidant handling equipment has indicated that dust suppression features are available and would be necessary to protect sensitive receptors (e.g., at the Day Care Center) and site workers. All mechanical feed systems would be staffed during operation to prevent unauthorized persons from accessing the equipment. In addition, there is an existing fence to eliminate access to the Pall site from the Day Care Center property. With regard to surface waters protection, all oxidant storage areas and equipment handling would be located at least 100 feet away from Glen Cove Creek so that potential surface water impacts would not be a concern.

The proposed chemical oxidation alternative would result in the reduction of toxicity, mobility, and volume of the contaminants. Chemical oxidation is a destructive remedy (i.e., the contaminant mass is reduced to relatively non-toxic and non-harmful reaction products) and would address all contaminants of concern in the treatment area.

Literature, field studies (at other sites), and site-specific, treatability tests have indicated that permanganate injection has proven effective for chlorinated organic compounds such as PCE and

TCE, site-specific pilot testing is essential to determine both short- and long-term effectiveness. Bench-scale treatability studies using soil and groundwater from the site have verified the theoretical and *ex-situ* effectiveness of the approach for chlorinated VOCs. For Freons, the remedy will essentially stimulate biodegradation and will therefore be effective, but relatively slower than for chlorinated VOCs (see References). In addition, a pilot program is currently being developed to evaluate the effectiveness of injection and *in-situ* mixing, which are often the limiting factors governing *in-situ* effectiveness.

Key issues impacting effectiveness include the ability to get adequate mixing of the oxidizing agent with the contaminants of concern in the subsurface; the kinetics of the reactions and the ability of the reactions to go to completion; and, the selectiveness of permanganate (i.e., its ability to target contaminants of concern *in-situ).* Since permanganate may react preferentially with other organic materials in the subsurface in addition to the contaminants of concern, it is important to determine the proper volumes (and mass) to inject to ensure that the contaminants of concern are fully reacted to completion Each of these issues would be evaluated through a site pilot test program that would demonstrate the effectiveness of the remedy and help to determine the mass of permanganate that must be injected to ensure a reasonable excess of the reactant. The pilot study would also help to evaluate the most efficient delivery network (i.e., multiple wells, Geoprobe injection, slurry trenches, etc.). A typical reaction for a representative contaminant of concern (TCE) is presented below:

$$2KMnO_4 + C_2HCl_3 \dashrightarrow 2CO_2 + 2\ MnO_2 + 2\ KCl + HCl$$

More comprehensive explanation of the reactions for TCE and other contaminants of concern, including intermediate reactions where known, are presented in technical articles and papers (see References). The treatability / pilot tests would verify that these reactions are taking place sufficiently to result in effective remediation of the site.

Assuming that the final remedy would be properly designed after pilot testing, short-term effectiveness would be one of the greatest benefits of *in-situ* chemical oxidation. Oxidation reactions using permanganate typically occur very rapidly with significant reduction in contaminant concentrations within weeks or months. Long-term effectiveness should also be excellent because of the destructive nature of the reactions.

In-situ chemical oxidation is easily implemented at the Pall site because the areas of concern to be addressed do not have any significant surface or utility obstructions. In addition, the oxidizer injection systems would be portable units so that no large-scale equipment compound would be required. In essence, there would be no visual indications of a treatment system except during the actual injection events.

Costs for the implementation of Alternative 3 are summarized in Table 5-4. As indicated in the table, the total remediation cost is estimated at $760,000. This estimate includes a 15% contingency fee built into the base cost. Assuming accuracy in the estimate of +/-20%, costs for implementation of Alternative 3 are projected to be in the range of $608,000 to $912,000.

Capital costs including construction, equipment, design, permits, and start-up costs were estimated to be approximately $189,000, the vast majority of which were related to injection well and monitoring point installation, design fees, and injection equipment. Annual O&M costs including operating labor, materials / chemicals, energy and utility costs, waste disposal, analytical fees, engineering oversight, and reporting were estimated at $242,000 per year assuming two injection events per year over a 2-year period. To remain conservative, a two-year O&M period was assumed. Using this assumption and accounting for the time value of money, total O&M costs for the two-year period were projected to be approximately $471,900 dollars. It is possible that the O&M period will be reduced to less than 1 year if the reaction proceeds as anticipated based upon experiences at other similar sites. This cost estimate includes quarterly status reports and annual groundwater monitoring at selected wells.

Based upon the evaluation of all criteria, Alternative No. 3 is considered the leading candidate technology for implementation if pilot testing proves successful.

5.2.4 Groundwater Extraction and Treatment for Groundwater (Alternative 4)

5.2.4.1 Description of Alternative 4

After consideration of several groundwater extraction system layouts, a system consisting of three (3) groundwater extraction wells with a combined flow of approximately 1,400 gpm was evaluated to address shallow (and as a benefit of the layout, intermediate) groundwater. Upon completion of the remedy for shallow and intermediate groundwater by Pall, and the successful conclusion of remedial actions eliminating sources of contamination in the upgradient shallow, intermediate, and deep groundwater zones by upgradient responsible parties, Pall will evaluate the need for further active or passive remedial actions, including such actions as may be necessary to address any contamination remaining in the deep groundwater zone on its property. The details for any future actions would have to be developed in coordination with the NYSDEC and upgradient responsible parties. The conceptual layout of the groundwater extraction system evaluated as Alternative No. 4 is presented in Figure 5-3A. A process schematic showing the key elements of the evaluated pump and treat remedy is provided in Figure 5-3B.

The evaluated system of groundwater recovery wells would be sized to provide hydraulic control within the upper and as a consequence of drawdown, intermediate, groundwater zone. The extraction wells would likely be up to 55 feet in depth and screened through both zones from 5 to 55 feet below grade. At the Pall site, the primary objective of the Pump and Treat system would be to control ground water flow off the site through groundwater removal and subsequent treatment (most likely consisting of air stripping and GAC adsorption plus any necessary filtration and pre-treatment processes) to remove contaminants. The down well pumps would pump the groundwater to the equipment compound for removal of the contaminants prior to discharge. Discharge either would have to be to Glen Cove Creek, the municipal sewer system, or reinjected back on-site. Under either of these options, groundwater discharge would be problematic. Conservative estimates from modeling indicate that in excess of 3,000 gpm per well (close to 10,000 gpm pumping for the three wells considered for this alternative) will be necessary for complete shallow dewatering of the site. Since this is not a realistic flow rate, very aggressive pump and treat approaches are not considered feasible. A more realistic approach would be to pump at the rate historically pumped at the municipal well field adjacent to the site (i.e., approximately 1,400 gpm). This is considered the maximum, reasonable flow rate that could be effectively treated given the size and layout of the site, and the availability of treatment equipment. Site-specific pump tests (and groundwater modeling) at high flow rates would have to be performed prior to detailed design to verify the cone of influence of the extraction wells and the ability to dewater the area of concern with the conceptual well layout.

It should be noted that a flow rate of 1,400 gpm on the Pall site may impact the municipal well capacity at Carney Street and may not be viewed favorably by the City of Glen Cove. Therefore, a possible alternative to the installation of new recovery wells at the Pall site would be to use the existing municipal supply well system at Carney Street with the addition of a VOC water treatment system (e.g., air stripping and/or carbon adsorption). This approach would essentially also initiate intermediate and deep groundwater remediation. However, it is probable that treatment would be required beyond the five year O&M period considered reasonable by the FS design basis and negotiations, including allocations of costs, with the City of Glen Cove and other responsible parties would be necessary before this approach could be implemented.

5.2.4.2 Evaluation of Alternative No. 4

As indicated in Table 5-1, Groundwater Extraction and Treatment (Pump and Treat) is not a desirable alternative for this site due to the massive quantity of dewatering (i.e., high flow requirements), extended operating time requirements (likely greater than 10 years), and the less than successful history for permanent reductions of contaminants using "pump and treat" as the primary remedial approach.

As indicated in Table 5-1, the individual evaluation criteria did not yield a favorable ranking for Pump and Treat. Pump and Treat is capable of meeting SCGs only after decades of operation and maintenance. In the short term, SCGs such as groundwater quality standards would not be met. Therefore, short-term effectiveness would have to be considered poor. Continued operation of this alternative will be protective of human health and the environment primarily because hydraulic control will be established for shallow and intermediate groundwater and the total mass of contaminants removed will increase with time. Consequently, long-term effectiveness would be relatively high. Although, the Pump and Treat alternative will result in the reduction of toxicity, mobility, and volume because of the removal of the groundwater as it comes under the influence of the recovery wells, the rate of removal of contaminant mass will be very slow relative to other more aggressive remedial technologies.

Pump and Treat can be implemented at the Pall site; however, the long operation and maintenance time and the discharge of copious amounts of groundwater could make discharge treatment and permitting difficult. In addition, the water treatment equipment needed would be considerable (e.g., large size air strippers and GAC vessels would likely be required). The costs of Pump and Treat are estimated at $11.6 million assuming an operation period of 20 years. Even if a more aggressive O&M period of ten years is assumed, the total remediation costs using a groundwater extraction remedy (i.e., $8.3 million) would still be prohibitive. A breakdown of the costs for Alternative No. 4 is presented in Table 5-5.

Due to the poor effectiveness and implementability ranking of Pump and Treat relative to the other technologies considered and the extremely high costs of this alternative, groundwater extraction and treatment is not recommended at this site.

5.2.5 Thermal Desorption – (Possible enhancement to Alternatives 2, 3, or 4)

Although thermal technologies were not evaluated as a primary remediation approach, thermal enhancements to the technologies described for Alternative 2 , and to a lesser degree Alternative 3, may expedite remediation and allow remediation to lower concentrations of contaminants.

Steam injection has been proven to work well when used in conjunction with air sparging systems . The addition of steam lowers the vapor pressure of contaminants and increases volatility, thereby making capture of contaminant mass in the vapor phase much more efficient. In addition, certain oxidation reactions kinetics are enhanced through the addition of heat to the reaction.

Based upon the existing data, it is likely that thermal enhancements will not be necessary to meet remedial objectives. However, thermal enhancements can be considered later if the design basis changes or in the unlikely event that the recommended technologies are not demonstrated to be effective after pilot testing.

6.0 CONCLUSIONS AND RECOMMENDATIONS

This section presents the conclusions of the FS and the recommended steps for completion of remedial activities and ultimate regulatory closure of the site.

6.1 Remedial Technology Selection and Implementation

After thoroughly evaluating remedial alternatives, Pall recommends that *in-situ* chemical oxidation (e.g., potassium or sodium permanganate injection) be implemented as the remedy for the site as outlined in Alternative No. 3. Prior to finalizing the selected remedy, a comprehensive pilot study must be initiated to ensure that the short-term and long-term effectiveness of *in-situ* chemical oxidation is consistent with remedial objectives. The pilot test will focus on the ability to achieve adequate *in-situ* mixing and determination of the proper dosing of permanganate to ensure that the contaminants of concern are addressed. The actual, site-specific, radius of influence of the permanganate injection well and the potential for long-term fouling of the injection wells should also be evaluated as part of the permanganate pilot test.

If the in-situ chemical oxidation pilot test proves effective, Pall recommends that a full-scale remedial design be prepared. If the *in-situ* chemical oxidation pilot test proves that the technology is not sufficiently effective, a contingent remedy of AS/SVE (Alternative 2) is recommended. Although pilot testing for AS/SVE would still be required to evaluate sparge system design parameters, the large body of work performed using AS/SVE at similar sites, and the preliminary data obtained from SVE pilot testing at Pall, makes it highly likely that AS/SVE would prove effective.

Remedial alternatives 1 and 4 should not receive further consideration at this time based upon the detailed evaluation of alternatives.

6.2 Pilot Testing and Remedial Design

Pilot testing for *in-situ* chemical oxidation would be initiated with the submittal of a pilot test work plan to the NYSDEC. The results of the pilot test will be submitted to the NYSDEC to assist them in selecting the final remedy for on-site groundwater contamination.

Full-scale remedial design would likely be initiated after the NYSDEC issues a Record of Decision, which will select a final remedy for on-site groundwater.

6.3 Remedy Implementation

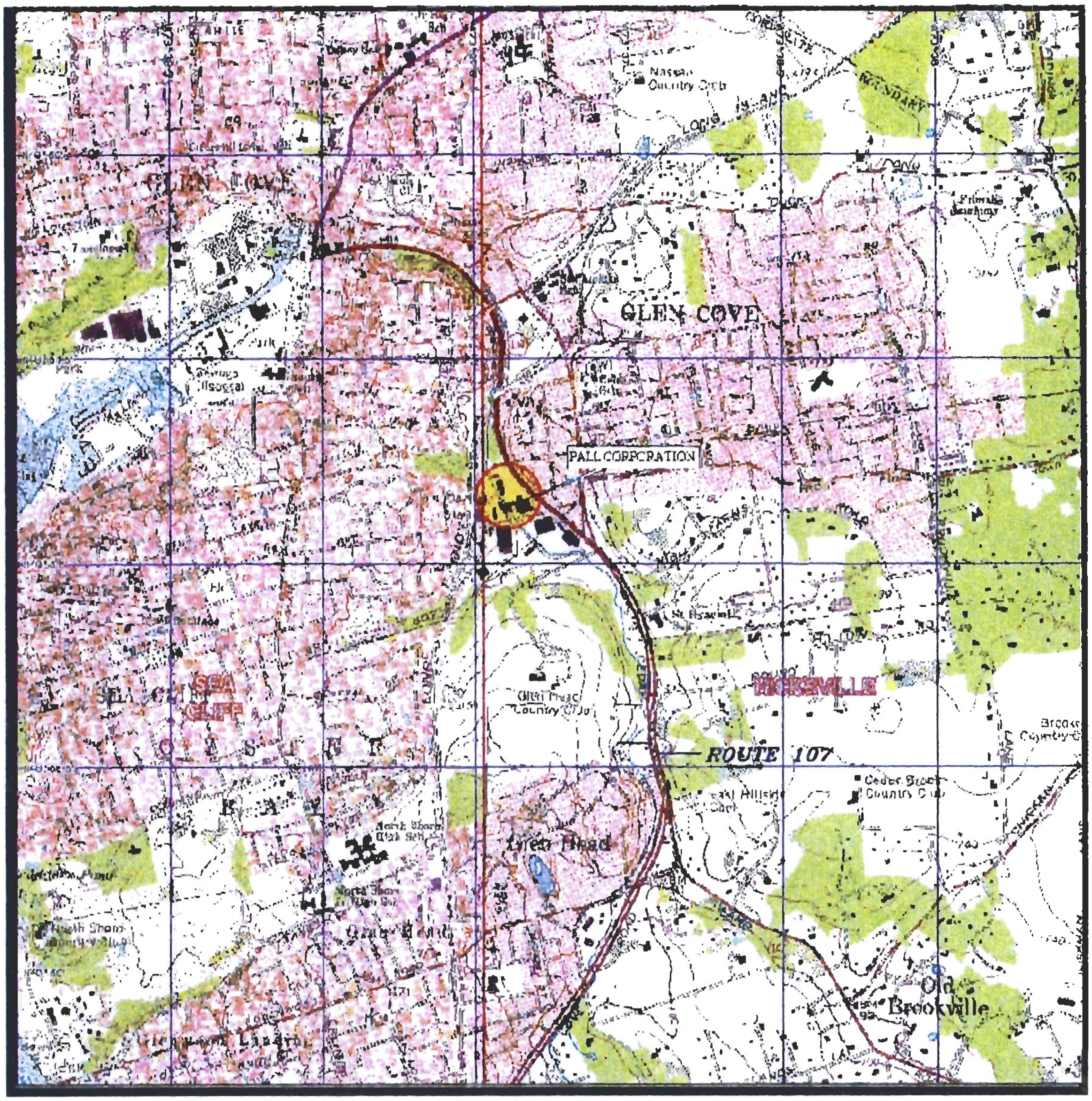
The final remedy would be implemented in accordance with the detailed remedial design following review by the agency and concerned parties. If the NYSDEC selects *in-situ* chemical oxidation as the on-site groundwater remedy for this site, the potassium permanganate, *in-situ* chemical oxidation system is anticipated to be constructed in a period of 3 months and injection events are planned to be completed periodically within a year or two. The actual duration of "O&M" (i.e., the secondary injection events and post-injection monitoring and data collection) would be dependent upon the effectiveness of the initial potassium permanganate injection events and the implementation of upgradient remedies initiated by others.

6.4 Remediation System Shut-Down and Closure

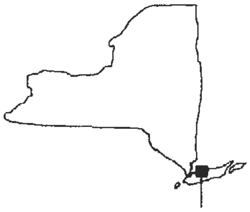
Once the *in-situ* chemical oxidation system has been implemented and closure objectives have been achieved, the remediation system will be shut-down and groundwater monitoring will be continued to determine if rebound of contaminants is evident at levels exceeding closure objectives. If necessary, the injection events will be re-started until it is determined that continued remediation will no longer result in any significant mass removal or until no further rebound of contaminants above closure objectives is occurring.

After final permanganate injection events, groundwater underlying the site would be monitored quarterly for the first year and annually thereafter until the groundwater meets SCGs or until cessation of post-shutdown monitoring is approved by the NYSDEC. .

FIGURES



SOURCE: U.S.G.S. TOPOGRAPHIC QUADRANGLE
DELORME 3D TOPOQUADS
7.5 MINUTE SERIES



QUADRANGLE LOCATION

SCALE 1:24,000

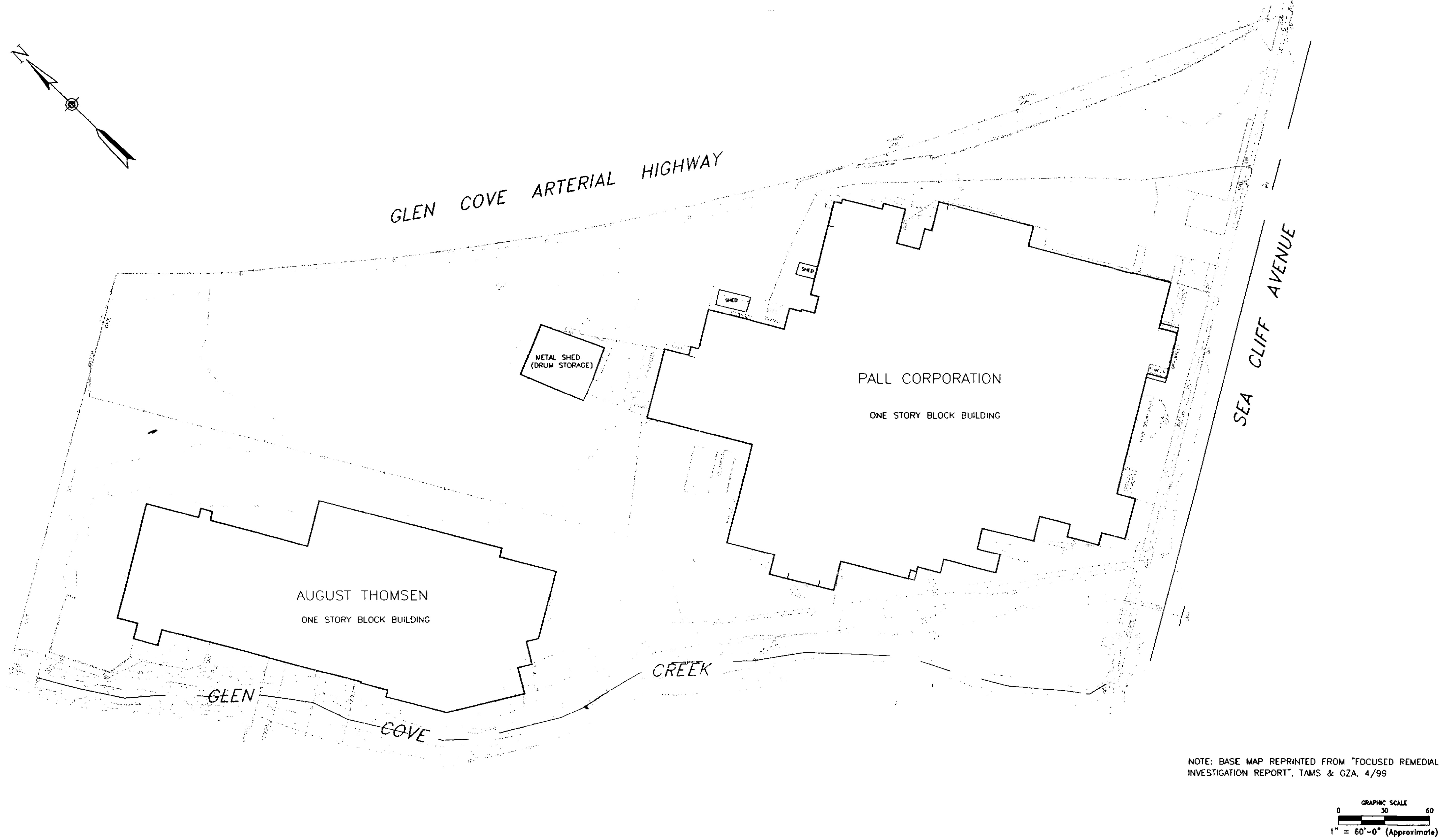
ENVIRO-SCIENCES, INC.
312 E. MAIN STREET
PATCHOGUE, N.Y. 11772
PHONE: (631) 207-9005

PALL CORPORATION
30 SEA CLIFF AVENUE
GLEN COVE, NEW YORK

SITE LOCATION MAP

FIGURE:
1-1

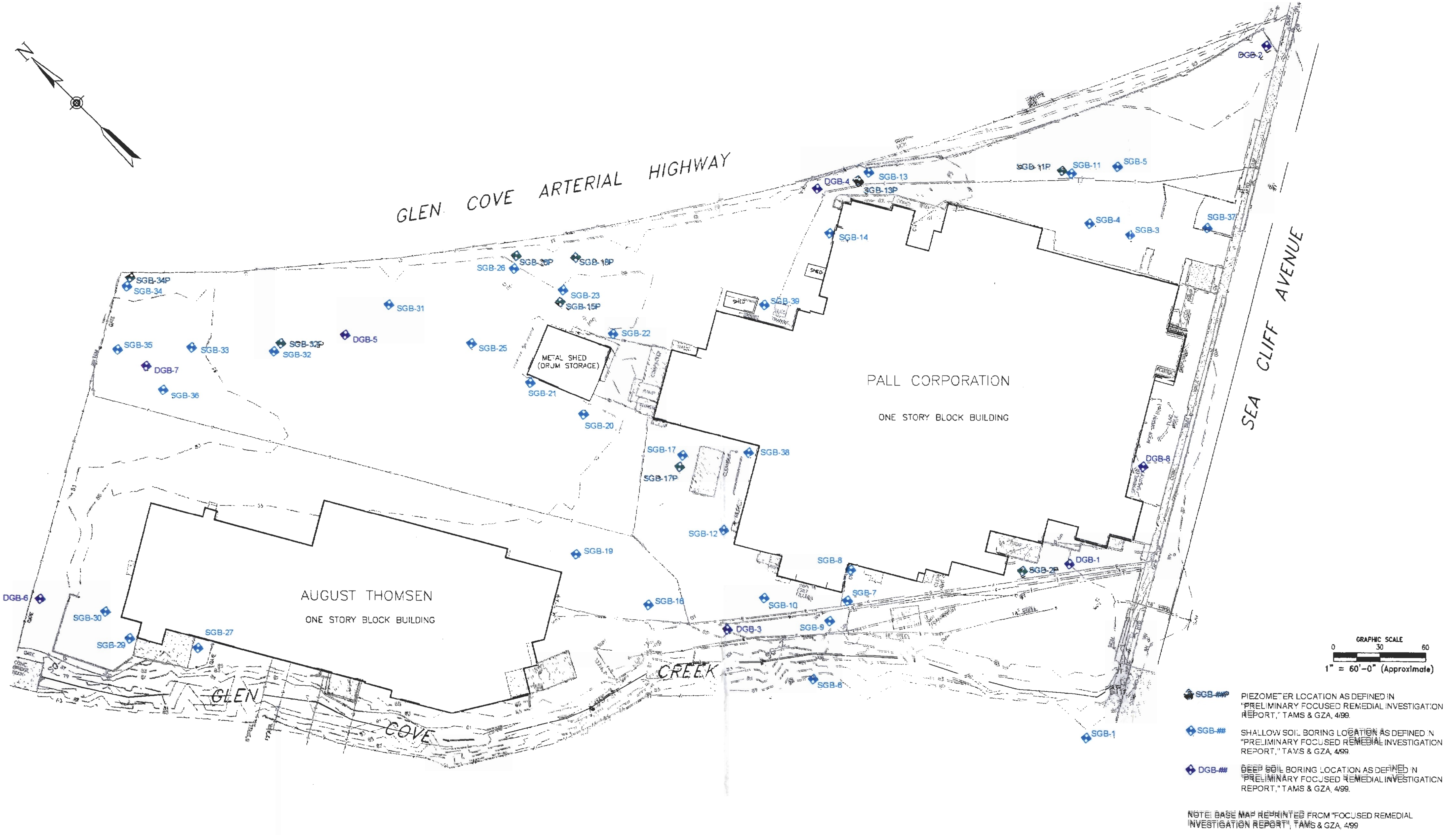
DRAWN BY		JOB No.	PM	DRAWING NUMBER	PALLSLOC.DWG
TS	6/28/01	MT&E/PALL	DS		



NOTE: BASE MAP REPRINTED FROM "FOCUSED REMEDIAL INVESTIGATION REPORT", TAMS & GZA, 4/99

ENVIRO-SCIENCES, INC. 312 EAST MAIN STREET PATCHOGUE, NEW YORK 11772 PHONE: 631-207-9005 FAX: 631-207-3614	PALL Pall Corporation 30 Sea Cliff Avenue Glen Cove, New York 11542	Pall Corp. / August Thomsen Site Plan	DATE: 03/09/00 REV. NO. 1 PROJECT NO. MT&E-PALL-M371	DRAWN: DJS DESIGNED: DJS FILE: FIGURE1-2.DWG

FIGURE:
1-2



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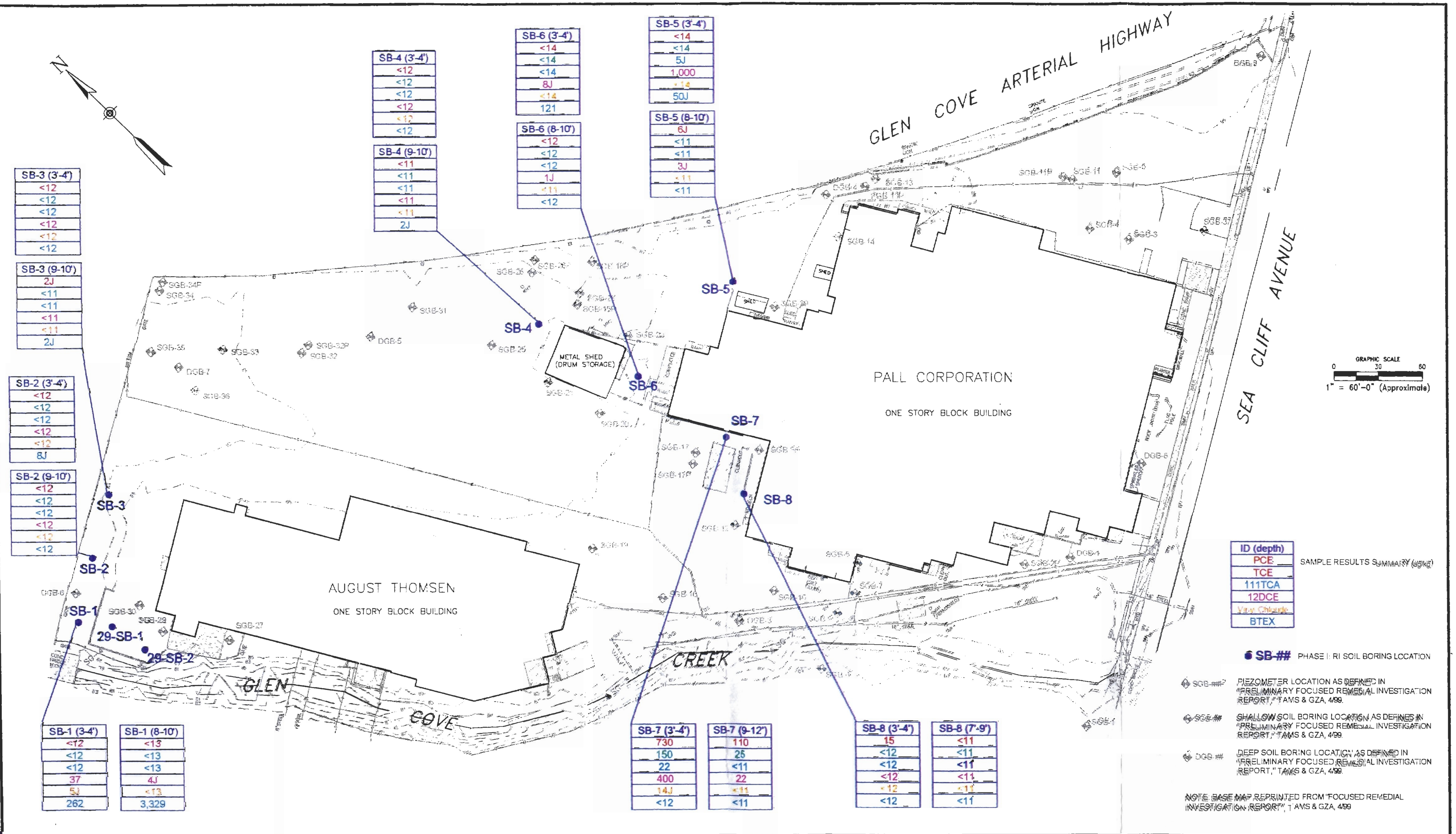
PALL

Pall Corporation
30 Sea Cliff Avenue
Glen Cove, New York 11542

NYSDEC Phase I Remedial Investigation Soil Boring Locations

DATE: 3/12/00	DRAWN: DJS	FIGURE:
REV. NO. 1	DESIGNED: DJS	3-1
PROJECT NO. MT&E-PALL-M371	FILE: FIGURE3-1 FS.DWG	



ID (depth)	SB-1 (3-4')	SB-1 (8-10')	SB-2 (3'-4')	SB-2 (9-10')	SB-3 (3'-4')	SB-3 (9-10')	SB-4 (3'-4')	SB-4 (9-10')	SB-5 (3'-4')	SB-5 (8-10')	SB-6 (3'-4')	SB-6 (8-10')	SB-7 (3'-4')	SB-7 (9-12')	SB-8 (3'-4')	SB-8 (7'-9')
PCE	<12	<13	<12	<12	<12	2J	<12	<11	<14	6J	<14	<12	730	110	15	<11
TCE	<12	<13	<12	<12	<12	<11	<12	<11	<14	<11	<14	<12	150	25	<12	<11
111TCA	<12	<13	<12	<12	<12	<11	<12	<11	5J	<11	<14	<12	22	<11	<12	<11
12DCE	37	4J	<12	<12	<12	<11	<12	<11	1,000	3J	8J	1J	400	22	<12	<11
Vinyl Chloride	5J	<13	<12	<12	<12	<11	<12	<11	<14	<11	<14	<11	14J	<11	<12	<11
BTEX	262	3,329	8J	<12	<12	2J	<12	2J	50J	<11	121	<12	<12	<11	<12	<11

SAMPLE RESULTS SUMMARY (ug/kg)

● SB-## PHASE II RI SOIL BORING LOCATION

SGB-##P PIEZOMETER LOCATION AS DEFINED IN "PRELIMINARY FOCUSED REMEDIAL INVESTIGATION REPORT," TAMS & GZA, 4/99.

SGB-## SHALLOW SOIL BORING LOCATION AS DEFINED IN "PRELIMINARY FOCUSED REMEDIAL INVESTIGATION REPORT," TAMS & GZA, 4/99.

DGB-## DEEP SOIL BORING LOCATION AS DEFINED IN "PRELIMINARY FOCUSED REMEDIAL INVESTIGATION REPORT," TAMS & GZA, 4/99.

NOTE: BASE MAP REPRINTED FROM "FOCUSED REMEDIAL INVESTIGATION REPORT", TAMS & GZA, 4/99

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PALL
Pall Corporation
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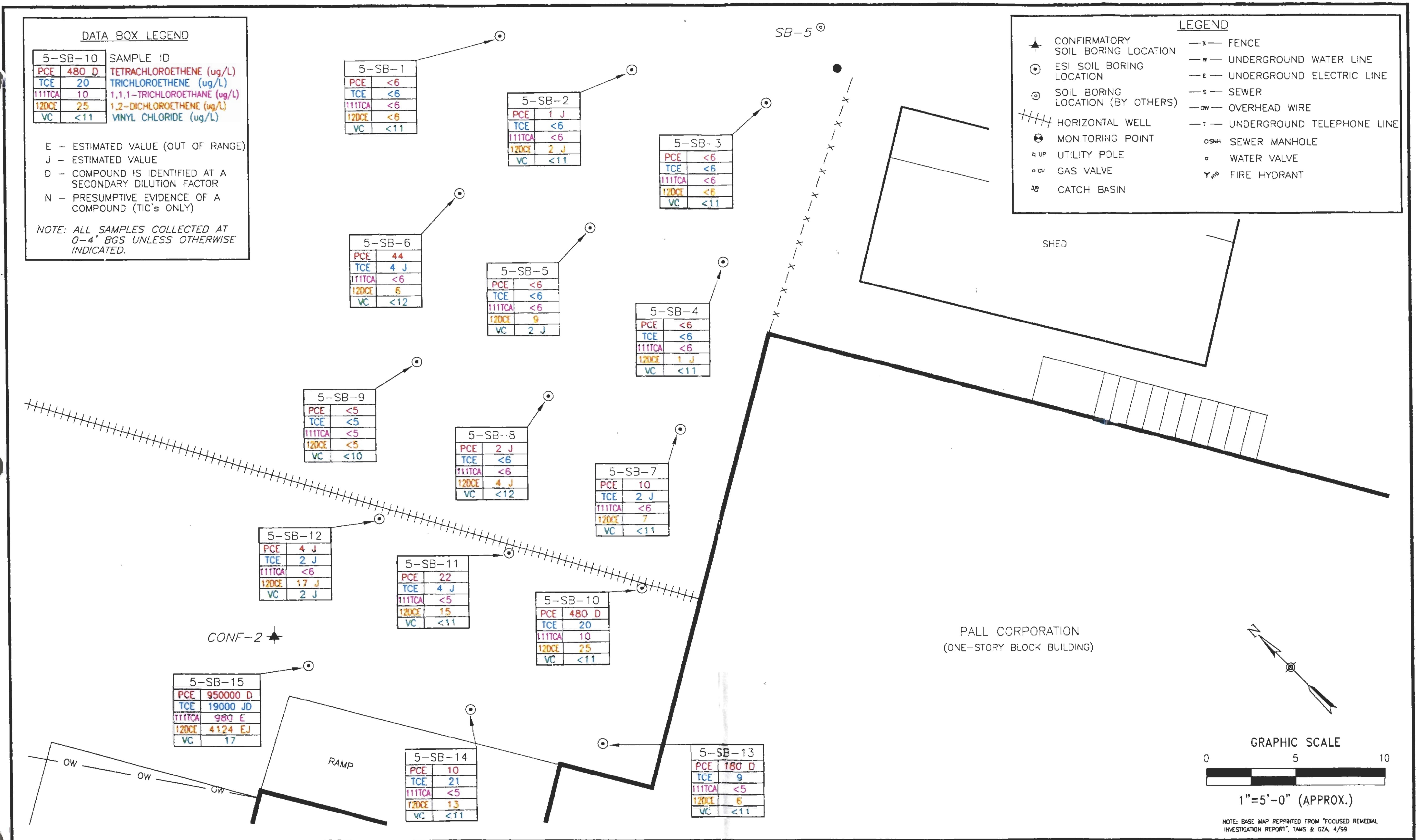
Glen Cove, New York 11542

Phase II Soil Investigation Results
(VOC Summary)

DATE:	3/17/00	DRAWN:	DJS	FIGURE:
REV. NO.	1	DESIGNED:	DJS	3-2
PROJECT NO.	MT&E-PALL-M371	FILE:	FIGURE3-2FS.DWG	



DATA BOX LEGEND

5-SB-10		SAMPLE ID
PCE	480 D	TETRACHLOROETHENE (ug/L)
TCE	20	TRICHLOROETHENE (ug/L)
111TCA	10	1,1,1-TRICHLOROETHANE (ug/L)
12DCE	25	1,2-DICHLOROETHENE (ug/L)
VC	<11	VINYL CHLORIDE (ug/L)

E – ESTIMATED VALUE (OUT OF RANGE)
J – ESTIMATED VALUE
D – COMPOUND IS IDENTIFIED AT A SECONDARY DILUTION FACTOR
N – PRESUMPTIVE EVIDENCE OF A COMPOUND (TIC's ONLY)

NOTE: ALL SAMPLES COLLECTED AT 0–4' BGS UNLESS OTHERWISE INDICATED.

LEGEND

CONFIRMATORY SOIL BORING LOCATION	—x— FENCE
ESI SOIL BORING LOCATION	—w— UNDERGROUND WATER LINE
SOIL BORING LOCATION (BY OTHERS)	—E— UNDERGROUND ELECTRIC LINE
HORIZONTAL WELL	—S— SEWER
MONITORING POINT	—OW— OVERHEAD WIRE
UP UTILITY POLE	—T— UNDERGROUND TELEPHONE LINE
GV GAS VALVE	SMH SEWER MANHOLE
CB CATCH BASIN	WATER VALVE
	FH FIRE HYDRANT

5-SB-1	
PCE	<6
TCE	<6
111TCA	<6
12DCE	<6
VC	<11

5-SB-2	
PCE	1 J
TCE	<6
111TCA	<6
12DCE	2 J
VC	<11

5-SB-3	
PCE	<6
TCE	<6
111TCA	<6
12DCE	<6
VC	<11

5-SB-6	
PCE	44
TCE	4 J
111TCA	<6
12DCE	6
VC	<12

5-SB-5	
PCE	<6
TCE	<6
111TCA	<6
12DCE	9
VC	2 J

5-SB-4	
PCE	<6
TCE	<6
111TCA	<6
12DCE	1 J
VC	<11

5-SB-9	
PCE	<5
TCE	<5
111TCA	<5
12DCE	<5
VC	<10

5-SB-8	
PCE	2 J
TCE	<6
111TCA	<6
12DCE	4 J
VC	<12

5-SB-7	
PCE	10
TCE	2 J
111TCA	<6
12DCE	7
VC	<11

5-SB-12	
PCE	4 J
TCE	2 J
111TCA	<6
12DCE	17 J
VC	2 J

5-SB-11	
PCE	22
TCE	4 J
111TCA	<5
12DCE	15
VC	<11

5-SB-10	
PCE	480 D
TCE	20
111TCA	10
12DCE	25
VC	<11

5-SB-15	
PCE	950000 D
TCE	19000 JD
111TCA	980 E
12DCE	4124 EJ
VC	17

5-SB-14	
PCE	10
TCE	21
111TCA	<5
12DCE	13
VC	<11

5-SB-13	
PCE	180 D
TCE	9
111TCA	<5
12DCE	6
VC	<11

NOTE: BASE MAP REPRINTED FROM "FOCUSED REMEDIAL INVESTIGATION REPORT", TAMS & GZA, 4/99

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AREA SB5
Soil Sample Results Summary
(Samples Collected August 1999)

DATE:	06/12/01	DRAWN:	TRS	FIGURE:	3-3
REV. NO.	-	DESIGNED:	DJS		
PROJECT NO.	MT&E-PALL-M371	FILE:	PALLSB5C.DWG		

DATA BOX LEGEND

CONF-2		SAMPLE ID
PCE	15	TETRACHLOROETHENE (ug/L)
TCE	44	TRICHLOROETHENE (ug/L)
111TCA	8 J	1,1,1-TRICHLOROETHANE (ug/L)
12DCE	130	1,2-DICHLOROETHENE (ug/L)
VC	4 J	VINYL CHLORIDE (ug/L)

E – ESTIMATED VALUE (OUT OF RANGE)
J – ESTIMATED VALUE
D – COMPOUND IS IDENTIFIED AT A SECONDARY DILUTION FACTOR
N – PRESUMPTIVE EVIDENCE OF A COMPOUND (TIC's ONLY)

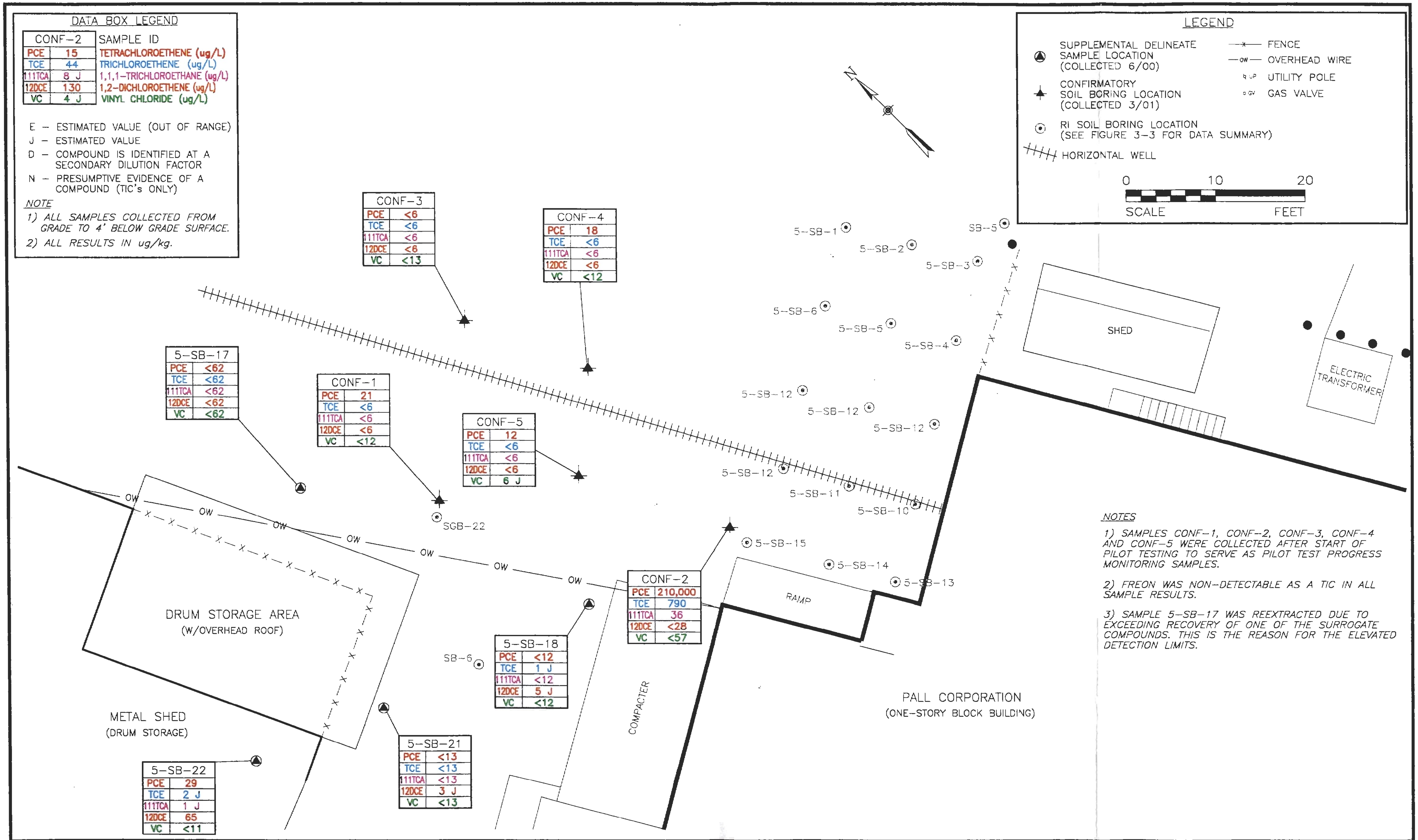
NOTE

1) ALL SAMPLES COLLECTED FROM GRADE TO 4' BELOW GRADE SURFACE.

2) ALL RESULTS IN ug/kg.

LEGEND

▲	SUPPLEMENTAL DELINEATE SAMPLE LOCATION (COLLECTED 6/00)
✦	CONFIRMATORY SOIL BORING LOCATION (COLLECTED 3/01)
⊙	RI SOIL BORING LOCATION (SEE FIGURE 3-3 FOR DATA SUMMARY)
┼┼┼┼	HORIZONTAL WELL
—x—	FENCE
—OW—	OVERHEAD WIRE
UP	UTILITY POLE
GV	GAS VALVE



SAMPLE ID	PCE	TCE	111TCA	12DCE	VC
CONF-3	<6	<6	<6	<6	<13
CONF-4	18	<6	<6	<6	<12
5-SB-17	<62	<62	<62	<62	<62
CONF-1	21	<6	<6	<6	<12
CONF-5	12	<6	<6	<6	6 J
CONF-2	210,000	790	36	<28	<57
5-SB-18	<12	1 J	<12	5 J	<12
5-SB-21	<13	<13	<13	3 J	<13
5-SB-22	29	2 J	1 J	65	<11

NOTES

1) SAMPLES CONF-1, CONF-2, CONF-3, CONF-4 AND CONF-5 WERE COLLECTED AFTER START OF PILOT TESTING TO SERVE AS PILOT TEST PROGRESS MONITORING SAMPLES.

2) FREON WAS NON-DETECTABLE AS A TIC IN ALL SAMPLE RESULTS.

3) SAMPLE 5-SB-17 WAS REEXTRACTED DUE TO EXCEEDING RECOVERY OF ONE OF THE SURROGATE COMPOUNDS. THIS IS THE REASON FOR THE ELEVATED DETECTION LIMITS.

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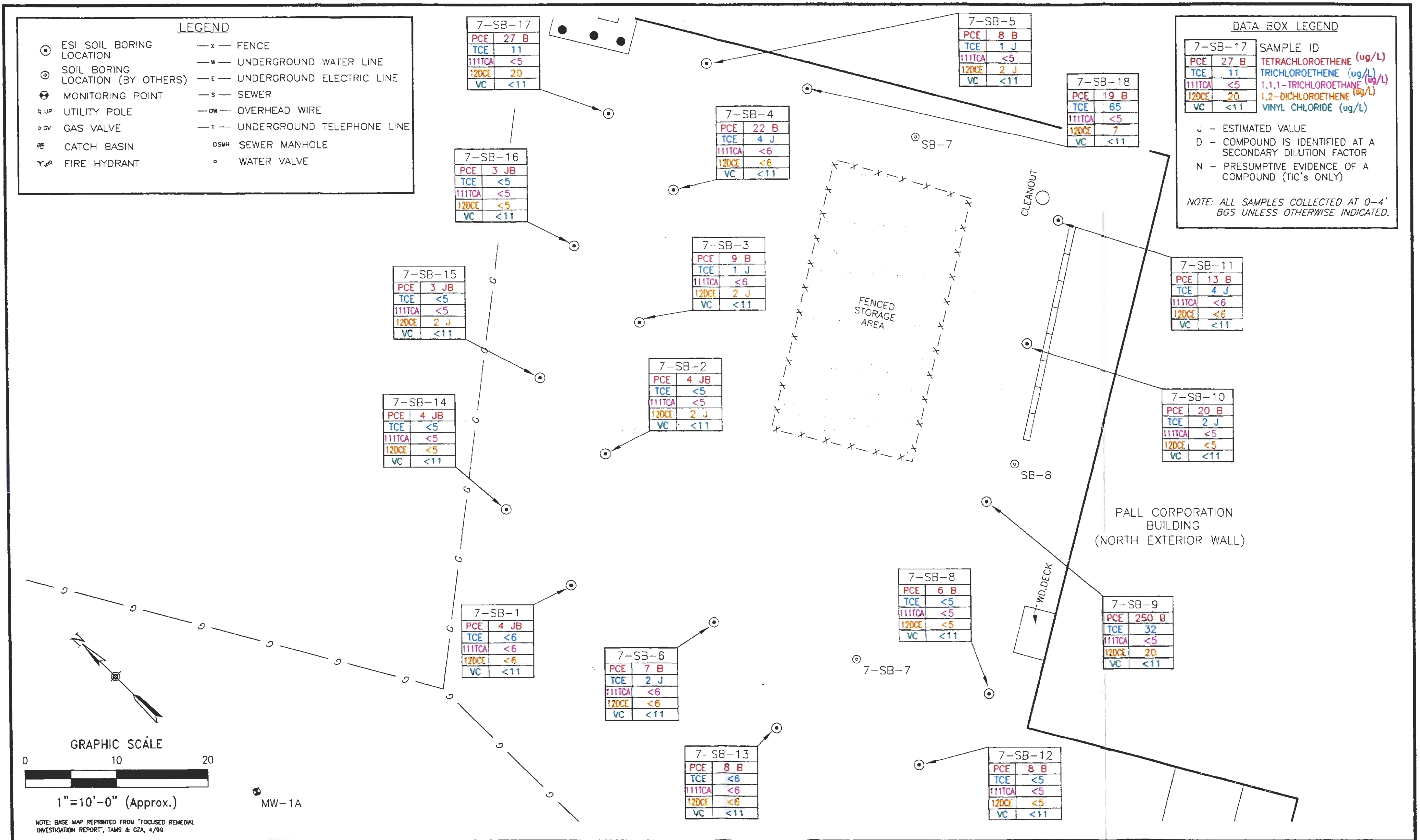
PILOT TEST SOIL SAMPLE RESULTS
(ADDITIONAL DELINEATION DATA)

DATE:	08/30/01	DRAWN:	TRS	FIGURE:	3-3A
REV. NO.	-	DESIGNED:	DJS		
PROJECT NO.	MT&E-PALL-M371	FILE:	PALLCF37A.DWG		



NOTE: BASE MAP REPRINTED FROM "FOCUSED REMEDIAL INVESTIGATION REPORT", TAMS & GZA, 4/99

DATA BOX LEGEND

7-SB-17		SAMPLE ID
PCE	27 B	TETRACHLOROETHENE (ug/L)
TCE	11	TRICHLOROETHENE (ug/L)
111TCA	<5	1,1,1-TRICHLOROETHANE (ug/L)
12DCE	20	1,2-DICHLOROETHENE (ug/L)
VC	<11	VINYL CHLORIDE (ug/L)

J – ESTIMATED VALUE
D – COMPOUND IS IDENTIFIED AT A SECONDARY DILUTION FACTOR
N – PRESUMPTIVE EVIDENCE OF A COMPOUND (TIC's ONLY)

NOTE: ALL SAMPLES COLLECTED AT 0–4' BGS UNLESS OTHERWISE INDICATED.

7-SB-17	
PCE	27 B
TCE	11
111TCA	<5
12DCE	20
VC	<11

7-SB-16	
PCE	3 JB
TCE	<5
111TCA	<5
12DCE	<5
VC	<11

7-SB-15	
PCE	3 JB
TCE	<5
111TCA	<5
12DCE	2 J
VC	<11

7-SB-14	
PCE	4 JB
TCE	<5
111TCA	<5
12DCE	<5
VC	<11

7-SB-5	
PCE	8 B
TCE	1 J
111TCA	<5
12DCE	2 J
VC	<11

7-SB-18	
PCE	19 B
TCE	65
111TCA	<5
12DCE	7
VC	<11

7-SB-4	
PCE	22 B
TCE	4 J
111TCA	<6
12DCE	<6
VC	<11

7-SB-3	
PCE	9 B
TCE	1 J
111TCA	<6
12DCE	2 J
VC	<11

7-SB-2	
PCE	4 JB
TCE	<5
111TCA	<5
12DCE	2 J
VC	<11

7-SB-11	
PCE	13 B
TCE	4 J
111TCA	<6
12DCE	<6
VC	<11

7-SB-10	
PCE	20 B
TCE	2 J
111TCA	<5
12DCE	<5
VC	<11

7-SB-1	
PCE	4 JB
TCE	<6
111TCA	<6
12DCE	<6
VC	<11

7-SB-6	
PCE	7 B
TCE	2 J
111TCA	<6
12DCE	<6
VC	<11

7-SB-8	
PCE	6 B
TCE	<5
111TCA	<5
12DCE	<5
VC	<11

7-SB-9	
PCE	250 B
TCE	32
111TCA	<5
12DCE	20
VC	<11

7-SB-13	
PCE	8 B
TCE	<6
111TCA	<6
12DCE	<6
VC	<11

7-SB-12	
PCE	8 B
TCE	<5
111TCA	<5
12DCE	<5
VC	<11

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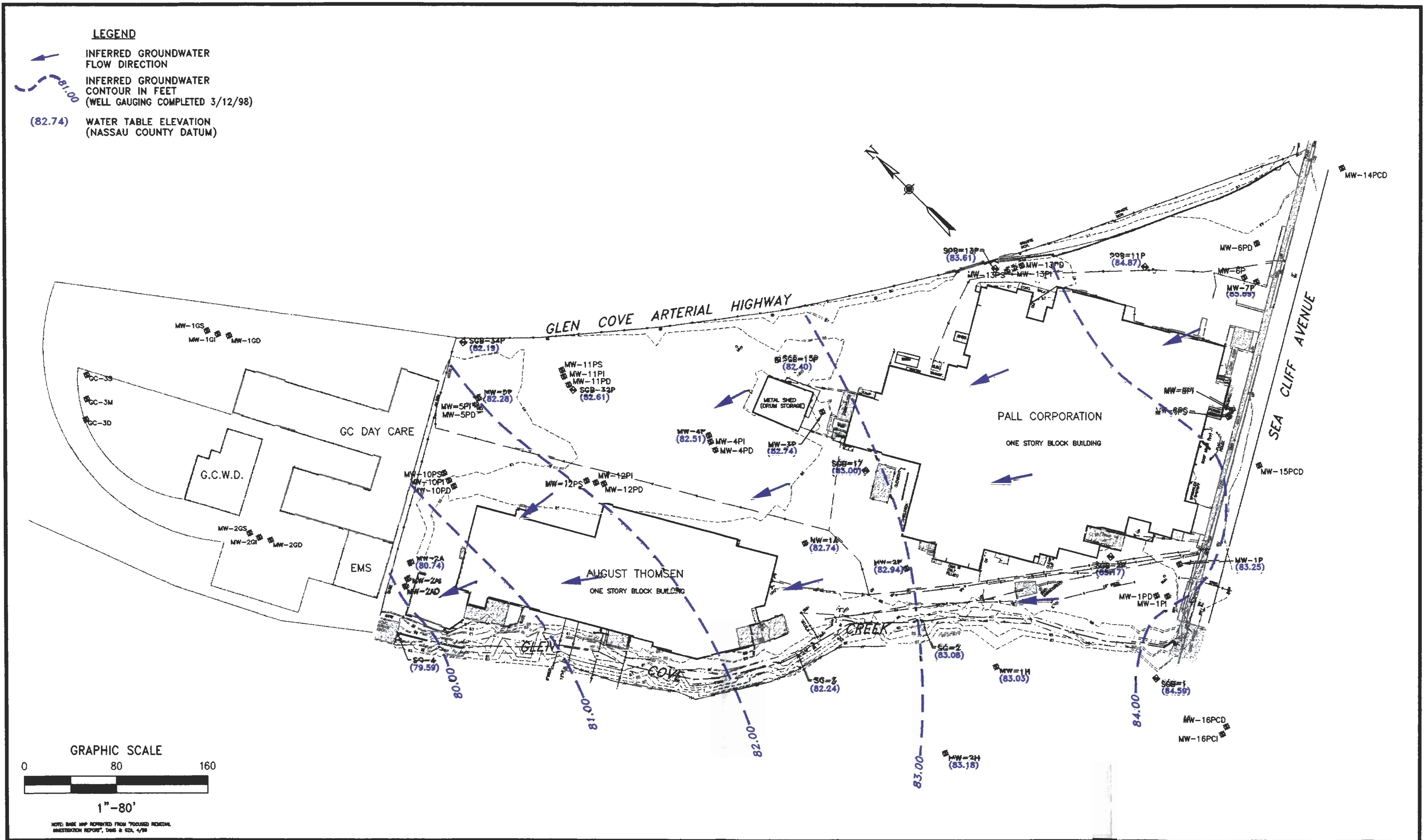
AREA SB7
Soil Sample Results Summary
(Samples Collected August 1999)

DATE:	06/15/01	DRAWN:	TRS	FIGURE:	3-4
REV. NO.	-	DESIGNED:	DJS		
PROJECT NO.	MT&E-PALL-M371	FILE:	PALLSB7.DWG		



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Title:
SHALLOW GROUNDWATER ELEVATION CONTOURS AND FLOW DIRECTION
(Phase I RI Data Collected 3/12/98)

Date:	10/24/01	Drawn:	TRS
Rev. No.:	-	Designed:	DJS
Project No.:	MT&E-PALL-M371	File:	DECGW2-26.dwg

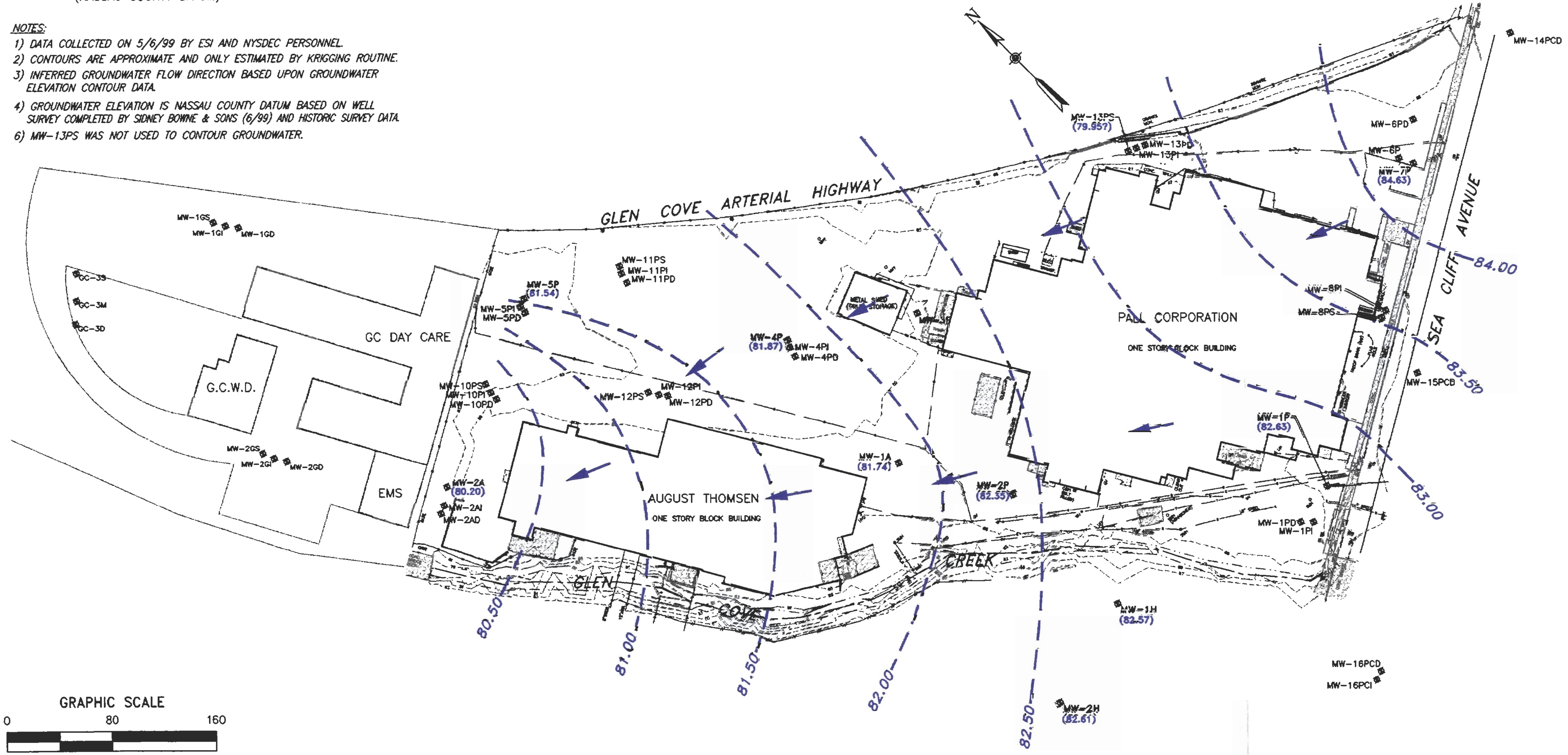
Figure:
3-5

LEGEND

- INFERRED GROUNDWATER FLOW DIRECTION
- 81.00 INFERRED GROUNDWATER CONTOUR IN FEET (WELL GAUGING COMPLETED 3/12/98)
- (82.74) WATER TABLE ELEVATION (NASSAU COUNTY DATUM)

NOTES:

1) *DATA COLLECTED ON 5/6/99 BY ESI AND NYSDEC PERSONNEL.*
2) *CONTOURS ARE APPROXIMATE AND ONLY ESTIMATED BY KRIGGING ROUTINE.*
3) *INFERRED GROUNDWATER FLOW DIRECTION BASED UPON GROUNDWATER ELEVATION CONTOUR DATA.*
4) *GROUNDWATER ELEVATION IS NASSAU COUNTY DATUM BASED ON WELL SURVEY COMPLETED BY SIDNEY BOWNE & SONS (6/99) AND HISTORIC SURVEY DATA.*
6) *MW-13PS WAS NOT USED TO CONTOUR GROUNDWATER.*



GRAPHIC SCALE

0 80 160

1"-80'

NOTE: BASE MAP REPRINTED FROM "FOCUSED REMEDIAL INVESTIGATION REPORT", TAMS & GZA, 4/99

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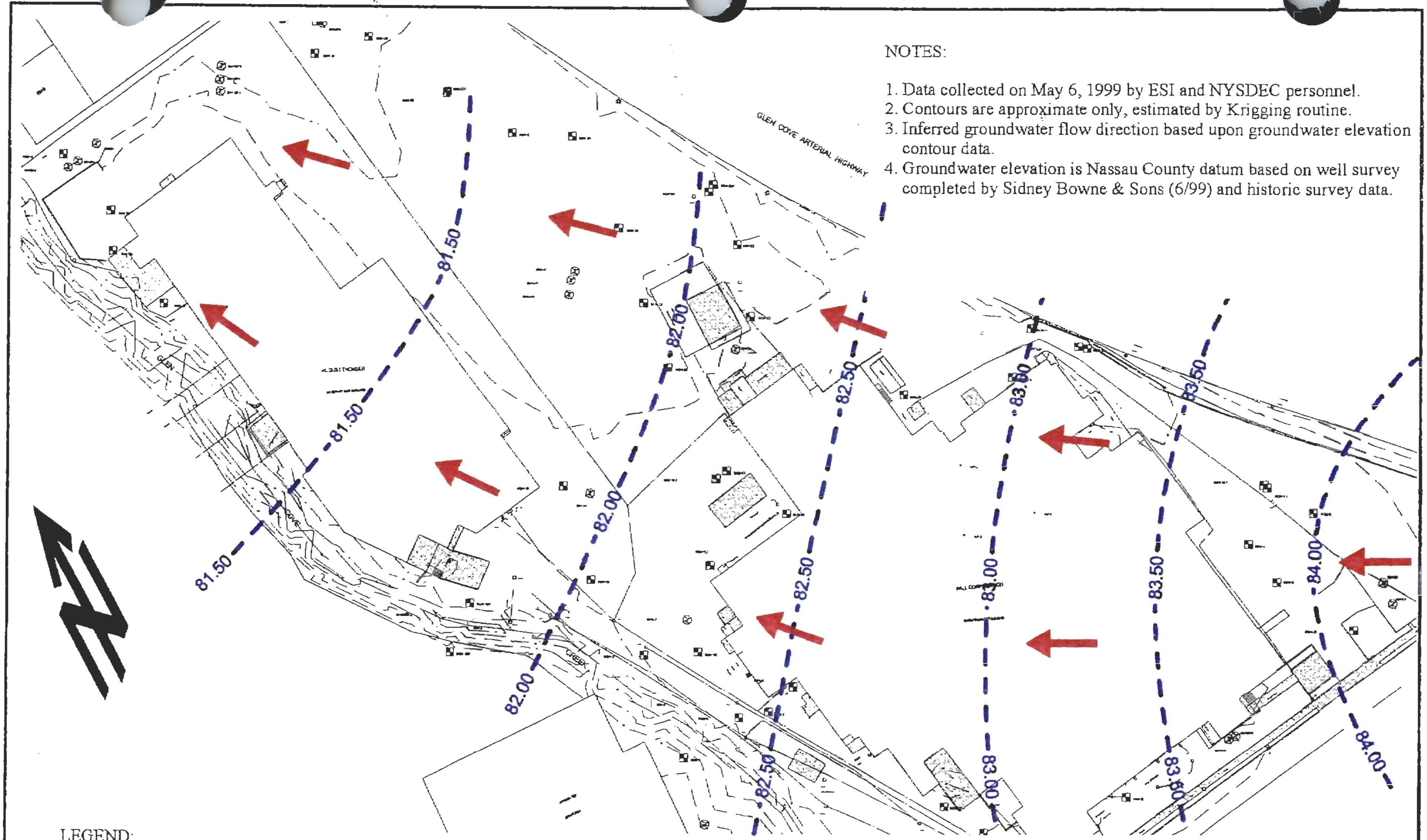
Title:
GROUNDWATER ELEVATION CONTOURS
SHALLOW GROUNDWATER ZONE
(Data Collected 5/6/99)

Date: 10/24/01	Drawn: TRS	Figure:
Rev. No.: -	Designed: DJS	3-6
Project No.: MT&E-PALL-M371	File: SHGW0506.dwg	



NOTES:

1. Data collected on May 6, 1999 by ESI and NYSDEC personnel.
2. Contours are approximate only, estimated by Krigging routine.
3. Inferred groundwater flow direction based upon groundwater elevation contour data.
4. Groundwater elevation is Nassau County datum based on well survey completed by Sidney Bowne & Sons (6/99) and historic survey data.

LEGEND:

← Inferred groundwater flow direction (approximate)

- - - - Inferred constant groundwater elevation contour (approximate)

0 ft 40 ft 80 ft 120 ft 160 ft

Approximate Scale in Feet

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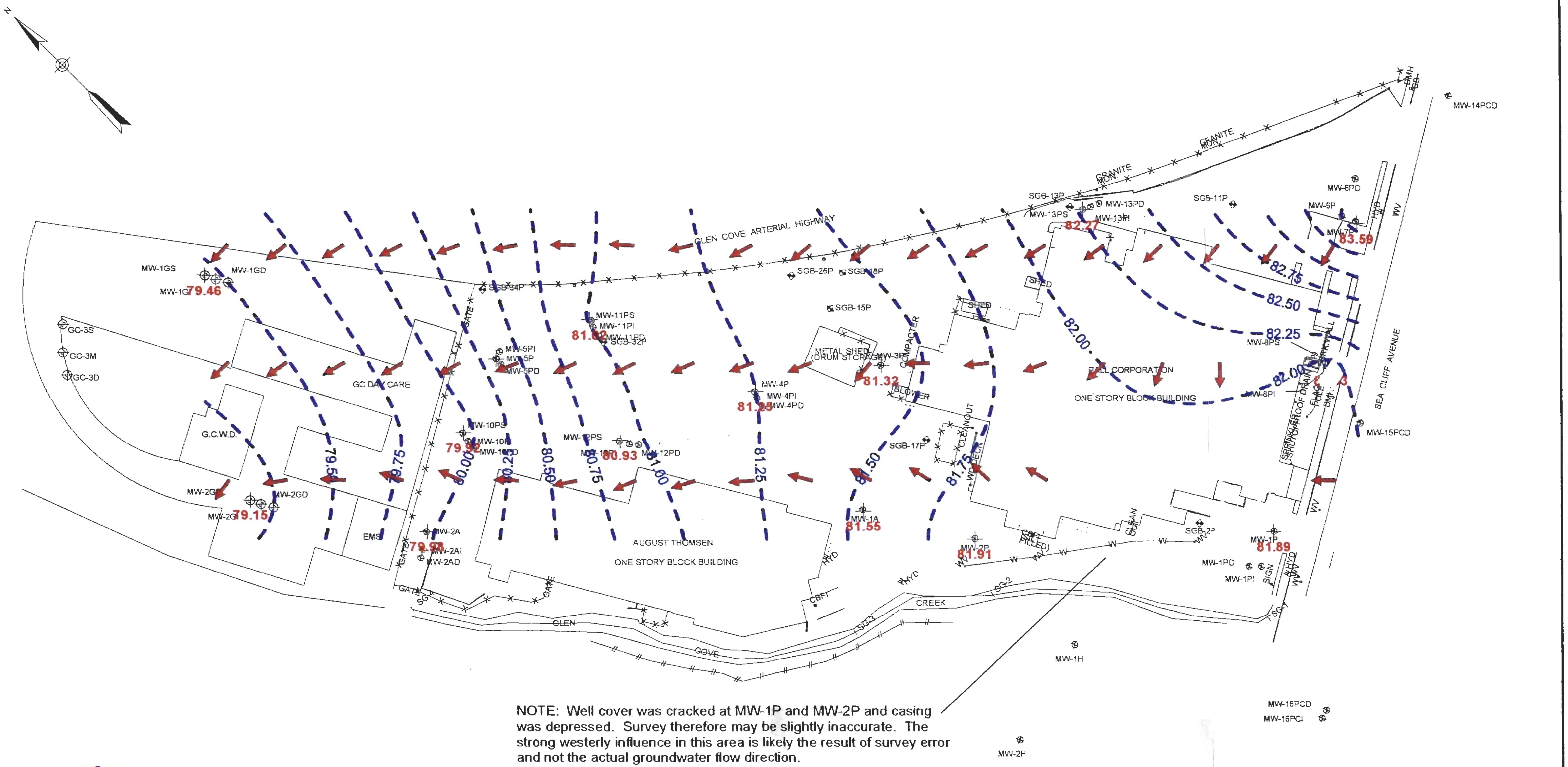
Groundwater Elevation Contours
(Deep Groundwater Zone, Data Collected 5/6/99)

Date: July 19, 1999 | Client / Project: MT&E-PALL | Drawing: DPGW0506.SRF



NOTE: Well cover was cracked at MW-1P and MW-2P and casing was depressed. Survey therefore may be slightly inaccurate. The strong westerly influence in this area is likely the result of survey error and not the actual groundwater flow direction.

- - - - -	Potentiometric Surface (ft)
↑	Inferred GW Flow Direction

0 20 40 60 80
Approximate Scale (ft)

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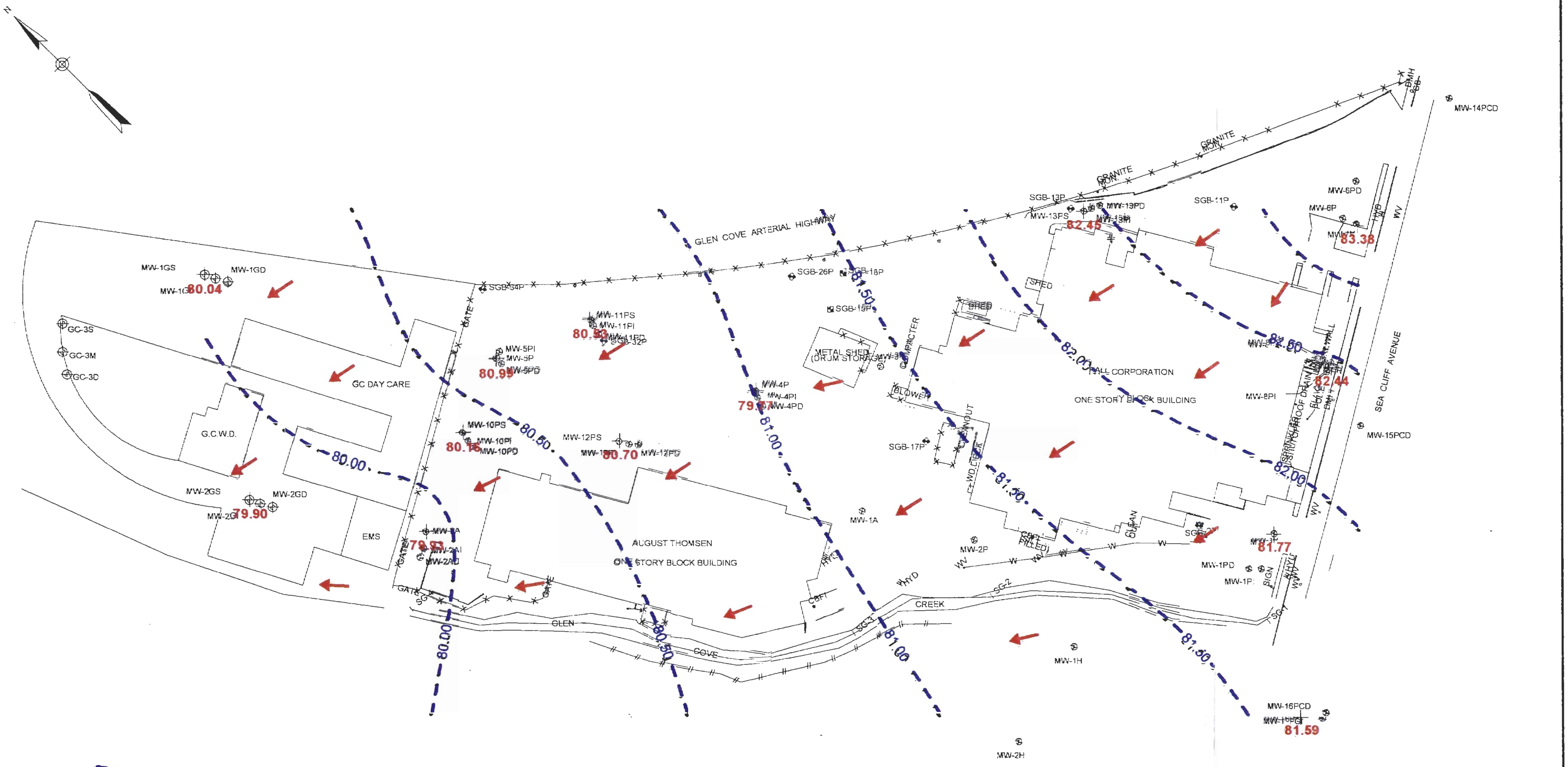
Groundwater Elevation Contours
(Shallow Groundwater Zone, Data Collected 01/00)

Date: Apr. 05, 1999 Drawn: DJS	Client / Project: MT&E-PALL Proj. No.: M37104	Drawing: SHGW0100.SRF Figure No: 3-8



Potentiometric Surface (ft)

Inferred GW Flow Direction

0 20 40 60 80
Approximate Scale (ft)

NOTE: MW-4PI gauging data was not used in development of the intermediate groundwater potentiometric surface map because the gauging data is believed to be inaccurate.

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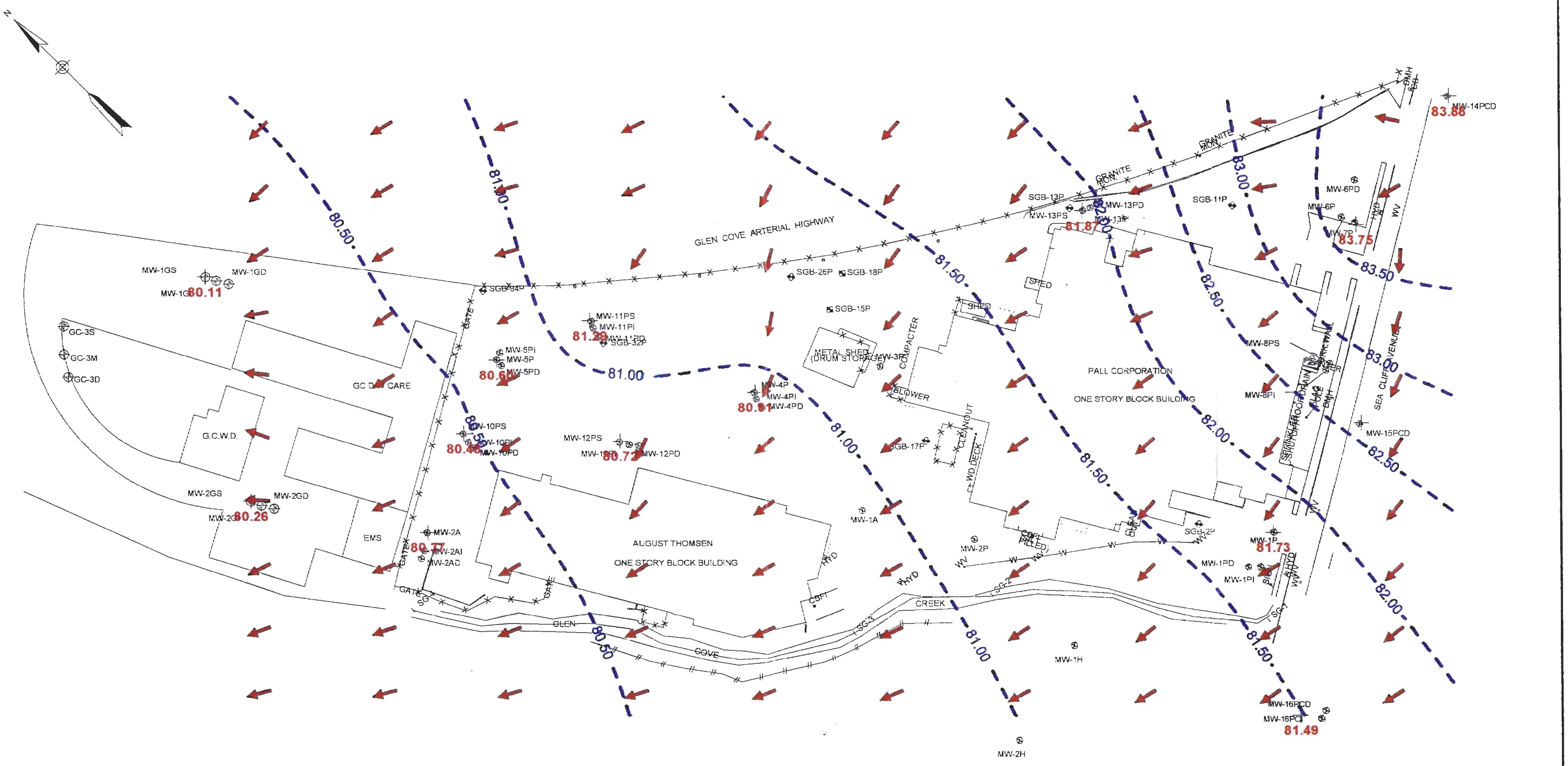
Groundwater Elevation Contours
(Intermediate Groundwater Zone, Data Collected 01/00)

Date: Apr. 05, 1999
Drawn: DJS
Client / Project: MT&E-PALL
Proj. No.: M37104
Drawing: INGW0100.SRF
Figure No: 3-9



- - - - Potentiometric Surface (ft)

↑ Inferred GW Flow Direction

NOTE: MW-4PI gauging data was not used in development of the intermediate groundwater potentiometric surface map because the gauging data is believed to be inaccurate.

0 20 40 60 80
Approximate Scale (ft)

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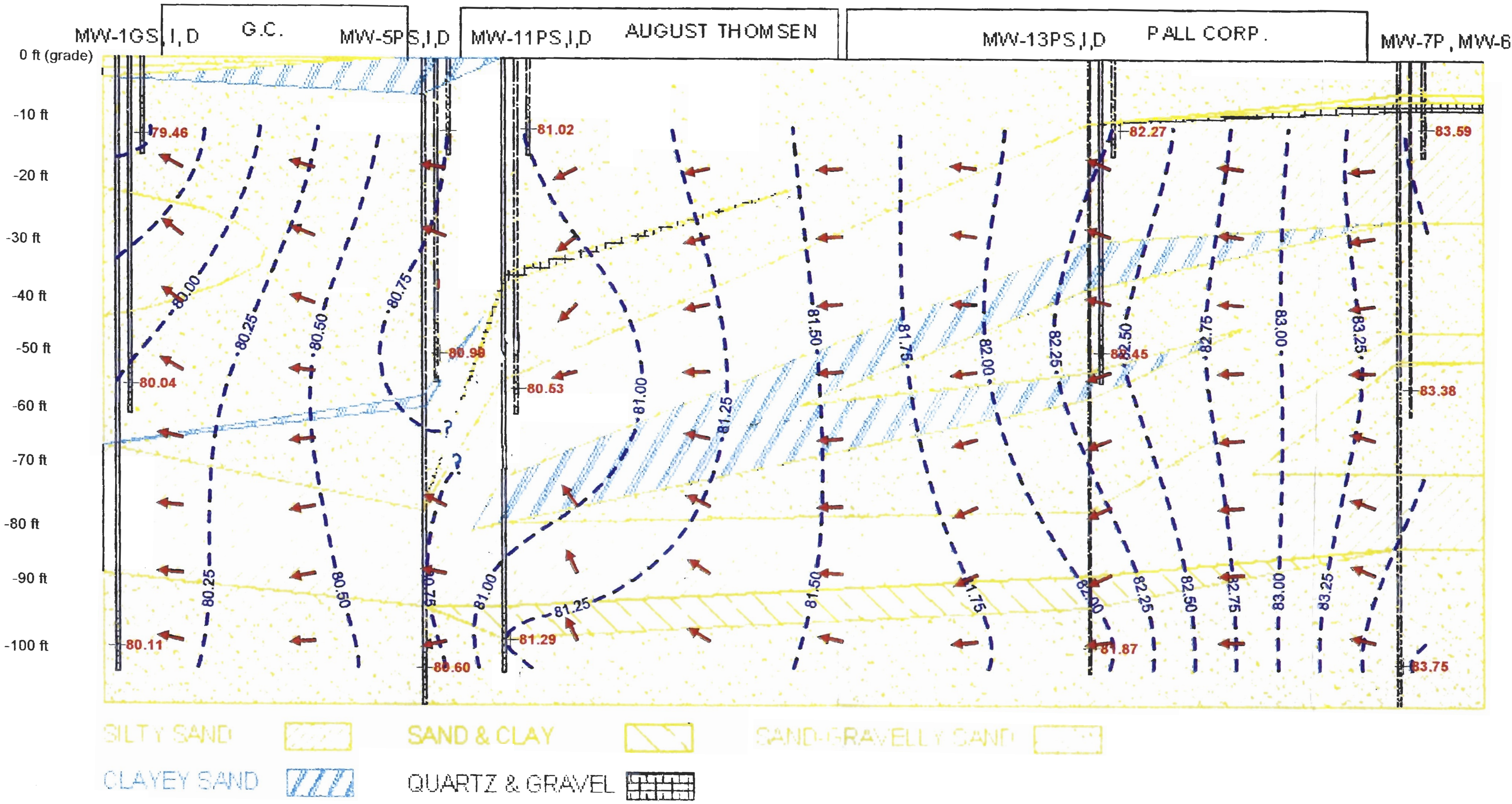
Groundwater Elevation Contours
(Deep Groundwater Zone, Data Collected 01/00)

Date: Apr. 05, 1999 Drawn: DJS	Client / Project: MT&E-PALL Proj. No.: M37104	Drawing: DPGW0100.SRF Figure No: 3-10



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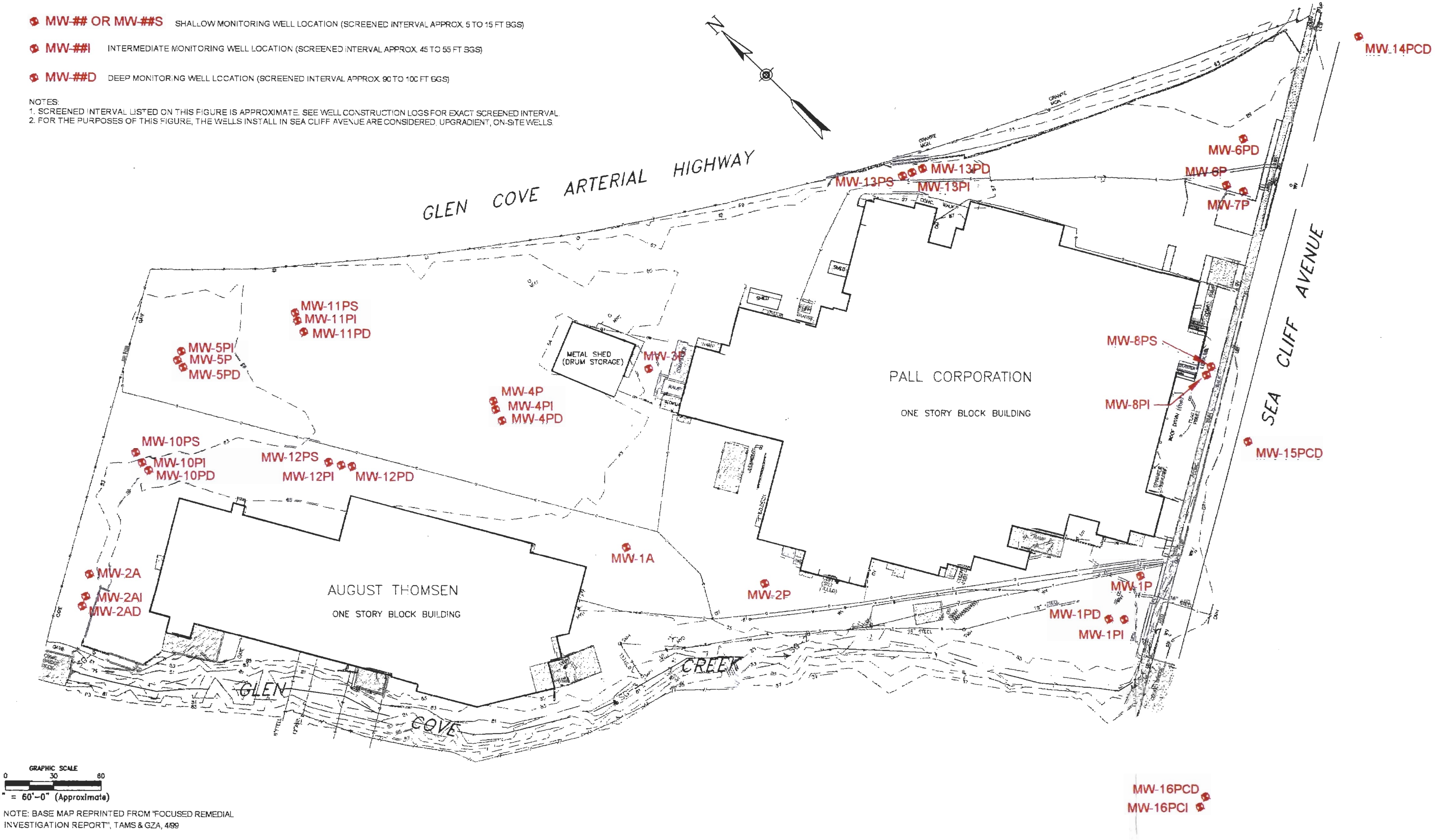
PALL CORPORATION
GLEN COVE, NEW YORK FACILITY

POTENTIOMETRIC SURFACE MAP
(EAST CROSS-SECTION)

Date: APR. 05, 2000
Drawn: DJS

Project: mt&e-pall
Proj. No.: M371

Drawing: 0100gweast.srf
Figure No: 3-11



● MW-## OR MW-##S SHALLOW MONITORING WELL LOCATION (SCREENED INTERVAL APPROX. 5 TO 15 FT BGS)

● MW-##I INTERMEDIATE MONITORING WELL LOCATION (SCREENED INTERVAL APPROX. 45 TO 55 FT BGS)

● MW-##D DEEP MONITORING WELL LOCATION (SCREENED INTERVAL APPROX. 90 TO 100 FT BGS)

NOTES:
1. SCREENED INTERVAL LISTED ON THIS FIGURE IS APPROXIMATE. SEE WELL CONSTRUCTION LOGS FOR EXACT SCREENED INTERVAL.
2. FOR THE PURPOSES OF THIS FIGURE, THE WELLS INSTALL IN SEA CLIFF AVENUE ARE CONSIDERED, UPGRADIENT, ON-SITE WELLS.

NOTE: BASE MAP REPRINTED FROM "FOCUSED REMEDIAL INVESTIGATION REPORT", TAMS & GZA, 4/99

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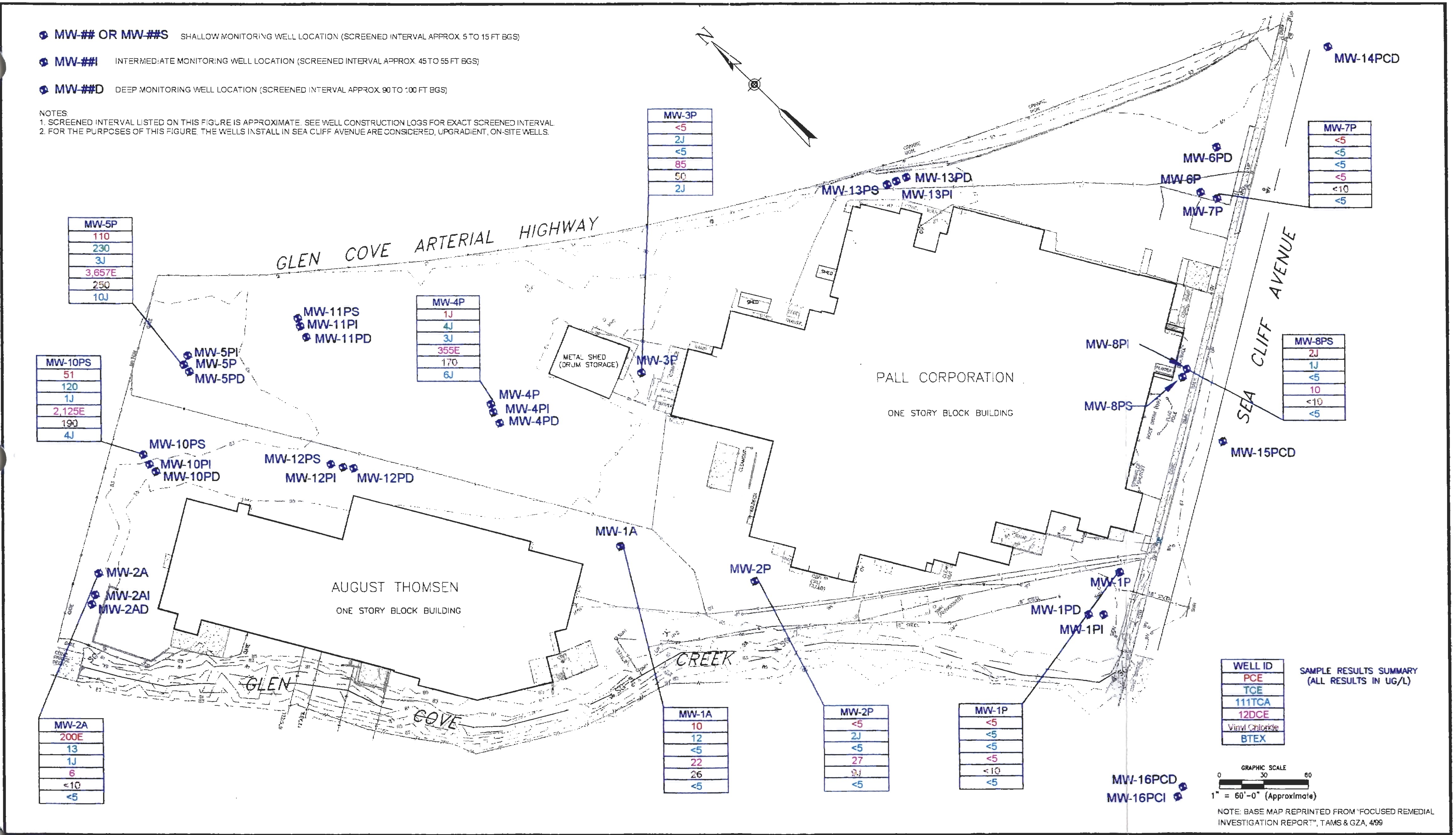
Monitoring Well Locations
(On-Site Wells)

DATE: 03/12/00
REV. NO. 1
PROJECT NO. MT&E-PALL-M371
DRAWN: DJS
DESIGNED: DJS
FILE: FIGURE3-12FS.DWG
FIGURE: 3-12



● MW-## OR MW-##S SHALLOW MONITORING WELL LOCATION (SCREENED INTERVAL APPROX. 5 TO 15 FT BGS)

● MW-##I INTERMEDIATE MONITORING WELL LOCATION (SCREENED INTERVAL APPROX. 45 TO 55 FT BGS)

● MW-##D DEEP MONITORING WELL LOCATION (SCREENED INTERVAL APPROX. 90 TO 100 FT BGS)

NOTES:
1. SCREENED INTERVAL LISTED ON THIS FIGURE IS APPROXIMATE. SEE WELL CONSTRUCTION LOGS FOR EXACT SCREENED INTERVAL.
2. FOR THE PURPOSES OF THIS FIGURE, THE WELLS INSTALL IN SEA CLIFF AVENUE ARE CONSIDERED, UPGRADIENT, ON-SITE WELLS.

SAMPLE RESULTS SUMMARY (ALL RESULTS IN UG/L)

WELL ID	PCE	TCE	111TCA	12DCE	Vinyl Chloride	BTEX
MW-3P	<5	2J	<5	85	50	2J
MW-7P	<5	<5	<5	<5	<10	<5
MW-5P	110	230	3J	3,657E	250	10J
MW-4P	1J	4J	3J	355E	170	6J
MW-10PS	51	120	1J	2,125E	190	4J
MW-8PS	2J	1J	<5	10	<10	<5
MW-2A	200E	13	1J	6	<10	<5
MW-1A	10	12	<5	22	26	<5
MW-2P	<5	2J	<5	27	9J	<5
MW-1P	<5	<5	<5	<5	<10	<5

NOTE: BASE MAP REPRINTED FROM "FOCUSED REMEDIAL INVESTIGATION REPORT", TAMS & GZA, 4/99

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Groundwater Sample Results Summary
(Shallow Wells, Samples Collected 4/99)

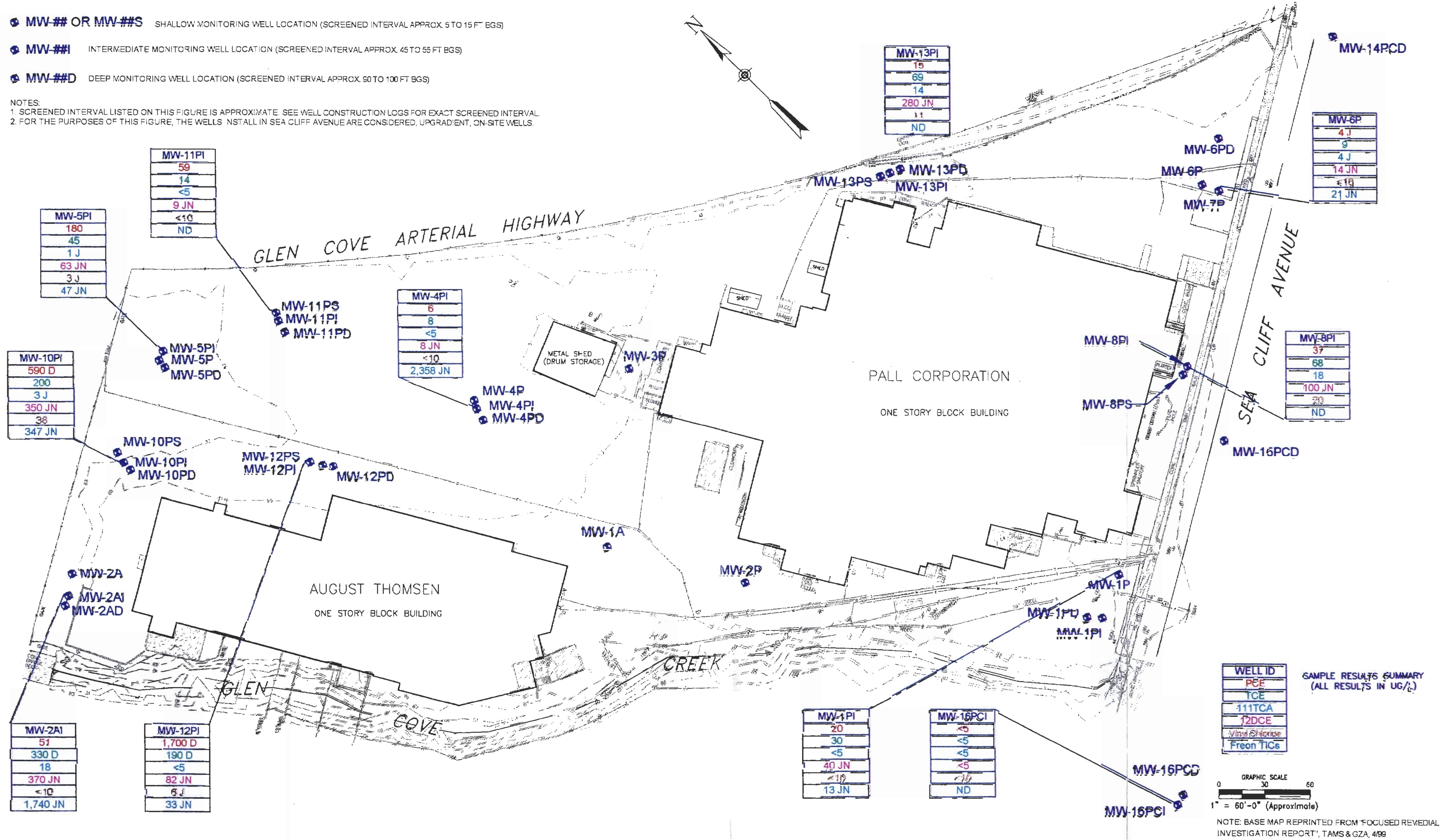
DATE:	03/20/00	DRAWN:	DJS	FIGURE:	3-13
REV. NO.	1	DESIGNED:	DJS		
PROJECT NO.	MT&E-PALL-M371	FILE:	FIGURE3-13FS.DWG		

● MW-## OR MW-##S SHALLOW MONITORING WELL LOCATION (SCREENED INTERVAL APPROX. 5 TO 15 FT BGS)

● MW-##I INTERMEDIATE MONITORING WELL LOCATION (SCREENED INTERVAL APPROX. 45 TO 55 FT BGS)

● MW-##D DEEP MONITORING WELL LOCATION (SCREENED INTERVAL APPROX. 90 TO 100 FT BGS)

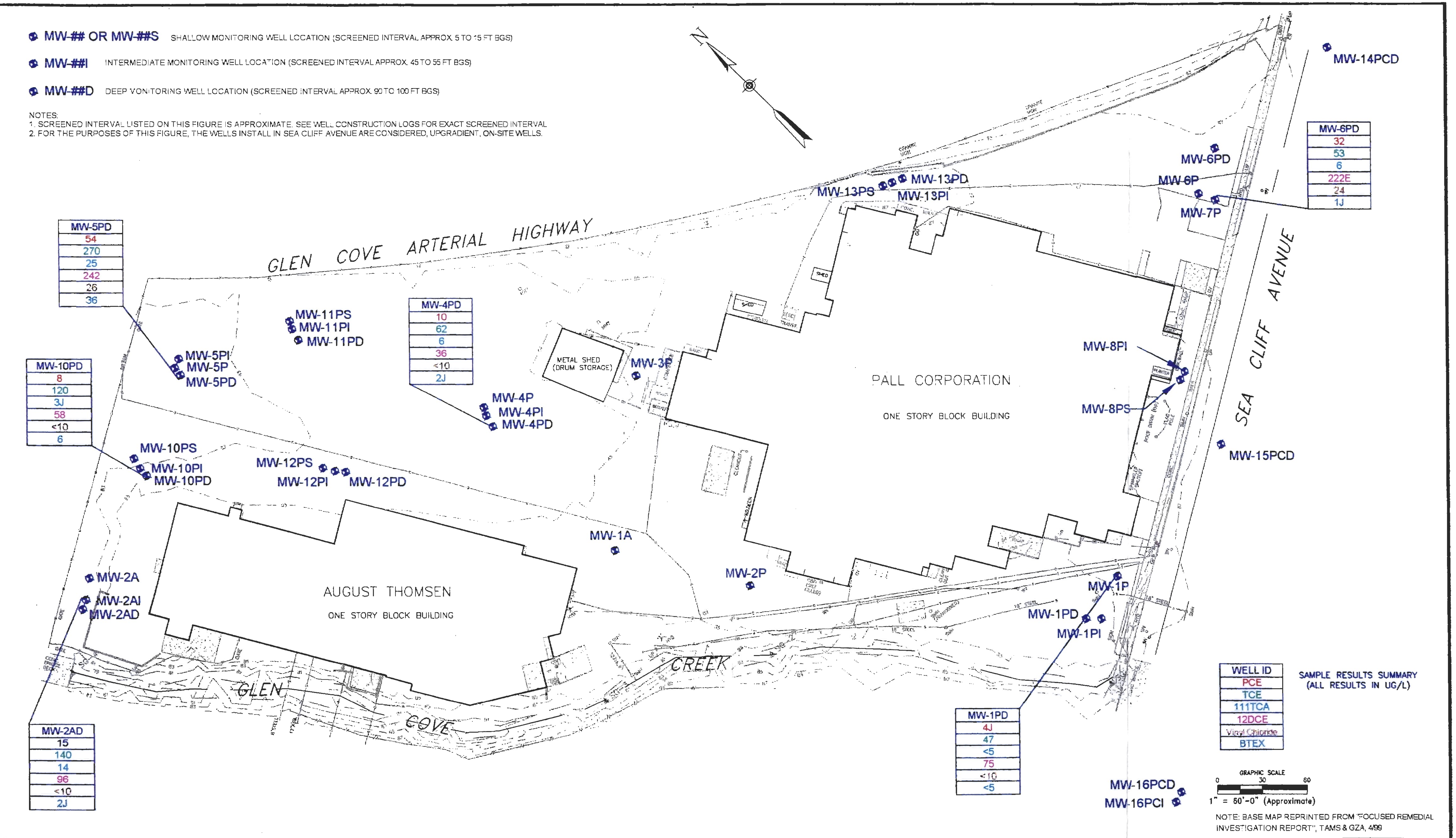
NOTES:
1. SCREENED INTERVAL LISTED ON THIS FIGURE IS APPROXIMATE. SEE WELL CONSTRUCTION LOGS FOR EXACT SCREENED INTERVAL.
2. FOR THE PURPOSES OF THIS FIGURE, THE WELLS INSTALL IN SEA CLIFF AVENUE ARE CONSIDERED, UPGRADIENT, ON-SITE WELLS.



WELL ID	MW-11PI	MW-5PI	MW-10PI	MW-4PI	MW-13PI	MW-6P	MW-8PI	MW-2AI	MW-12PI	MW-1PI	MW-16PCI
PCE	59	180	590 D	6	15	4 J	37	51	1,700 D	20	<5
TCE	14	45	200	8	69	9	68	330 D	190 D	30	<5
111TCA	<5	1 J	3 J	<5	14	4 J	18	18	<5	<5	<5
12DCE	9 JN	63 JN	350 JN	8 JN	280 JN	14 JN	100 JN	370 JN	82 JN	40 JN	<5
Vinyl Chloride	<10	3 J	38	<10	11	<10	70	<10	6 J	<10	<10
Freon TICs	ND	47 JN	347 JN	2,358 JN	ND	21 JN	ND	1,740 JN	33 JN	13 JN	ND

NOTE: BASE MAP REPRINTED FROM "FOCUSED REMEDIAL INVESTIGATION REPORT", TAMS & GZA, 4/99

ENVIRO-SCIENCES, INC. 312 EAST MAIN STREET PATCHOGUE, NEW YORK 11772 PHONE: 631-207-9005 FAX: 631-207-3614	PALL Pall Corporation 30 Sea Cliff Avenue Glen Cove, New York 11542	Groundwater Sample Results Summary (Intermediate Wells, Samples Coll. 1/00)	DATE: 03/20/00 REV. NO. 1 PROJECT NO. MT&E-PALL-M371	DRAWN: DJS DESIGNED: DJS FILE: FIGURE3-17FS.DWG	FIGURE: 3-17



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Groundwater Sample Results Summary
(Deep Wells, Samples Collected 4/99)

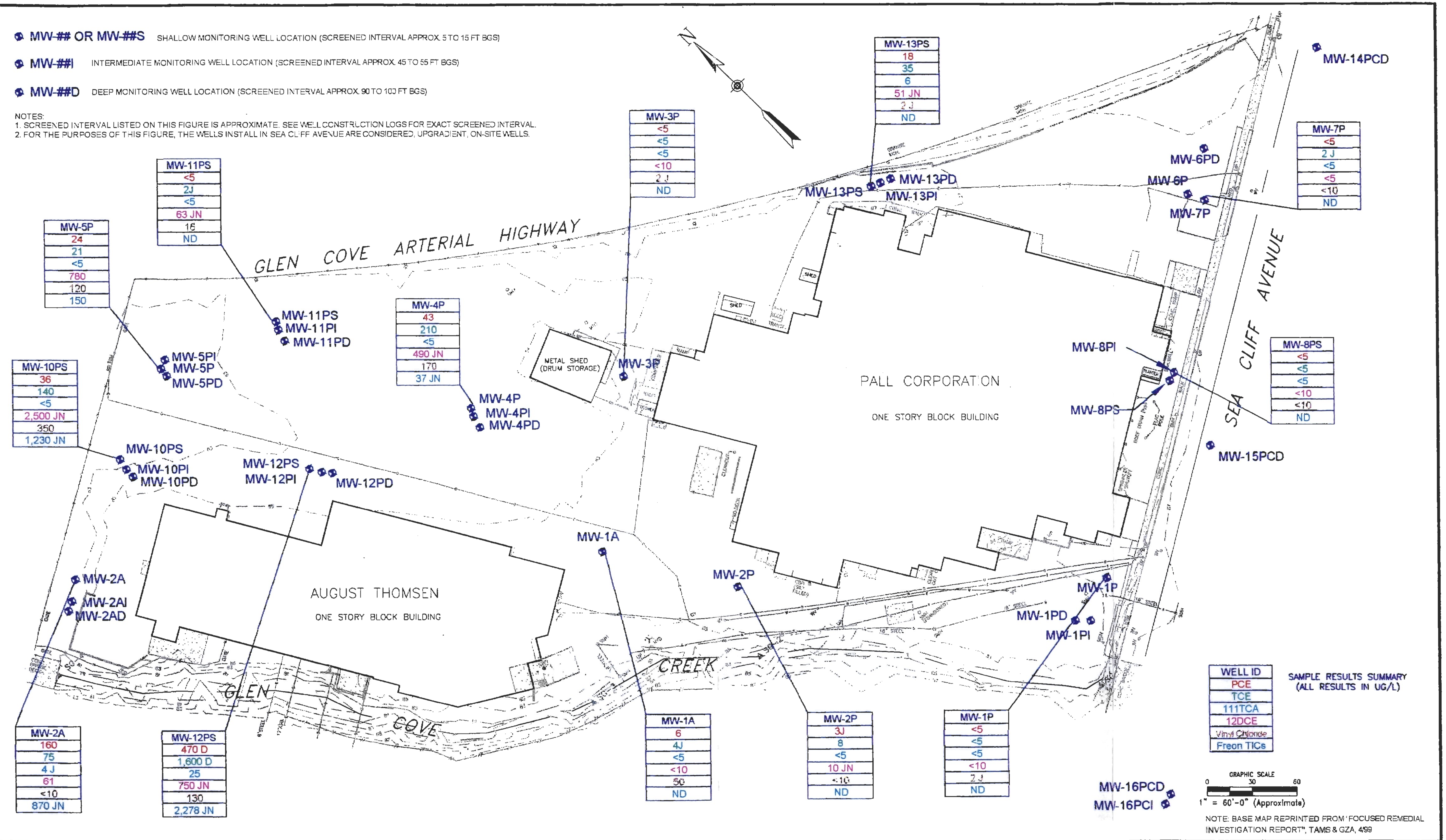
DATE:	03/20/00	DRAWN:	DJS	FIGURE:	3-15
REV. NO.	1	DESIGNED:	DJS		
PROJECT NO.	MT&E-PALL-M371	FILE:	FIGURE3-15FS.DWG		

● MW-## OR MW-##S SHALLOW MONITORING WELL LOCATION (SCREENED INTERVAL APPROX. 5 TO 15 FT BGS)

● MW-##I INTERMEDIATE MONITORING WELL LOCATION (SCREENED INTERVAL APPROX. 45 TO 55 FT BGS)

● MW-##D DEEP MONITORING WELL LOCATION (SCREENED INTERVAL APPROX. 90 TO 100 FT BGS)

NOTES:
1. SCREENED INTERVAL LISTED ON THIS FIGURE IS APPROXIMATE. SEE WELL CONSTRUCTION LOGS FOR EXACT SCREENED INTERVAL.
2. FOR THE PURPOSES OF THIS FIGURE, THE WELLS INSTALL IN SEA CLIFF AVENUE ARE CONSIDERED, UPGRADIENT, ON-SITE WELLS.



SAMPLE RESULTS SUMMARY (ALL RESULTS IN UG/L)

WELL ID	PCE	TCE	111TCA	12DCE	Vinyl Chloride	Freon TICs
MW-11PS	<5	2J	<5	63 JN	16	ND
MW-5P	24	21	<5	780	120	150
MW-10PS	36	140	<5	2,500 JN	350	1,230 JN
MW-4P	43	210	<5	490 JN	170	37 JN
MW-3P	<5	<5	<5	<10	2 J	ND
MW-13PS	18	35	6	51 JN	2 J	ND
MW-7P	<5	2 J	<5	<5	<10	ND
MW-8PS	<5	<5	<5	<10	<10	ND
MW-2A	160	75	4 J	61	<10	870 JN
MW-12PS	470 D	1,600 D	25	750 JN	130	2,278 JN
MW-1A	6	4J	<5	<10	50	ND
MW-2P	3J	8	<5	10 JN	<10	ND
MW-1P	<5	<5	<5	<10	2 J	ND

NOTE: BASE MAP REPRINTED FROM "FOCUSED REMEDIAL INVESTIGATION REPORT", TAMS & GZA, 4/99

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Groundwater Sample Results Summary
(Shallow Wells, Samples Collected 1/00)

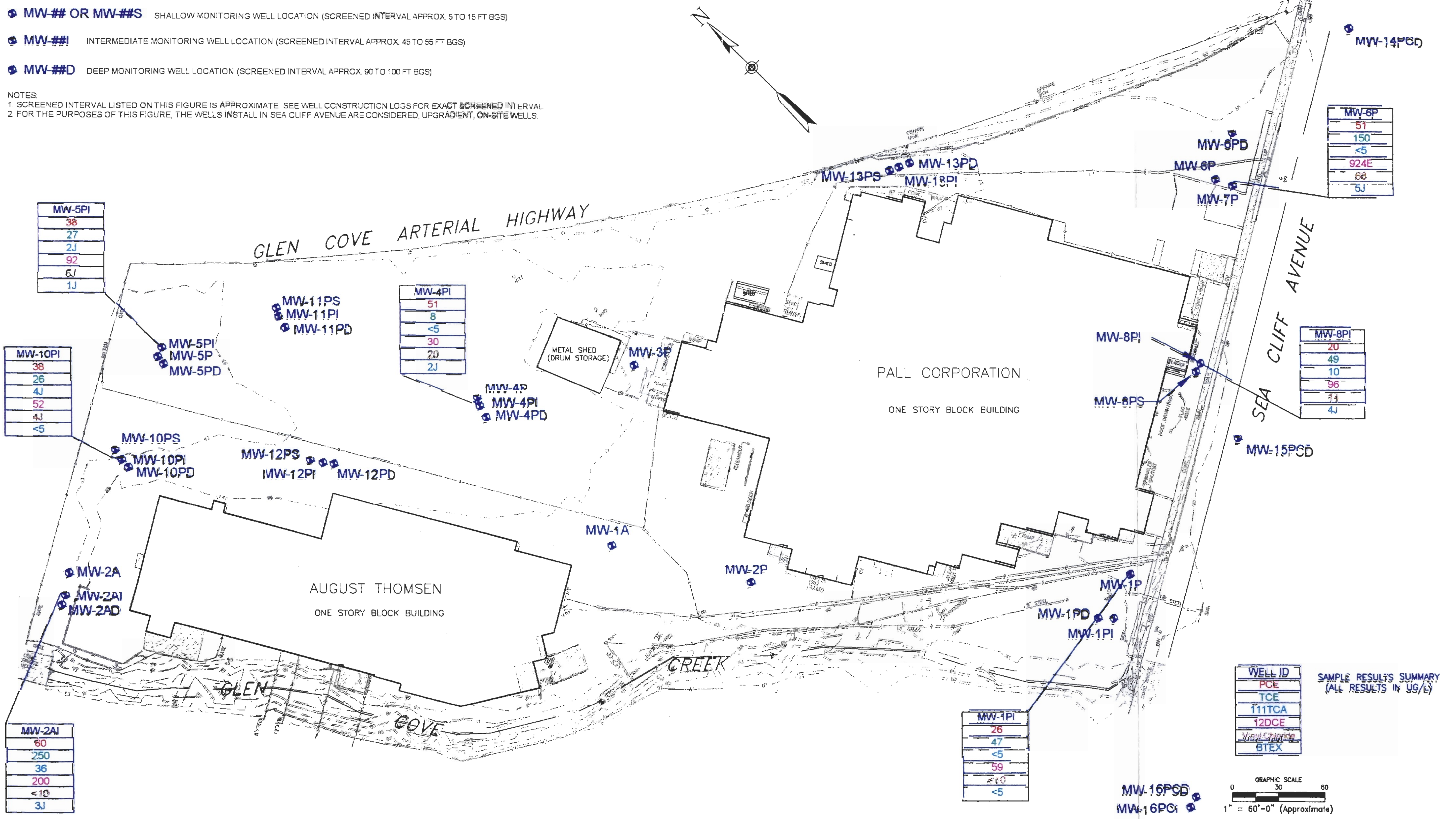
DATE:	03/21/00	DRAWN:	DJS	FIGURE:	3-16
REV. NO.	1	DESIGNED:	DJS		
PROJECT NO.	MT&E-PALL-M371	FILE:	FIGURE3-16FS.DWG		

● MW-## OR MW-##S SHALLOW MONITORING WELL LOCATION (SCREENED INTERVAL APPROX. 5 TO 15 FT BGS)

● MW-##I INTERMEDIATE MONITORING WELL LOCATION (SCREENED INTERVAL APPROX. 45 TO 55 FT BGS)

● MW-##D DEEP MONITORING WELL LOCATION (SCREENED INTERVAL APPROX. 90 TO 100 FT BGS)

NOTES:
1. SCREENED INTERVAL LISTED ON THIS FIGURE IS APPROXIMATE. SEE WELL CONSTRUCTION LOGS FOR EXACT SCREENED INTERVAL.
2. FOR THE PURPOSES OF THIS FIGURE, THE WELLS INSTALL IN SEA CLIFF AVENUE ARE CONSIDERED, UPGRADIENT, ON-SITE WELLS.



WELL ID	PCE	TCE	111TCA	12DCE	Vinyl Chloride	BTEX
MW-5PI	38	27	2J	92	6J	1J
MW-10PI	38	26	4J	52	4J	<5
MW-4PI	51	8	<5	30	20	2J
MW-6P	51	150	<5	924E	68	5J
MW-8PI	20	49	10	96	11	4J
MW-1PI	26	47	<5	59	<10	<5
MW-2AI	60	250	36	200	<10	3J

NOTE: BASE MAP REPRINTED FROM "FOCUSED REMEDIAL INVESTIGATION REPORT", TAMS & GZA, 4/99

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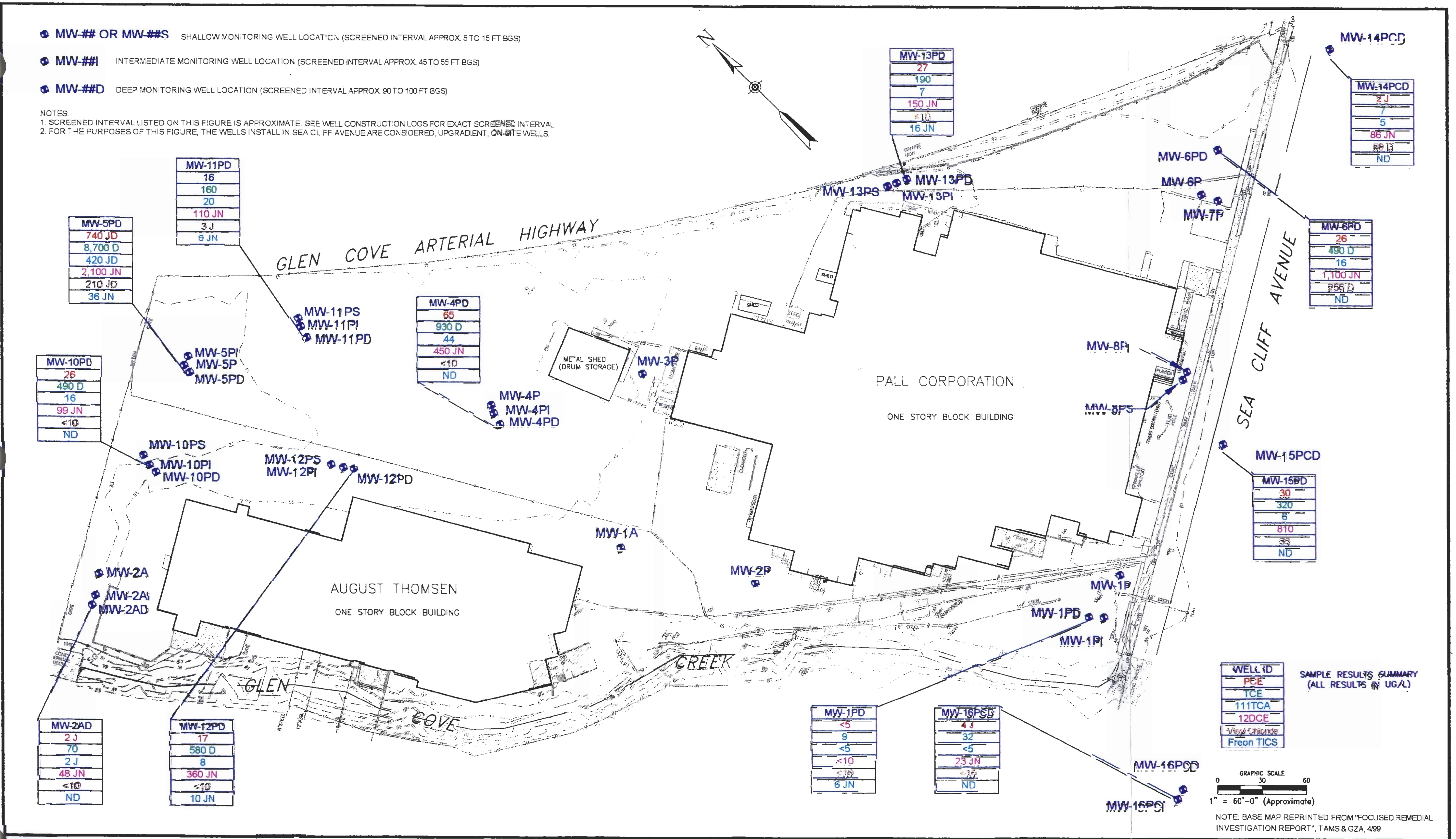
Groundwater Sample Results Summary
(Intermediate Wells, Samples Coll. 4/99)

DATE:	03/20/00	DRAWN:	DJS	FIGURE:
REV. NO.	1	DESIGNED:	DJS	3-14
PROJECT NO.	MT&E-PALL-M371	FILE:	FIGURE3-14FS.DWG	



● MW-## OR MW-##S SHALLOW MONITORING WELL LOCATION (SCREENED INTERVAL APPROX. 5 TO 15 FT BGS)

● MW-##I INTERMEDIATE MONITORING WELL LOCATION (SCREENED INTERVAL APPROX. 45 TO 55 FT BGS)

● MW-##D DEEP MONITORING WELL LOCATION (SCREENED INTERVAL APPROX. 90 TO 100 FT BGS)

NOTES:
1. SCREENED INTERVAL LISTED ON THIS FIGURE IS APPROXIMATE. SEE WELL CONSTRUCTION LOGS FOR EXACT SCREENED INTERVAL
2. FOR THE PURPOSES OF THIS FIGURE, THE WELLS INSTALL IN SEA CLIFF AVENUE ARE CONSIDERED, UPGRADIENT, ON-SITE WELLS.

SAMPLE RESULTS SUMMARY
(ALL RESULTS IN UG/L)

WELL ID
PCE
TCE
111TCA
12DCE
Vinyl Chloride
Freon TICS

WELL ID	PCE	TCE	111TCA	12DCE	Vinyl Chloride	Freon TICS
MW-5PD	740 JD	8,700 D	420 JD	2,100 JN	210 JD	36 JN
MW-11PD	16	160	20	110 JN	3 J	6 JN
MW-4PD	65	930 D	44	450 JN	<10	ND
MW-10PD	26	490 D	16	99 JN	<10	ND
MW-13PD	27	190	7	150 JN	<10	16 JN
MW-14PCD	2 J	7	5	86 JN	58 D	ND
MW-6PD	26	490 D	16	1,100 JN	256 D	ND
MW-15PD	30	320	6	810	33	ND
MW-2AD	2 J	70	2 J	48 JN	<10	ND
MW-12PD	17	580 D	8	360 JN	<10	10 JN
MW-1PD	<5	9	<5	<10	<10	6 JN
MW-16PCD	4 J	32	<5	23 JN	<10	ND

NOTE: BASE MAP REPRINTED FROM "FOCUSED REMEDIAL INVESTIGATION REPORT", TAMS & GZA, 4/99

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Groundwater Sample Results Summary
(Deep Wells, Samples Coll. 1/00)

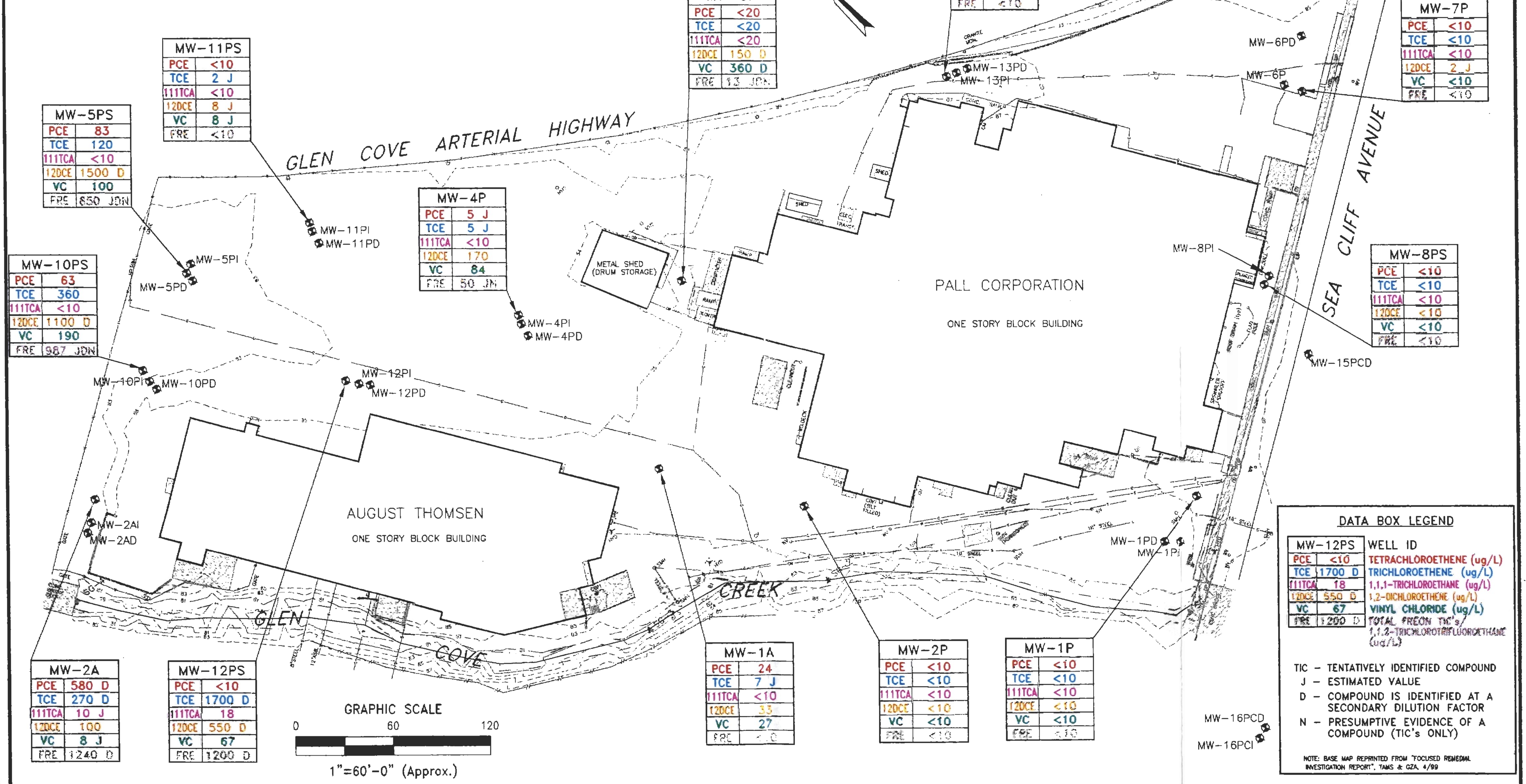
DATE:	03/21/00	DRAWN:	DJS
REV. NO.	1	DESIGNED:	DJS
PROJECT NO.	MT&E-PALL-M371	FILE:	FIGURE3-18FS.DWG

FIGURE:
3-18

LEGEND

- MW-## OR MW-##S SHALLOW MONITORING WELL LOCATION (SCREENED INTERVAL APPROX. 5 TO 15 FT BGS)
- MW-##I INTERMEDIATE MONITORING WELL LOCATION (SCREENED INTERVAL APPROX. 45 TO 55 FT BGS)
- MW-##D DEEP MONITORING WELL LOCATION (SCREENED INTERVAL APPROX. 90 TO 100 FT BGS)

NOTES:
1. SCREENED INTERVAL LISTED ON THIS FIGURE IS APPROXIMATE. SEE WELL CONSTRUCTION LOGS FOR EXACT SCREENED INTERVAL.
2. FOR THE PURPOSES OF THIS FIGURE, THE WELLS INSTALLED ON SEA CLIFF AVENUE ARE CONSIDERED, UPGRADIENT, ON-SITE WELLS.



MW-11PS	
PCE	<10
TCE	2 J
111TCA	<10
12DCE	8 J
VC	8 J
FRE	<10

MW-5PS	
PCE	83
TCE	120
111TCA	<10
12DCE	1500 D
VC	100
FRE	850 JDN

MW-10PS	
PCE	63
TCE	360
111TCA	<10
12DCE	1100 D
VC	190
FRE	987 JDN

MW-4P	
PCE	5 J
TCE	5 J
111TCA	<10
12DCE	170
VC	84
FRE	50 JN

MW-3P	
PCE	<20
TCE	<20
111TCA	<20
12DCE	150 D
VC	360 D
FRE	13 JDN

MW-13PS	
PCE	4 J
TCE	23
111TCA	2 J
12DCE	47
VC	2 J
FRE	<10

MW-7P	
PCE	<10
TCE	<10
111TCA	<10
12DCE	2 J
VC	<10
FRE	<10

MW-8PS	
PCE	<10
TCE	<10
111TCA	<10
12DCE	<10
VC	<10
FRE	<10

MW-2A	
PCE	580 D
TCE	270 D
111TCA	10 J
12DCE	100
VC	8 J
FRE	1240 D

MW-12PS	
PCE	<10
TCE	1700 D
111TCA	18
12DCE	550 D
VC	67
FRE	1200 D

MW-1A	
PCE	24
TCE	7 J
111TCA	<10
12DCE	33
VC	27
FRE	<10

MW-2P	
PCE	<10
TCE	<10
111TCA	<10
12DCE	<10
VC	<10
FRE	<10

MW-1P	
PCE	<10
TCE	<10
111TCA	<10
12DCE	<10
VC	<10
FRE	<10

DATA BOX LEGEND

MW-12PS		WELL ID
PCE	<10	TETRACHLOROETHENE (ug/L)
TCE	1700 D	TRICHLOROETHENE (ug/L)
111TCA	18	1,1,1-TRICHLOROETHANE (ug/L)
12DCE	550 D	1,2-DICHLOROETHENE (ug/L)
VC	67	VINYL CHLORIDE (ug/L)
FRE	1200 D	TOTAL FREON TIC's/ 1,1,2-TRICHLOROTRIFLUOROETHANE (ug/L)

TIC – TENTATIVELY IDENTIFIED COMPOUND
J – ESTIMATED VALUE
D – COMPOUND IS IDENTIFIED AT A SECONDARY DILUTION FACTOR
N – PRESUMPTIVE EVIDENCE OF A COMPOUND (TIC's ONLY)

NOTE: BASE MAP REPRINTED FROM "FOCUSED REMEDIAL INVESTIGATION REPORT", TAMS & GZA, 4/99

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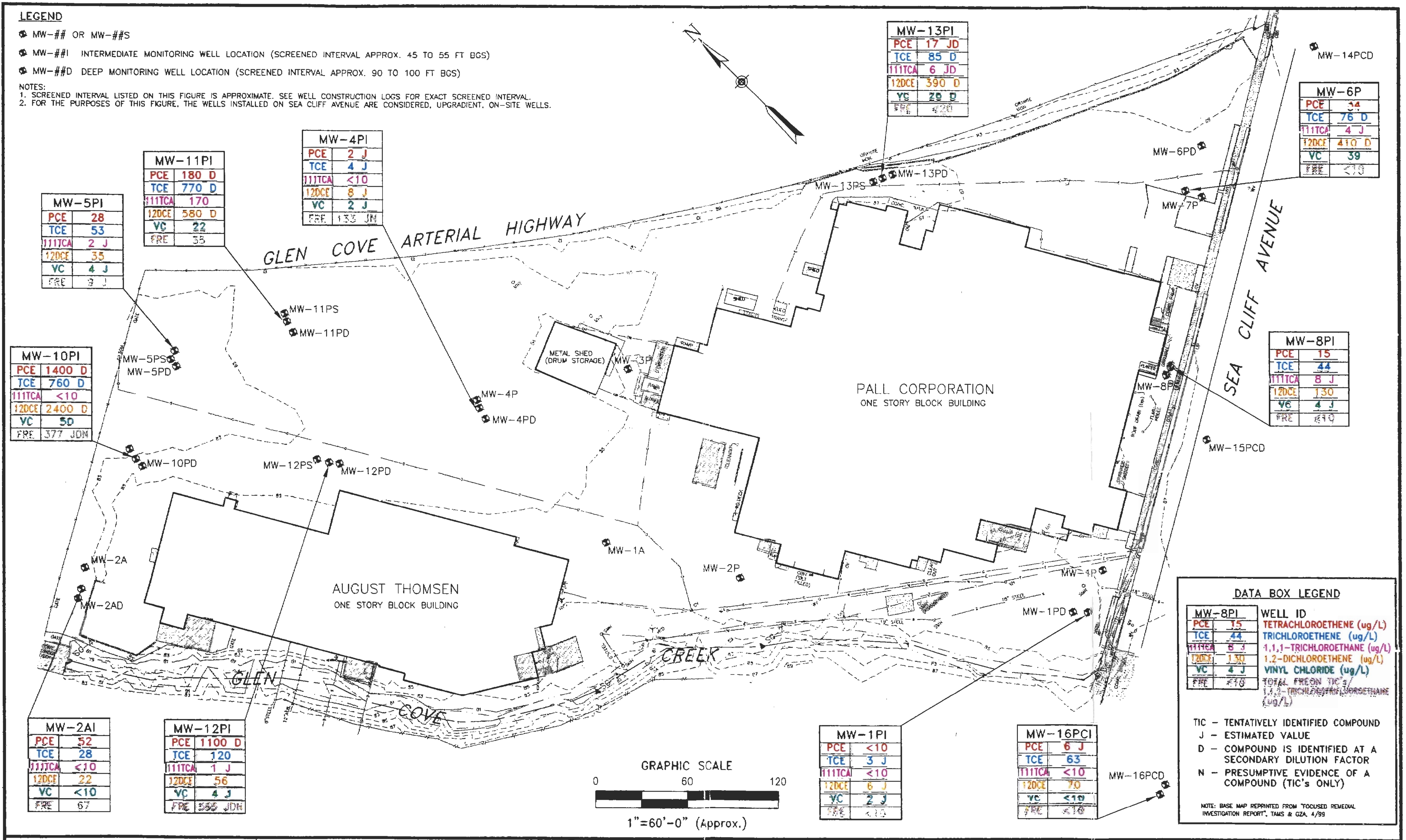
Groundwater Sample Results Summary
(Shallow Wells, Samples Coll. 12/00)

DATE:	06/15/01	DRAWN:	TRS	FIGURE:
REV. NO.	-	DESIGNED:	DJS	3-19
PROJECT NO.	MT&E-PALL-M371	FILE:	PALLSS12.DWG	



LEGEND

- MW-## OR MW-##S
- MW-##I INTERMEDIATE MONITORING WELL LOCATION (SCREENED INTERVAL APPROX. 45 TO 55 FT BGS)
- MW-##D DEEP MONITORING WELL LOCATION (SCREENED INTERVAL APPROX. 90 TO 100 FT BGS)

NOTES:
1. SCREENED INTERVAL LISTED ON THIS FIGURE IS APPROXIMATE. SEE WELL CONSTRUCTION LOGS FOR EXACT SCREENED INTERVAL.
2. FOR THE PURPOSES OF THIS FIGURE, THE WELLS INSTALLED ON SEA CLIFF AVENUE ARE CONSIDERED, UPGRADIENT, ON-SITE WELLS.

MW-5PI	
PCE	28
TCE	53
111TCA	2 J
12DCE	35
VC	4 J
FRE	9 J

MW-11PI	
PCE	180 D
TCE	770 D
111TCA	170
12DCE	580 D
VC	22
FRE	35

MW-4PI	
PCE	2 J
TCE	4 J
111TCA	<10
12DCE	8 J
VC	2 J
FRE	133 JN

MW-13PI	
PCE	17 JD
TCE	85 D
111TCA	6 JD
12DCE	390 D
VC	26 D
FRE	<20

MW-6P	
PCE	34
TCE	76 D
111TCA	4 J
12DCE	410 D
VC	39
FRE	<10

MW-10PI	
PCE	1400 D
TCE	760 D
111TCA	<10
12DCE	2400 D
VC	50
FRE	377 JDN

MW-8PI	
PCE	15
TCE	44
111TCA	8 J
12DCE	130
VC	4 J
FRE	<10

MW-2AI	
PCE	52
TCE	28
111TCA	<10
12DCE	22
VC	<10
FRE	67

MW-12PI	
PCE	1100 D
TCE	120
111TCA	1 J
12DCE	56
VC	4 J
FRE	585 JDN

MW-1PI	
PCE	<10
TCE	3 J
111TCA	<10
12DCE	6 J
VC	2 J
FRE	<10

MW-16PCI	
PCE	6 J
TCE	63
111TCA	<10
12DCE	70
VC	<10
FRE	<10

DATA BOX LEGEND

MW-8PI		WELL ID
PCE	15	TETRACHLOROETHENE (ug/L)
TCE	44	TRICHLOROETHENE (ug/L)
111TCA	8 J	1,1,1-TRICHLOROETHANE (ug/L)
12DCE	130	1,2-DICHLOROETHENE (ug/L)
VC	4 J	VINYL CHLORIDE (ug/L)
FRE	<10	TOTAL FREON TIC's/ 1,1,2-TRICHLOROTRIFLUOROETHANE (ug/L)

TIC – TENTATIVELY IDENTIFIED COMPOUND
J – ESTIMATED VALUE
D – COMPOUND IS IDENTIFIED AT A SECONDARY DILUTION FACTOR
N – PRESUMPTIVE EVIDENCE OF A COMPOUND (TIC's ONLY)

NOTE: BASE MAP REPRINTED FROM "FOCUSED REMEDIAL INVESTIGATION REPORT", TAMS & GZA, 4/99

GRAPHIC SCALE
0 60 120
1"=60'-0" (Approx.)

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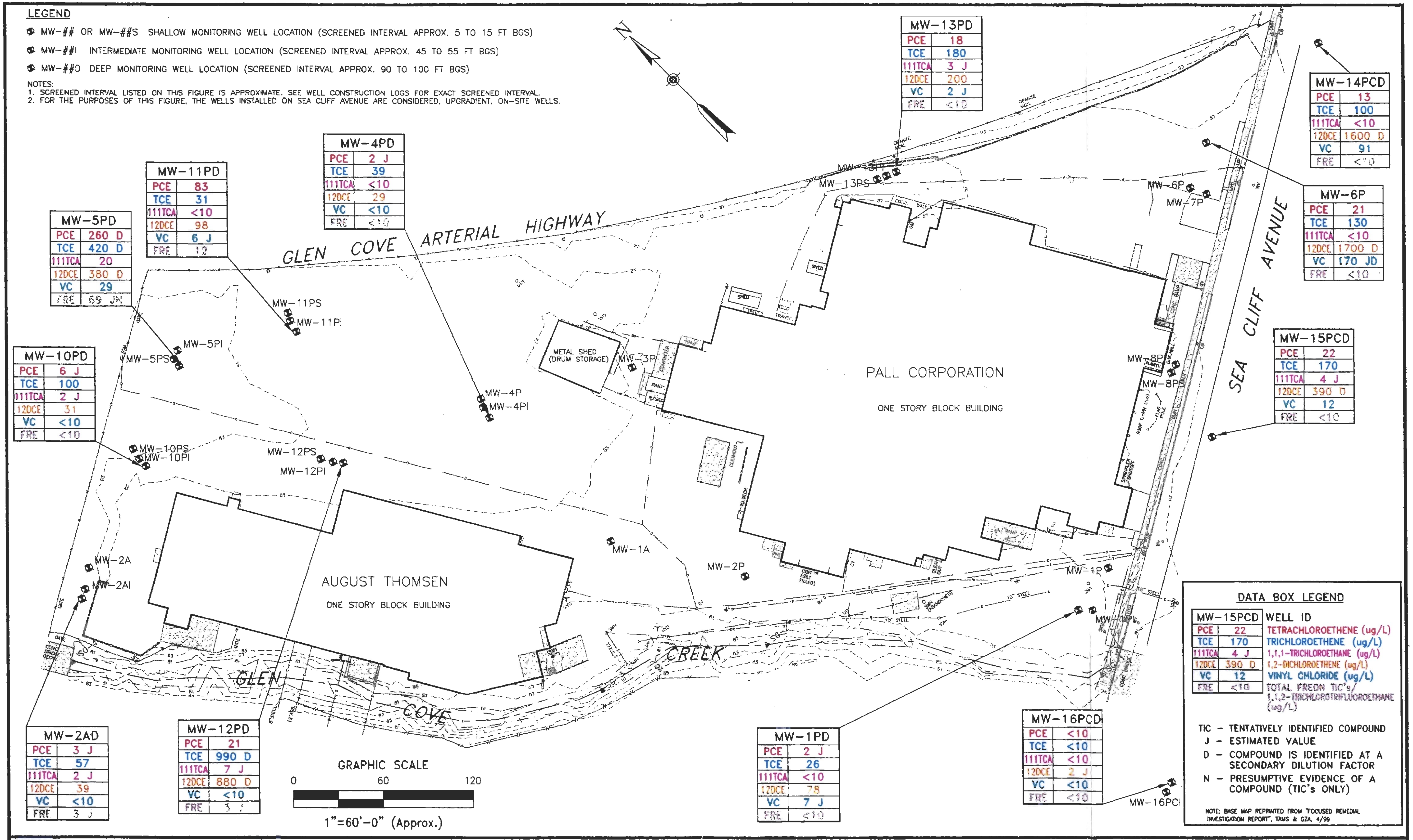
Groundwater Sample Results Summary
(Intermediate Wells, Samples Coll. 12/00)

DATE: 06/12/01
REV. NO. -
PROJECT NO. MT&E-PALL-M371
DRAWN: TRS
DESIGNED: DJS
FILE: PALLSI12.DWG
FIGURE: 3-20

LEGEND

- MW-## OR MW-##S SHALLOW MONITORING WELL LOCATION (SCREENED INTERVAL APPROX. 5 TO 15 FT BGS)
- MW-##I INTERMEDIATE MONITORING WELL LOCATION (SCREENED INTERVAL APPROX. 45 TO 55 FT BGS)
- MW-##D DEEP MONITORING WELL LOCATION (SCREENED INTERVAL APPROX. 90 TO 100 FT BGS)

NOTES:
1. SCREENED INTERVAL LISTED ON THIS FIGURE IS APPROXIMATE. SEE WELL CONSTRUCTION LOGS FOR EXACT SCREENED INTERVAL.
2. FOR THE PURPOSES OF THIS FIGURE, THE WELLS INSTALLED ON SEA CLIFF AVENUE ARE CONSIDERED, UPGRADIENT, ON-SITE WELLS.



MW-13PD	
PCE	18
TCE	180
111TCA	3 J
12DCE	200
VC	2 J
FRE	<10

MW-14PCD	
PCE	13
TCE	100
111TCA	<10
12DCE	1600 D
VC	91
FRE	<10

MW-4PD	
PCE	2 J
TCE	39
111TCA	<10
12DCE	29
VC	<10
FRE	<10

MW-11PD	
PCE	83
TCE	31
111TCA	<10
12DCE	98
VC	6 J
FRE	12

MW-5PD	
PCE	260 D
TCE	420 D
111TCA	20
12DCE	380 D
VC	29
FRE	69 JN

MW-6P	
PCE	21
TCE	130
111TCA	<10
12DCE	1700 D
VC	170 JD
FRE	<10

MW-10PD	
PCE	6 J
TCE	100
111TCA	2 J
12DCE	31
VC	<10
FRE	<10

MW-15PCD	
PCE	22
TCE	170
111TCA	4 J
12DCE	390 D
VC	12
FRE	<10

MW-2AD	
PCE	3 J
TCE	57
111TCA	2 J
12DCE	39
VC	<10
FRE	3 J

MW-12PD	
PCE	21
TCE	990 D
111TCA	7 J
12DCE	880 D
VC	<10
FRE	3 J

MW-1PD	
PCE	2 J
TCE	26
111TCA	<10
12DCE	78
VC	7 J
FRE	<10

MW-16PCD	
PCE	<10
TCE	<10
111TCA	<10
12DCE	2 J
VC	<10
FRE	<10

DATA BOX LEGEND

MW-15PCD		WELL ID
PCE	22	TETRACHLOROETHENE (ug/L)
TCE	170	TRICHLOROETHENE (ug/L)
111TCA	4 J	1,1,1-TRICHLOROETHANE (ug/L)
12DCE	390 D	1,2-DICHLOROETHENE (ug/L)
VC	12	VINYL CHLORIDE (ug/L)
FRE	<10	TOTAL FREON TIC's/ 1,1,2-TRICHLOROTRIFLUOROETHANE (ug/L)

TIC – TENTATIVELY IDENTIFIED COMPOUND
J – ESTIMATED VALUE
D – COMPOUND IS IDENTIFIED AT A SECONDARY DILUTION FACTOR
N – PRESUMPTIVE EVIDENCE OF A COMPOUND (TIC's ONLY)

NOTE: BASE MAP REPRINTED FROM "FOCUSED REMEDIAL INVESTIGATION REPORT", TAMS & GZA, 4/99

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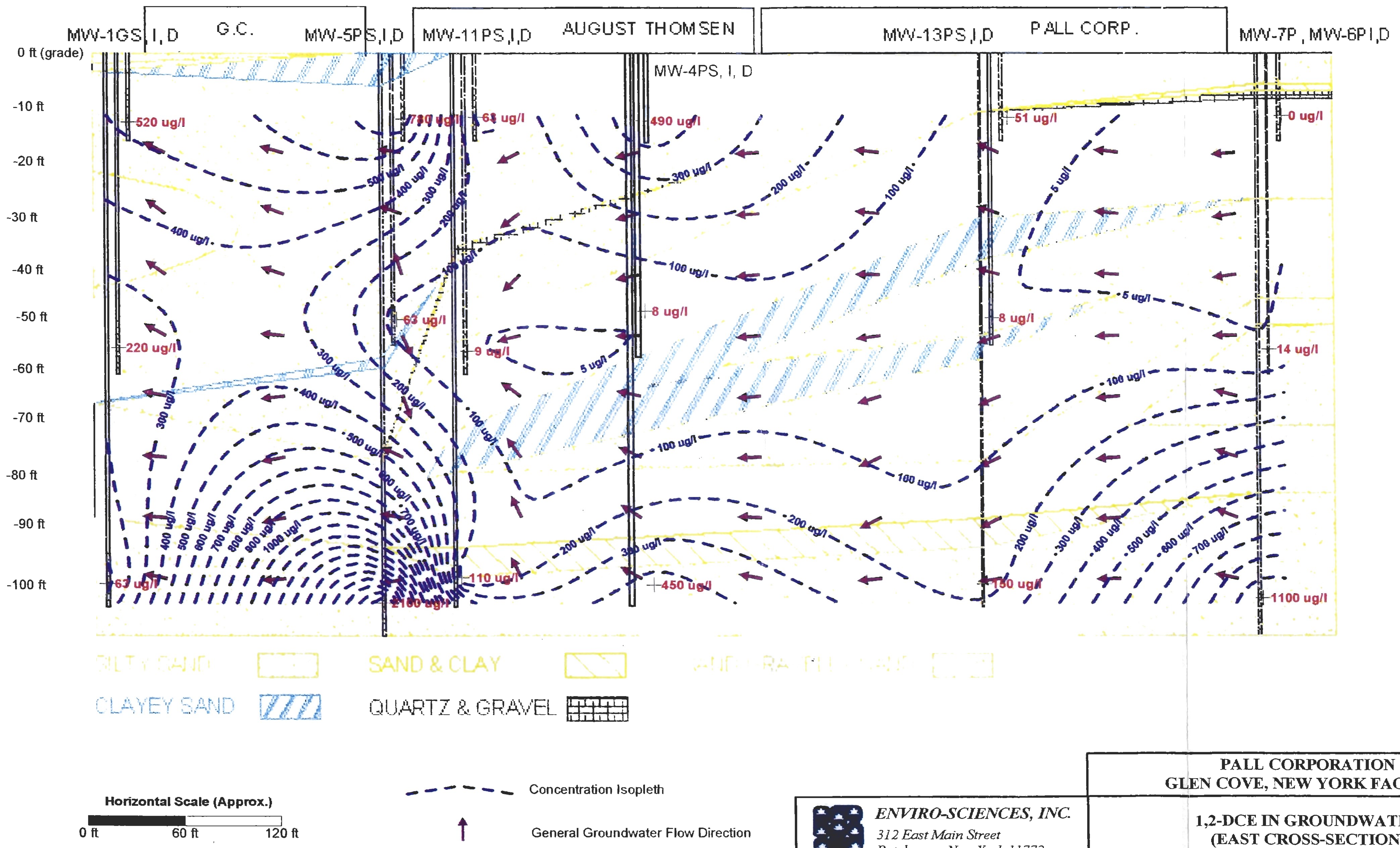
Groundwater Sample Results Summary
(Deep Wells, Samples Coll. 12/00)

DATE:	06/15/01	DRAWN:	TRS	FIGURE:
REV. NO.	-	DESIGNED:	DJS	3-21
PROJECT NO.	MT&E-PALL-M371	FILE:	PALLSD12.DWG	



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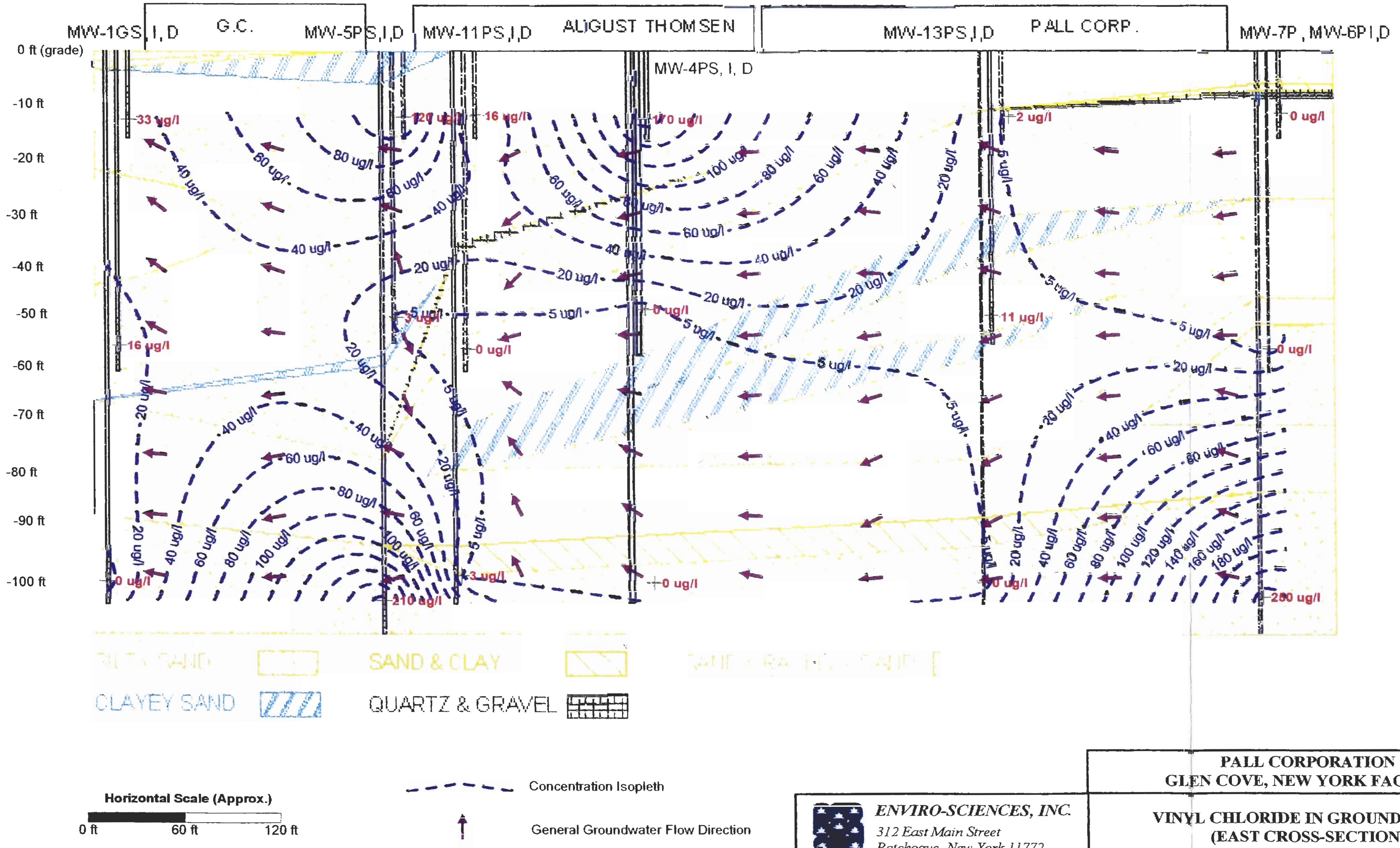
PALL CORPORATION
GLEN COVE, NEW YORK FACILITY

1,2-DCE IN GROUNDWATER
(EAST CROSS-SECTION)

Date: MAR. 13, 2000 Drawn: DJS	Project: mt&e-pall Proj. No.: M371	Drawing: dce-east.srf Figure No: 3-22



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PALL CORPORATION
GLEN COVE, NEW YORK FACILITY

VINYL CHLORIDE IN GROUNDWATER
(EAST CROSS-SECTION)

Date: MAR. 13, 2000
Drawn: DJS

Project: mt&e-pall
Proj. No.: M371

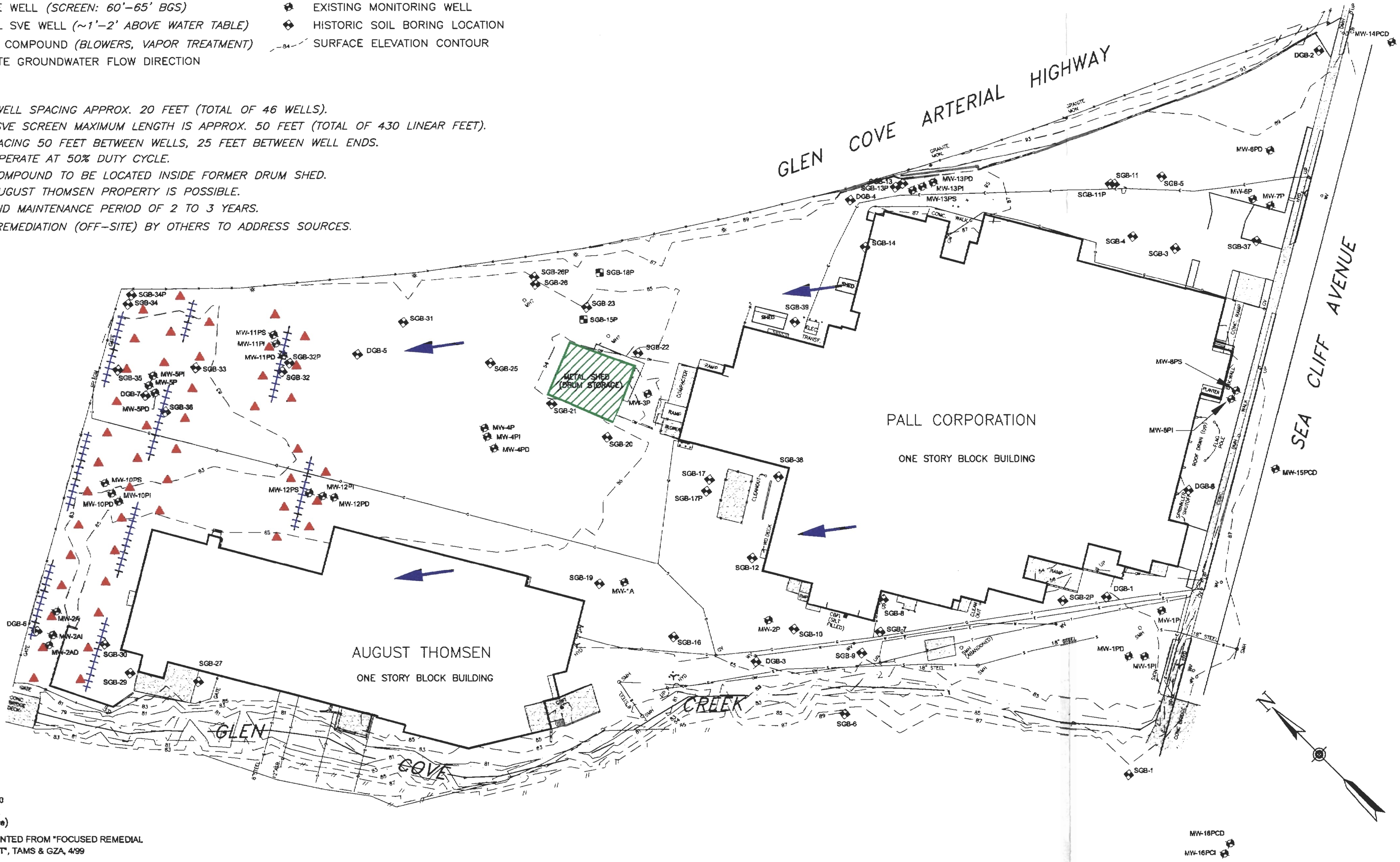
Drawing: vceast.srf
Figure No: 3-23

LEGEND

- ▲ AIR SPARGE WELL *(SCREEN: 60'–65' BGS)*
- ++++++ HORIZONTAL SVE WELL *(~1'–2' ABOVE WATER TABLE)*
- ▨ EQUIPMENT COMPOUND *(BLOWERS, VAPOR TREATMENT)*
- ← APPROXIMATE GROUNDWATER FLOW DIRECTION
- ◈ EXISTING MONITORING WELL
- ◈ HISTORIC SOIL BORING LOCATION
- --84-- SURFACE ELEVATION CONTOUR

ASSUMPTIONS

1) AIR SPARGE WELL SPACING APPROX. 20 FEET (TOTAL OF 46 WELLS).
2) HORIZONTAL SVE SCREEN MAXIMUM LENGTH IS APPROX. 50 FEET (TOTAL OF 430 LINEAR FEET).
3) SVE WELL SPACING 50 FEET BETWEEN WELLS, 25 FEET BETWEEN WELL ENDS.
4) SYSTEM TO OPERATE AT 50% DUTY CYCLE.
5) EQUIPMENT COMPOUND TO BE LOCATED INSIDE FORMER DRUM SHED.
6) ACCESS TO AUGUST THOMSEN PROPERTY IS POSSIBLE.
7) OPERATION AND MAINTENANCE PERIOD OF 2 TO 3 YEARS.
8) UPGRADIENT REMEDIATION (OFF-SITE) BY OTHERS TO ADDRESS SOURCES.



GRAPHIC SCALE
0 30 60
1" = 60'-0" (Approximate)

NOTE: BASE MAP REPRINTED FROM "FOCUSED REMEDIAL INVESTIGATION REPORT", TAMS & GZA, 4/99

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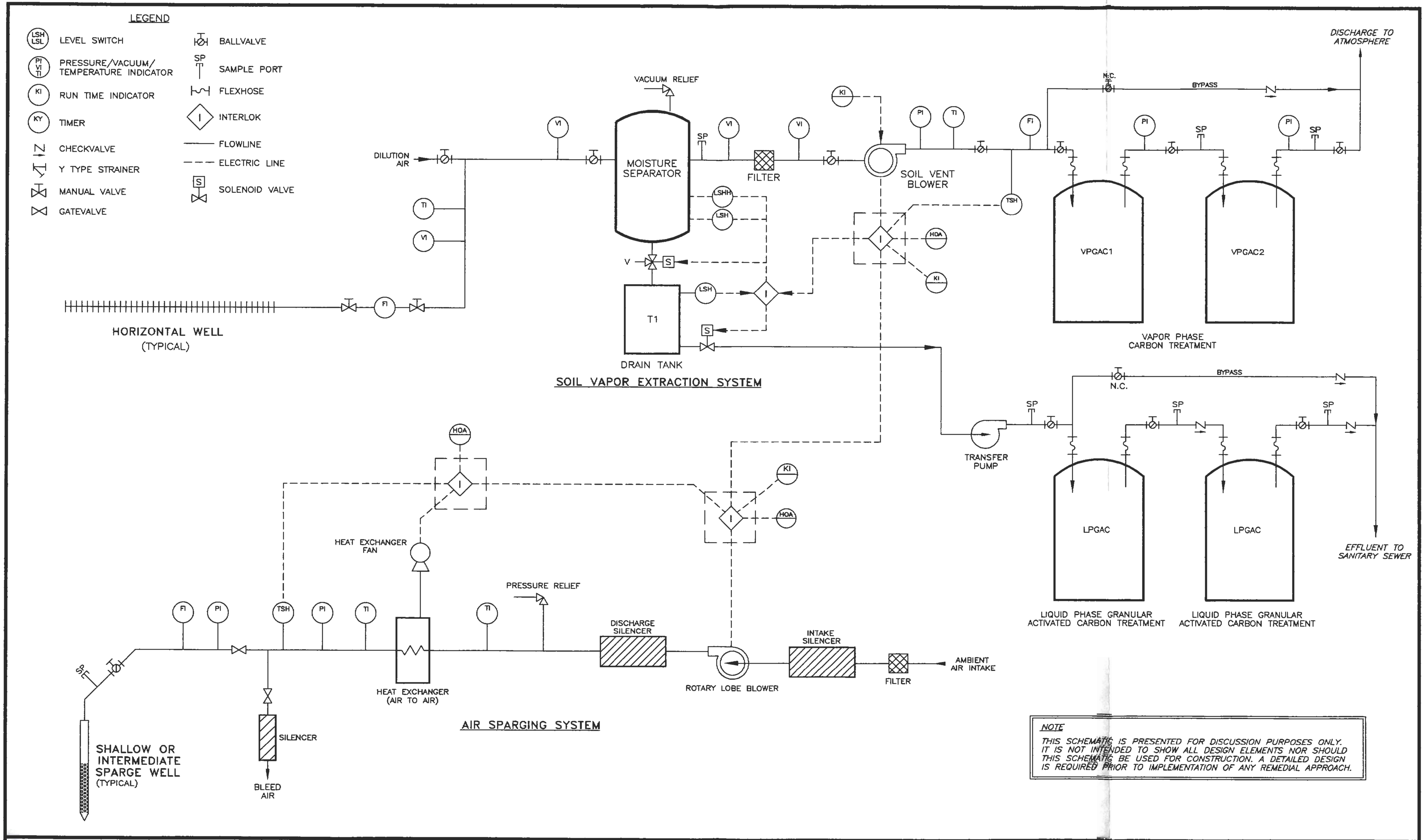
Alternative #2
Air Sparge / Soil Vapor Extraction
Conceptual Layout

DATE: 10/24/01
REV. NO. -
PROJECT NO. MT&E-PALL-M371
DRAWN: TRS
DESIGNED: DJS
FILE: PALLALT2.DWG
FIGURE: 5-1A



NOTE

THIS SCHEMATIC IS PRESENTED FOR DISCUSSION PURPOSES ONLY. IT IS NOT INTENDED TO SHOW ALL DESIGN ELEMENTS NOR SHOULD THIS SCHEMATIC BE USED FOR CONSTRUCTION. A DETAILED DESIGN IS REQUIRED PRIOR TO IMPLEMENTATION OF ANY REMEDIAL APPROACH.

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Alternative #2
Air Sparge / Soil Vapor Extraction
Process Schematic

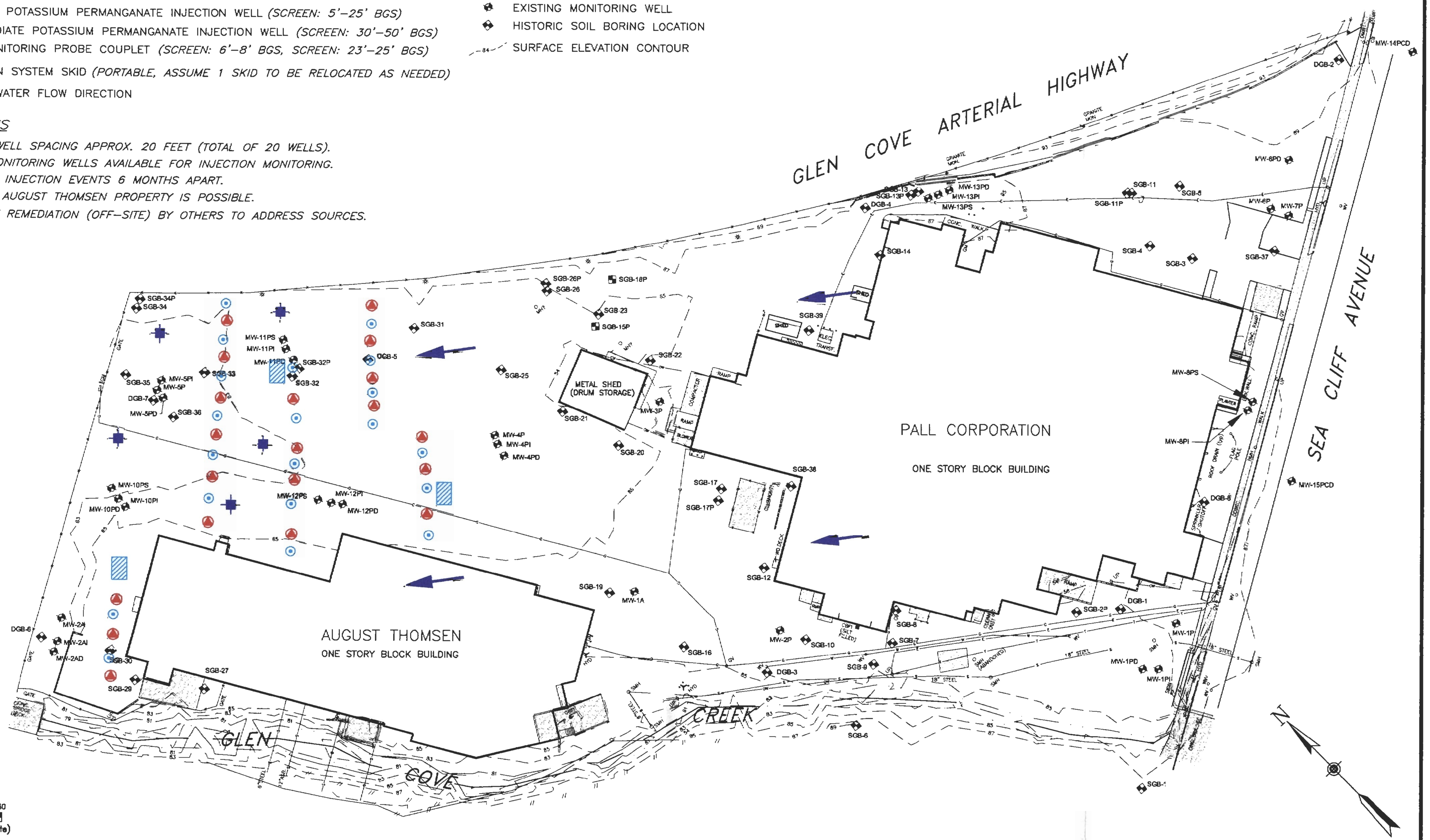
DATE:	10/24/01	DRAWN:	TRS	FIGURE:
REV. NO.	-	DESIGNED:	DJS	5-1B
PROJECT NO.	MT&E-PALL-M371	FILE:	PALLALT2BFS.DWG	

LEGEND

- ⊙ SHALLOW POTASSIUM PERMANGANATE INJECTION WELL *(SCREEN: 5'–25' BGS)*
- ● INTERMEDIATE POTASSIUM PERMANGANATE INJECTION WELL *(SCREEN: 30'–50' BGS)*
- ✚ NEW MONITORING PROBE COUPLET *(SCREEN: 6'–8' BGS, SCREEN: 23'–25' BGS)*
- ▨ INJECTION SYSTEM SKID *(PORTABLE, ASSUME 1 SKID TO BE RELOCATED AS NEEDED)*
- ← GROUNDWATER FLOW DIRECTION
- ⊗ EXISTING MONITORING WELL
- ◈ HISTORIC SOIL BORING LOCATION
- --84-- SURFACE ELEVATION CONTOUR

ASSUMPTIONS

1) INJECTION WELL SPACING APPROX. 20 FEET (TOTAL OF 20 WELLS).
2) EXISTING MONITORING WELLS AVAILABLE FOR INJECTION MONITORING.
3) ASSUMES 4 INJECTION EVENTS 6 MONTHS APART.
4) ACCESS TO AUGUST THOMSEN PROPERTY IS POSSIBLE.
5) UPGRADIENT REMEDIATION (OFF-SITE) BY OTHERS TO ADDRESS SOURCES.



NOTE: BASE MAP REPRINTED FROM "FOCUSED REMEDIAL INVESTIGATION REPORT", TAMS & GZA, 4/99

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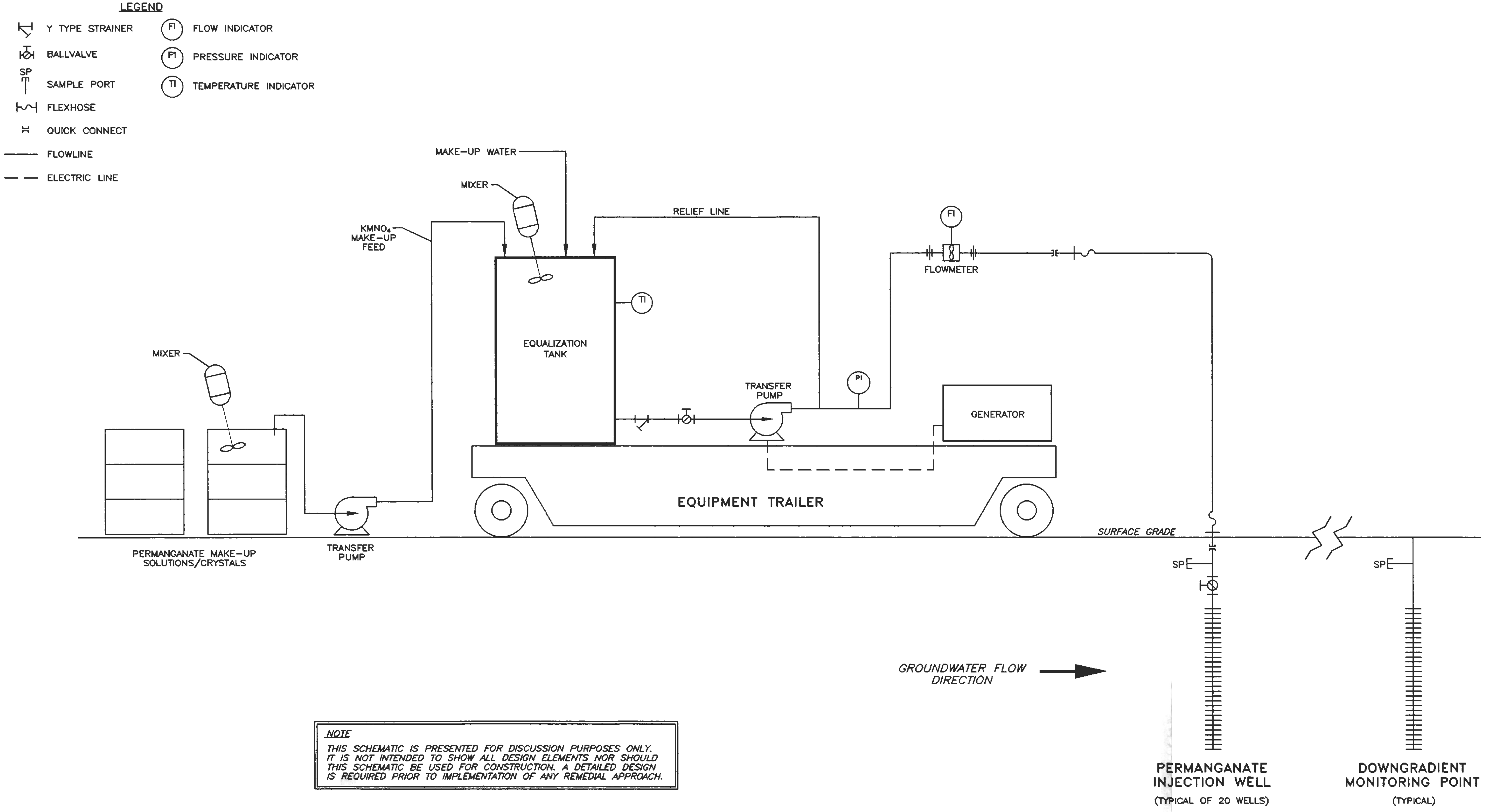
PALL
Pall Corporation
30 Sea Cliff Avenue
Glen Cove, New York 11542

Pilot Test
System Layout
(Potassium Permanagate Injection)

DATE:	10/24/01	DRAWN:	TRS	FIGURE:	5-2A
REV. NO.	-	DESIGNED:	DJS		
PROJECT NO.	MT&E-PALL-M371	FILE:	PALLALT3FS.DWG		



NOTE

THIS SCHEMATIC IS PRESENTED FOR DISCUSSION PURPOSES ONLY. IT IS NOT INTENDED TO SHOW ALL DESIGN ELEMENTS NOR SHOULD THIS SCHEMATIC BE USED FOR CONSTRUCTION. A DETAILED DESIGN IS REQUIRED PRIOR TO IMPLEMENTATION OF ANY REMEDIAL APPROACH.

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Preliminary
Permanganate Injection
Process Schematic

DATE:	10/24/01	DRAWN:	TRS
REV. NO.	-	DESIGNED:	DJS
PROJECT NO.	MT&E-PALL-M371	FILE:	PALLALT3BFS.DWG

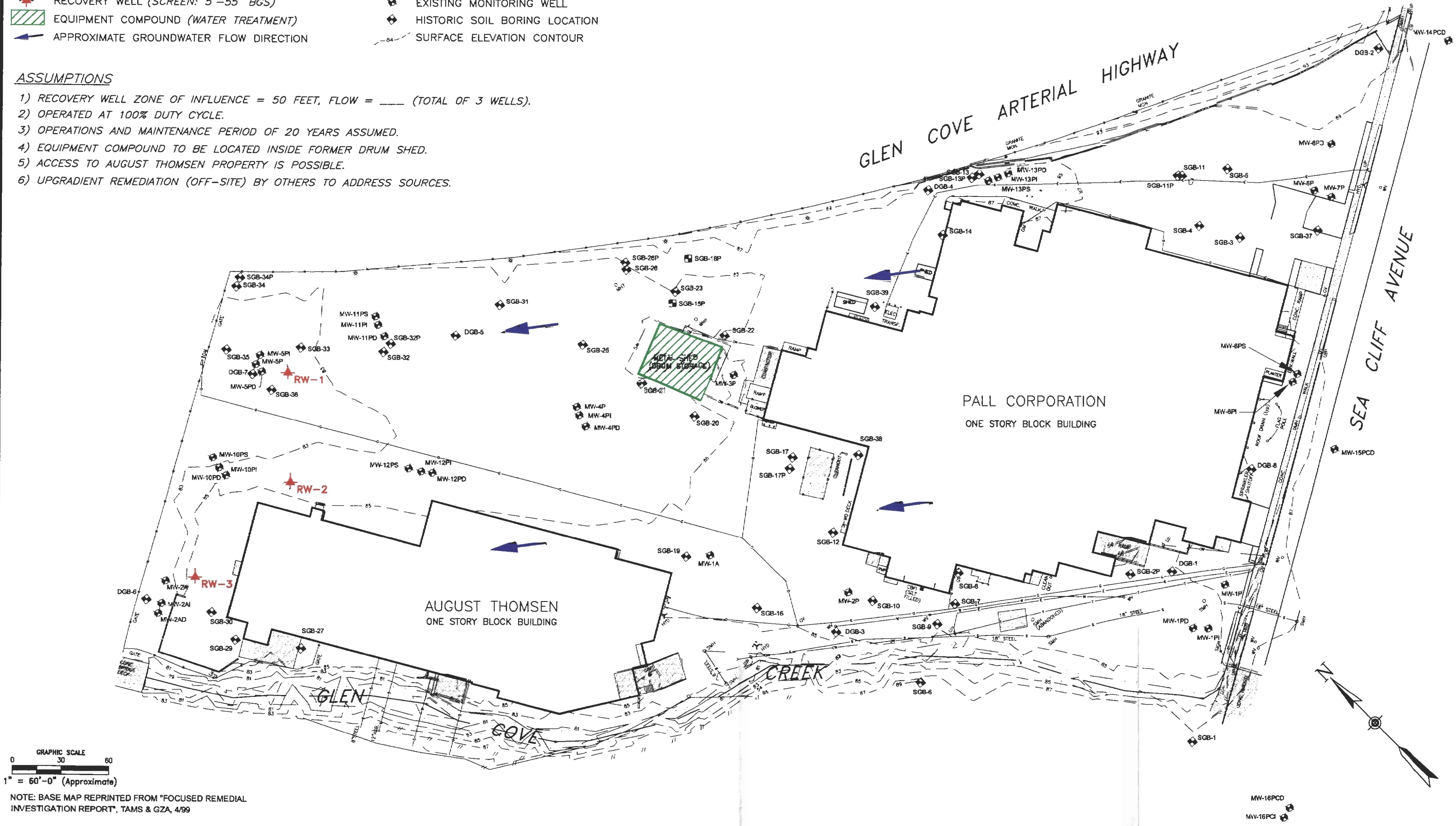
FIGURE:
5-2B

LEGEND

- ✚ RECOVERY WELL *(SCREEN: 5'-55' BGS)*
- ▨ EQUIPMENT COMPOUND *(WATER TREATMENT)*
- ← APPROXIMATE GROUNDWATER FLOW DIRECTION
- ◈ EXISTING MONITORING WELL
- ◈ HISTORIC SOIL BORING LOCATION
- --84-- SURFACE ELEVATION CONTOUR

ASSUMPTIONS

1) *RECOVERY WELL ZONE OF INFLUENCE = 50 FEET, FLOW = ___ (TOTAL OF 3 WELLS).*
2) *OPERATED AT 100% DUTY CYCLE.*
3) *OPERATIONS AND MAINTENANCE PERIOD OF 20 YEARS ASSUMED.*
4) *EQUIPMENT COMPOUND TO BE LOCATED INSIDE FORMER DRUM SHED.*
5) *ACCESS TO AUGUST THOMSEN PROPERTY IS POSSIBLE.*
6) *UPGRADIENT REMEDIATION (OFF-SITE) BY OTHERS TO ADDRESS SOURCES.*



NOTE: BASE MAP REPRINTED FROM "FOCUSED REMEDIAL INVESTIGATION REPORT", TAMS & GZA, 4/99

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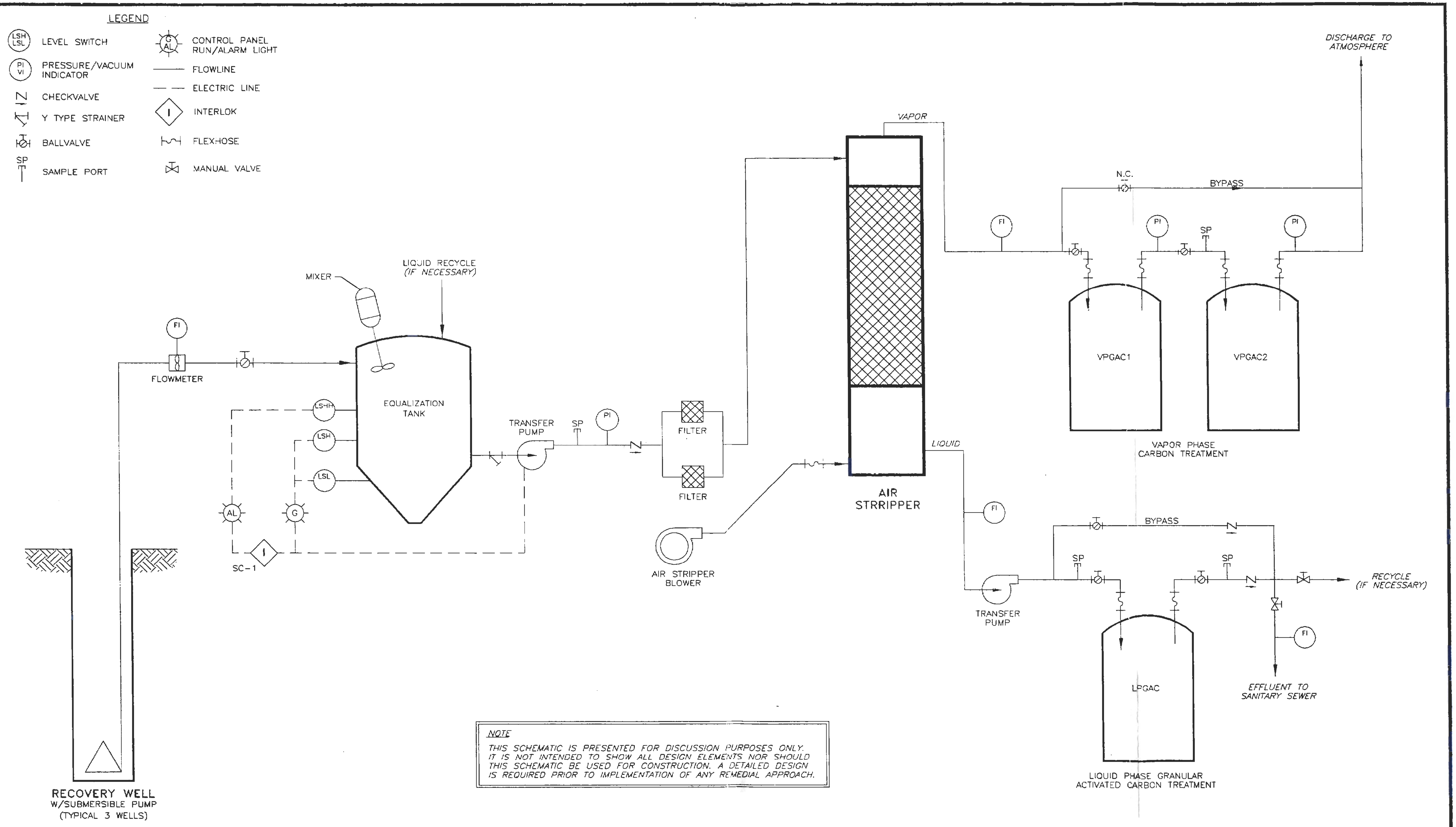
Alternative #4
Pump and Treat Conceptual Layout

DATE:	10/24/01	DRAWN:	TRS	FIGURE:
REV. NO.	-	DESIGNED:	DJS	5-3A
PROJECT NO.	MT&E-PALL-M371	FILE:	PALLALT4FS.DWG	



NOTE

THIS SCHEMATIC IS PRESENTED FOR DISCUSSION PURPOSES ONLY. IT IS NOT INTENDED TO SHOW ALL DESIGN ELEMENTS NOR SHOULD THIS SCHEMATIC BE USED FOR CONSTRUCTION. A DETAILED DESIGN IS REQUIRED PRIOR TO IMPLEMENTATION OF ANY REMEDIAL APPROACH.

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Alternative #4
Pump & Treat Process Schematic

DATE: 9/26/00
REV. NO. -
PROJECT NO. MT&E-PALL-M371

DRAWN: TRS
DESIGNED: DJS
FILE: PALLALT5BFS.DWG

FIGURE: 5-3B

TABLES

TABLE 3-1
SUMMARY OF DETECTED VOC COMPOUNDS IN SOIL SAMPLES

(Phase I RI Soil Investigation)

Sample ID: **Sample Depth (ft):** **Units of Measure:** **Detected Compound**	**RSCO** **UG/KG**	**DGB-1A-3.5** **3.5** **UG/KG**	**DGB-2A-3** **3** **UG/KG**	**DGB-3A-3** **3** **UG/KG**	**DGB4A-3** **3** **UG/KG**	**DGB-5A-2** **2** **UG/KG**	**DGB-6** **4** **UG/KG**	**DGB-7A-4** **4** **UG/KG**	**DGB-8-2.5** **2.5** **UG/KG**	**SGB-1** **11.5 to 12** **UG/KG**	**SGB-2-2** **2** **UG/KG**	**SGB-3-3** **3** **UG/KG**	**SGB-4-2** **2** **UG/KG**	**SGB-5A-3** **3** **UG/KG**	**SGB-7-2** **2** **UG/KG**	**SGB-8-2** **2** **UG/KG**	**SGB-9-2** **2** **UG/KG**
Tetrachloroethene	1400	11 U	11 U	11 U	14 U	11 U	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	8 J	11 U	5 J
Trichloroethene	700	11 U	11 U	11 U	14 U	11 U	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	27 U	11 U	11 U
1,2-Dichloroethene(Total)	300 [6]	11 U	11 U	11 U	14 U	11 U	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	17 J	11 U	11 U
Vinyl chloride	120	11 U	11 U	11 U	14 U	11 UJ	11 UJ	11 U	12 U	11 UJ	11 U	11 U	11 U	11 U	27 U	11 U	11 U
OTHER DETECTED COMPOUNDS																	
Methylene chloride	100	11 U	11 U	11 U	14 U	11 U	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	27 U	11 U	11 U
Acetone	200	31 U	16 U	83 U	53 UJ	11 U	73 J	27 U	12 U	16 U	11 UJ	21 UJ	24 U	25 UJ	33 UJ	49 UJ	13 UJ
2-Butanone	300	11 U	12	28	14	11 UJ	17 J	11 J	12 U	11 UJ	11 U	11 U	11 U	11 U	27 UJ	14 J	11 UJ
1,1,1-Trichloroethane	800	11 U	11 U	11 U	14 U	11 U	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	27 U	11 U	11 U
Benzene	60	11 U	11 U	11 U	14 U	11 U	11 U	11 U	12 U	11 U	11 UJ	11 UJ	11 UJ	11 U	27 U	11 U	11 U
Toluene	1500	11 U	11 U	11 U	14 U	11 U	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	27 U	11 U	11 U
Ethylbenzene	5500	11 U	11 U	11 U	14 U	11 U	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	56	2 J	11 U
Xylenes (Total)	1200	11 U	1 J	11 U	14 U	11 U	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	410	15	11 U

NOTES:
1. DGB = Deep Geoprobe Boring
2. SGB = Shallow Geoprobe Boring
3. Qualifiers defined in Appendix F.
4. RSCO = "Recommended Soil Cleanup Objective" in NYSDEC Division Technical and Administrative Guidance Memorandum on the Determination of Soil Cleanup Objectives and Cleanup Levels dated January 24, 1994 (TAGM 4046).
5. Blank = No "Recommended Soil Cleanup Objective" standard.
6. Recommended Soil Cleanup Objective standard for 1,2 Dichloroethene (trans).
7. TCL VOCs not listed were not detected in any of the soil samples, Bold, italic indicates an exceedance of the RSCO.

Tables based upon data originally presented in "Focused Remedial Investigation Report", April 1999.

TABLE 3-1
SUMMARY OF DETECTED VOC COMPOUNDS IN SOIL SAMPLES

(Phase I RI Soil Investigation)

Sample ID:	**RSCO**	**SGB-10-3**	**SGB-11-2**	**SGB-12-2**	**SGB-13-2**	**SGB-14-3**	**SGB-16-3**	**SGB-17-3**	**SGB-19**	**SGB-20-3**	**SGB-21-2**	**SGB-22-3**	**SGB-22-3R**	**SGB-23-3**	**SGB-23-6**	**SGB-25-2.5**	**SGB-26-3**
Sample Depth (ft):		**3**	**2**	**2**	**2**	**3**	**3**	**3**	**3.5 to 4**	**3**	**2**	**3**	**3**	**3**	**6**	**2.5**	**3**
Units of Measure:	**UG/KG**	**UG/KG**	**UG/KG**	**UG/KG**	**UG/KG**	**UG/KG**	**UG/KG**	**UG/KG**	**UG/KG**	**UG/KG**	**UG/KG**	**UG/KG**	**UG/KG**	**UG/KG**	**UG/KG**	**UG/KG**	**UG/KG**
Detected Compound																	
Tetrachloroethene	1400	11 U	12 U	11 U	11 U	11 U	11 U	1 J	11 U	2 J	430	700	10 J	11 U	120 U	11 U	11 U
Trichloroethene	700	11 U	12 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	27 U	21 J	44 U	11 U	120 U	11 U	11 U
1,2-Dichloroethene(Total)	300 [6]	11 U	12 U	11 U	11 U	11 U	11 U	11 U	11 U	16	27 U	15 J	5 J	11 U	120 U	11 U	11 U
Vinyl chloride	120	11 U	12 U	11 U	11 U	11 U	11 U	11 U	11 UJ	4 J	27 U	130 U	44 U	11 U	120 U	11 U	11 U
OTHER DETECTED COMPOUNDS																	
Methylene chloride	100	11 U	12 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	27 U	130 U	44 U	11 U	120 U	11 UJ	11 U
Acetone	200	65 J	35 UJ	13 UJ	11 UJ	14 UJ	64 J	11 UJ	11 U	74 J	27 UJ	380 UJ	44 U	14 UJ	120 UJ	11 UJ	18 UJ
2-Butanone	300	18	11 J	11 U	11 U	11 UJ	19	11 U	11 UJ	24 J	27 U	230	27 J	11 UJ	120 UJ	11 U	11 UJ
1,1,1-Trichloroethane	800	11 U	12 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	27 U	130 U	44 U	11 U	120 U	11 U	11 U
Benzene	60	11 U	12 UJ	11 U	11 UJ	11 U	11 U	11 U	11 U	11 U	27 U	130 U	44 U	11 U	120 U	11 U	11 U
Toluene	1500	11 U	12 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	27 U	14 J	14 J	11 U	120 U	11 U	11 U
Ethylbenzene	5500	11 U	12 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	27 U	130 U	14 J	11 U	17 J	11 U	11 U
Xylenes (Total)	1200	11 U	12 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	27 U	79 J	150	11 U	96 J	11 U	11 U

NOTES:
1. DGB = Deep Geoprobe Boring
2. SGB = Shallow Geoprobe Boring
3. Qualifiers defined in Appendix F.
4. RSCO = "Recommended Soil Cleanup Objectiv
   on the Detemination of Soil Cleanup Objectives
5. Blank = No "Recommended Soil Cleanup Objec
6. Recommended Soil Cleanup Objective standarc
7. TCL VOCs not listed were not detected in any o

Tables based upon data originally presented in "Focused Remedial Investigation Report", April 1999.

TABLE 3-1
SUMMARY OF DETECTED VOC COMPOUNDS IN SOIL SAMPLES

(Phase I RI Soil Investigation)

Sample ID:	RSCO	SGB-30	SGB-31-3.5	SGB-32-3	SGB-33-3	SGB-34-3.5	SGB-35-3	SGB-36-2	SGB-37-2.5RE	SGB-38-2	SGB-39-2.5	APS-1-2.5	APS-2-2.5	APS-3-3.5
Sample Depth (ft):		10 to 11	3.5	3	3	3.5	3	2	2.5	2	2.5	2.5	2.5	3.5
Units of Measure:	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG
Detected Compound														
Tetrachloroethene	1400	74 U	6 J	11 U	11 U	12 U	11 U	11 U	R	66	11 U	11 U	11 U	1 J
Trichloroethene	700	74 U	11 U	11 U	11 U	12 U	11 U	11 U	R	29	11 U	11 U	11 U	11 U
1,2-Dichloroethene(Total)	300[6]	74 U	11 U	11 U	11 U	12 U	11 U	11 U	R	48	11 U	11 U	11 U	3 J
Vinyl chloride	120	74 U	11 U	11 U	11 U	12 U	11 U	11 U	R	11 U	11 U	11 U	11 UJ	11 UJ
OTHER DETECTED COMPOUNDS														
Methylene chloride	100	74 U	11 U	11 U	15	12 U	11 U	11 U	21 UJ	11 U	11 U	11 U	11 U	11 U
Acetone	200	140 U	11 UJ	11 UJ	94 J	12 UJ	11 UJ	32 UJ	R	11 U	11 U	24 UJ	11 U	16 UJ
2-Butanone	300	74	11 UJ	11 UJ	26 J	12 UJ	11 UJ	11 UJ	R	11 U	11 U	11 UJ	11 U	11 U
1,1,1-Trichloroethane	800	74 U	11 U	11 U	11 U	12 U	11 U	11 U	R	2 J	11 U	11 U	11 U	11 U
Benzene	60	82	11 U	11 U	11 U	12 U	11 U	11 U	2 J	11 U	11 U	11 U	11 U	11 U
Toluene	1500	74 U	11 U	11 U	11 U	12 U	11 U	11 U	R	11 U	11 U	11 U	11 U	11 U
Ethylbenzene	5500	400	11 U	11 U	11 U	12 U	11 U	11 U	R	11 U	11 U	11 U	11 U	11 U
Xylenes (Total)	1200	***2300***	11 U	11 U	11 U	12 U	11 U	11 U	R	11 U	11 U	4 J	11 U	11 U

NOTES:

1. DGB = Deep Geoprobe Boring
2. SGB = Shallow Geoprobe Boring
3. Qualifiers defined in Appendix F.
4. RSCO = "Recommended Soil Cleanup Objectiv
   on the Detemination of Soil Cleanup Objectives a
5. Blank = No "Recommended Soil Cleanup Objec
6. Recommended Soil Cleanup Objective standarc
7. TCL VOCs not listed were not detected in any o

Tables based upon data originally presented in "Focused Remedial Investigation Report", April 1999.

TABLE 3-2
SUMMARY OF SVOC TESTING ON SOIL SAMPLES
(NYSDEC Phase I Soil Investigation)

Sample ID:	**RSCO**	**SGB-7-2**	**SGB-21-2**	**SGB-22-3**	**SGB-22-3R**	**SGB-23-3R**	**SGB-30**
Units of Measure: **Compound Description**	**UG/KG**	**UG/KG**	**UG/KG**	**UG/KG**	**UG/KG**	**UG/KG**	**UG/KG**
1,2,4-Trichlorobenzene		350 U	1,900	420 U	13,000 UJ	350 U	480 U
Naphthalene	1,300	330 J	340 U	420 U	1,300 J	350 U	190 J
2-Methylnaphthalene	36,400	350 U	56 J	420 U	3,100 J	350 U	120 J
Acenaphthene	50,000	350 U	93 J	420 U	13,000 UJ	350 U	480 U
Fluorene	50	350 U	340 U	420 U	***1,900 J***	350 U	480 U
Pentachlorophenol	1,000	51 J	860 U	1,100 U	***1,800 J***	880 U	1,200 U
Phenanthrene	50,000	350 U	94 J	420 U	2,500 J	350 U	77 J
Anthracene	50,000	350 U	140 J	420 U	13,000 UJ	350 U	480 U
Di-n-butyl phthalate	8,100	350 U	340 U	420 U	2,200 J	350 U	480 U
Fluoranthene	50,000	350 U	780	420 U	13,000 UJ	350 U	170 J
Pyrene	50,000	350 U	960	420 U	13,000 UJ	350 U	180 J
Butyl benzyl phthalate	50,000	160 J	340 U	420 U	13,000 UJ	350 U	480 U
Benzo(a)anthracene	224	350 U	***350***	420 U	13,000 UJ	350 U	120 J
Chrysene	400	350 U	380	420 U	13,000 UJ	350 U	160 J
bis(2-Ethylhexyl)phthalate	50,000	750	570	420 U	13,000 UJ	350 U	110 J
Benzo(b)fluoranthene	1,100	350 U	1,000 NJ	420 U	13,000 UJ	350 U	250 NJ
Benzo(k)fluoranthene	1,100	350 U	***1,200 NJ***	420 U	13,000 UJ	350 U	270 NJ
Benzo(a)pyrene	61	350 U	***630***	420 U	13,000 UJ	350 U	***130 J***
Indeno(1,2,3-cd)pyrene	3,200	350 U	310 J	420 U	13,000 UJ	350 U	99 J
Dibenzo(a,h)anthracene		350 U	80 J	420 U	13,000 UJ	350 U	480 U
Benzo(g,h,i)perylene	50,000	350 U	280 J	420 U	13,000 UJ	350 U	87 J

Notes:

1. SGB = Shallow Geoprobe Boring
2. Qualifiers are included in Appendix F.
3. "Recommended Soil Cleanup Objective" in NYSDEC Division Technical and Administrative Guidance Memorandum on the Detemination of Soil Cleanup Objectives and Cleanup Levels dated January 24, 1994 (TAGM 4046).

Table based upon data originally presented by NYSDEC in "Focused Remedial Investigation Report, April 1999

TABLE 3-3
SUMMARY OF INORGANIC PARAMETERS IN SOIL SAMPLES
(NYSDEC Phase I RI Soil Investigation)

Sample ID: **Sample Depth (ft.):** **Units of Measure:** **Compound Description**	**RSCO** **MG/KG**	**SGB-7-2** **2** **MG/KG**	**SGB-21-2** **2** **MG/KG**	**SGB-22-3** **3** **MG/KG**	**SGB-22-3R** **3** **MG/KG**	**SGB-23-3R** **3** **MG/KG**	**SGB-30** **10-11** **MG/KG**
Aluminum		4680 *J	4010 *J	3500	1500 *J	3720 *J	10900
Antimony		0.71 UNJ	0.71 UNJ	0.83 U	5 BNJ	0.7 UNJ	0.97 UNJ
Arsenic	7.5 *	1.8 B	0.93 B	1.1 B	18.4	0.76 U	8.1
Barium	300 *	28.2 B	19.9 B	43.1 BN*J	1330	26.5 B	70.4
Beryllium	0.16 *	0.18 B	0.21 B	0.34 B	0.13 U	0.18 B	0.76 B
Cadmium	1 *	0.09 U	0.09 U	0.63 B	2.2	0.08 U	0.29 B
Calcium		10900	462 B	3550 *J	9450	502 B	1260 B
Chromium	10 *	9.4	7.3	9.6	16.2	7.3	16.3
Cobalt	30 *	3.5 B	2.8 B	2.2 B	1.8 B	3.4 B	5.6 BJ
Copper	25 *	8	5.3 B	24.9 EJ	166	15.2	33 *
Iron	2000 *	***7680***	***4970***	***4120***	***24700***	***6510***	***12900***
Lead	200-500 **	10.7 *J	5 *J	23.1	***2940 *J***	8.4 *J	81.2
Magnesium		6780	733 B	2670 *J	836 B	1060 B	1550
Manganese		127 *J	34.3 *J	39.4	83.8 *J	105 *J	213
Mercury	0.1 *	0.05 U	0.05 U	***0.29 NJ***	***1.1***	0.05 U	***0.32***
Nickel	13 *	7.1 B	5.7 B	8 B	8.4 B	7 B	10 B
Potassium		424 B	284 B	363 BJ	294 B	376 B	364 BJ
Selenium	2 *	1.1 NJ	0.73 UN	0.96 B	***63.8 NJ***	0.84 BNJ	***2.7 NJ***
Silver		0.13 U	0.13 U	0.15 U	0.67 B	0.13 U	0.18 U
Sodium		111 U	110 U	130 U	763 B	109 U	151 U
Thallium		0.84 U	0.83 U	0.99 U	1.1 B	0.83 U	1.5 B
Vanadium	150 *	10.5 B	9 B	9.5 B	12.4 B	8.9 B	20.7
Zinc	20 *	***20.8*** EJ	16.2 EJ	***123 NJ***	***299 EJ***	19.7 EJ	***55.9 EJ***
Cyanide		0.51 U	0.53 UJ	0.63 U	0.65 U	0.51 U	0.73 U

Notes:

1. SGB = Shallow Geoprobe Borings
2. Qualifiers are defined in Appendix F.
3. RSCO = "Recommended Soil Cleanup Objective" in NYSDEC Division Technical and Administrative Guidance Memorandum on the Detemination of Soil Cleanup Objectives and Cleanup Levels dated January 24, 1994 (TAGM 4046).
4. Blank = No "Recommended Soil Cleanup Objective" or "Eastern USA Background" standard.
5. * = or Site background
6. ** = Background levles for lead vary widely. Average levles in undeveloped, rural areas may range from 4-61 mg/kg. Average background levles in metropolitan or suburban areas or near highways are much higher and typically range from 200 - 500 mg/kg.

Table based upon data originally presented by NYSDEC in 'Focused Remedial Investigation Report", April 1999

TABLE 3-4
SUMMARY OF TOTAL ORGANIC CARBON TESTING IN SOIL SAMPLES

(NYSDEC Phase I RI Soil Investigation)

Sample ID: Sample Depth (ft.): Matrix: Units of Measure:	SED-3 SO mg/kg	DGB-1A-7 7 SO mg/kg	DGB-3A-7 7 SO mg/kg	DGB-7A-7 7 SO mg/kg	SGB-23-6 6 SO mg/kg	SGB-23-6 6 SO mg/kg	SGB-30 11-12 SO mg/kg
Organic Carbon	4250	2120	777	2290	2060	3190	>16000*

Notes:

1. SED = Sediment sample
2. DGB = Deep Geoprobe Boring
3. SGB = Shallow Geoprobe Boring
4. * = 16,000 mg/kg is the maximum range a 10 mg sample for TOC soil may read.

TABLE 3-5
SUMMARY OF DETECTED VOC COMPOUNDS IN SEDIMENT SAMPLES
(NYSDEC Phase I RI Soil / Sediment Investigation)

Sample ID: **Sample Location:** **Units of Measure:** **Detected Compound**	**Sediment Criteria UG/KG**	**SED1R upgradient UG/KG**	**SED2R midstream UG/KG**	**SED3R downgradient UG/KG**
Tetrachloroethene	3.4	13 U	13 U	2100 D
Trichloroethene	8.5	13 U	13 U	100
1,2-Dichloroethene(Total)		13 U	13 U	12 U
Vinyl chloride		13 U	13 U	12 U

Notes:

1. SED = Sediment sample
2. Qualifiers are defined in Appendix F.
3. Results compaired to Division of Fish and Wildlife, Technical Guidance for Screening Contaminated Sediments, July, 1994 (NYSDEC Sediment Criteria).
4. All samples retrieved from Glen Cove Creek.
5. Sediment samples had to be resampled on March 14, 1998, due to laboratory interference on the first samples retrieved on February 17, 1998.

Table based upon data originally presented by NYSDEC in "Focused Remedial Investigation Report, April 1999

Table 3-6
Pall Corporation, Sea Cliff Avenue Facility
Soil Sample Data Summary

All results in ug/kg except as noted.

Parameter	NYSDEC TAGM HWR-94-4046 RSCO's*	SB-1 3'-4' (3/29/99)	SB-1 8.5'-9.5' (3/29/99)	SB-2 3'-4' (3/29/99)	SB-2 9'-10' (3/29/99)	SB-3 3'-4' (3/29/99)	SB-3 9'-10' (3/29/99)	SB-4 3'-4' (3/29/99)	SB-4 9'-10' (3/29/99)	SB-5 3'-4' (3/29/99)	SB-5 8.5'-9.5' (3/29/99)	SB-6 3'-4' (3/29/99)	SB-6 8.5'-9.5' (3/29/99)	SB-7 3'-4' (3/30/99)	SB-7 9'-12' (3/30/99)	SB-8 3'-5' (3/30/99)	SB-8 7'-9' (3/30/99)
Chloromethane	NA	<12	<13	<12	<12	<12	<11	<12	<11	<14	<11	<14	<12	<12	<11	<12	<11
Bromomethane	NA	<12	<13	<12	<12	<12	<11	<12	<11	<14	<11	<14	<12	<12	<11	<12	<11
Vinyl Chloride	200	5 J	<13	<12	<12	<12	<11	<12	<11	<14	<11	<14	<12	14 JD	<11	<12	<11
Chloroethane	1,900	<12	<13	<12	<12	<12	<11	<12	<11	<14	<11	<14	<12	<12	<11	<12	<11
Methylene Chloride	100	<12	<13	4 J	2 JB	2 J	3 J	3 J	2 J	4 J	2 J	4 J	4 J	3 J	3 J	4 J	<11
Acetone	200	<12	<13	56	<12	27	<11	19	12	42	<11	92	21	<12	<11	<12	<11
Carbon Disulfide	2,700	<12	<13	<12	<12	<12	<11	<12	<11	<14	<11	<14	<12	<12	<11	<12	<11
1,1-Dichloroethene	400	<12	<13	<12	<12	<12	<11	<12	<11	<14	<11	<14	<12	<12	<11	<12	<11
1,1-Dichlorethane	200	<12	<13	<12	<12	<12	<11	<12	<11	10 J	<11	2 J	<12	3 J	<11	<12	<11
1,2-Dichloroethene (total)	300**	37	4 J	<12	<12	<12	<11	<12	<11	***1,000 D***	3 J	8 J	1 J	***400 D***	22	<12	<11
2-Butanone	300	<12	<13	<12	<12	<12	<11	<12	<11	<14	<11	<14	<12	<12	<11	<12	<11
Chloroform	300	<12	<13	<12	<12	<12	<11	<12	<11	<14	<11	<14	<12	<12	<11	<12	<11
1,2-Dichloroethane	100	<12	<13	<12	<12	<12	<11	<12	<11	<14	<11	<14	<12	<12	<11	<12	<11
1,1,1-Trichloroethane	800	<12	<13	<12	<12	<12	<11	<12	<11	5 J	<11	<14	<12	22	<11	<12	<11
Carbon Tetrachloride	600	<12	<13	<12	<12	<12	<11	<12	<11	<14	<11	<14	<12	<12	<11	<12	<11
Bromodichloromethane	NA	<12	<13	<12	<12	<12	<11	<12	<11	<14	<11	<14	<12	<12	<11	<12	<11
1,2-Dichloropropane	NA	<12	<13	<12	<12	<12	<11	<12	<11	<14	<11	<14	<12	<12	<11	<12	<11
cis-1,3-Dichloropropene	NA	<12	<13	<12	<12	<12	<11	<12	<11	<14	<11	<14	<12	<12	<11	<12	<11
Trichloroethene	700	<12	<13	<12	<12	<12	<11	<12	<11	<14	<11	<14	<12	150	25	<12	<11
Benzene	60	<12	<13	<12	<12	<12	<11	<12	<11	<14	<11	<14	<12	<12	<11	<12	<11
Dibromochloromethane	NA	<12	<13	<12	<12	<12	<11	<12	<11	<14	<11	<14	<12	<12	<11	<12	<11
trans-1,3-Dichloropropene	NA	<12	<13	<12	<12	<12	<11	<12	<11	<14	<11	<14	<12	<12	<11	<12	<11
1,1,2-Trichloroethane	NA	<12	2,400 D	<12	<12	<12	<11	<12	<11	<14	<11	<14	<12	<12	<11	<12	<11
Bromoform	NA	<12	<13	<12	<12	<12	<11	<12	<11	<14	<11	<14	<12	<12	<11	<12	<11
4-Methyl-2-Pentanone	1,000	<12	<13	<12	<12	<12	<11	<12	<11	<14	<11	<14	<12	<12	<11	<12	<11
Tetrachloroethene	1,400	<12	<13	<12	<12	<12	2 J	<12	<11	<14	6 J	<14	<12	730 D	110	15	<11
1,1,2,2-Tetrachloroethane	600	<12	<13	<12	<12	<12	<11	<12	<11	<14	<11	<14	<12	<12	<11	<12	<11
Toluene	1,500	7 J	160	<12	<12	<12	<11	<12	<11	8 J	<11	27	<12	<12	<11	<12	<11
Chlorobenzene	1,700	<12	<13	<12	<12	<12	<11	<12	<11	<14	<11	<14	<12	<12	<11	<12	<11
Ethylbenzene	5,500	120 D	320 D	<12	<12	<12	<11	<12	<11	8 J	<11	16	<12	<12	<11	<12	<11
Styrene	NA	<12	29 JD	<12	<12	<12	<11	<12	<11	<14	<11	2 J	<12	<12	<11	<12	<11
m/p-Xylene	1,200***	130 D	***2,600 D***	8 J	<12	<12	2 J	<12	<11	30	<11	34	<12	<12	<11	<12	<11
o-Xylene	1,200***	<12	540 D	<12	<12	<12	<11	<12	<11	6 J	<11	44	<12	<12	<11	<12	<11
Total VOCs	10,000	299	6,053	68	2	29	7	22	14	1,113	11	229	26	1,322	160	19	0

Notes:

* Recommended Soil Clean-up Objectives (RSCO's) defined in NYSDEC Technical and Administrative Guidance Memorandum (TAGM) HWR-94-4046, as amended.
** RSCO for trans-1,2-Dichloroethene used.
*** RSCO for total Xylenes used.
NA = Not Available
J = Estimated value
B = Analyte is found in associated blank as well as in the sample
E = Compound whose concentrations exceeded the calibration range of the GC/MS for that specific analysis. The sample was diluted and re-analyzed.
D = Compound is identified at a secondary dilution factor.
<## = Compound was analyzed for but not detected. The ## represents the sample quantitation limit (This is similar to the U flag).

Table 3-7

SB-5 Area Soil Sampling Results
(Samples Collected August 1999)

Parameter	NYSDEC HWR-94-4046 RSCO's	5-SB-1 0'-4' 8/24/1999	5-SB-2 0'-4' 8/24/1999	5-SB-3 0'-4' 8/24/1999	5-SB-4 0'-4' 8/24/1999	5-SB-5 0'-4' 8/24/1999	5-SB-6 0'-4' 8/24/1999	5-SB-7 0'-4' 8/24/1999	5-SB-8 0'-4' 8/24/1999	5-SB-9 0'-4' 8/24/1999	5-SB-10 0'-4' 8/24/1999	5-SB-11 0'-4' 8/24/1999	5-SB-12 0'-4' 8/24/1999	5-SB-13 0'-4' 8/24/1999	5-SB-14 0'-4' 8/24/1999	SB-15 0'-4' 8/24/1999
Chloromethane	NA	<11	<11	<11	<11	<11	<12	<11	<12	<10	<11	<11	<11	<11	<11	<11
Bromomethane	NA	<11	<11	<11	<11	<11	<12	<11	<12	<10	<11	<11	<11	<11	<11	<11
Vinyl Chloride	200	<11	<11	<11	<11	2 J	<12	<11	<12	<10	<11	<11	2 J	<11	<11	17
Chloroethane	1,900	<11	<11	<11	<11	<11	<12	<11	<12	<10	<11	<11	<11	<11	<11	<11
Methylene Chloride	100	2 J	2 J	2 J	2 J	2 J	2 J	2 J	2 J	2 J	3 J	4 J	3 J	3 J	3 J	4 J
1,1-Dichloroethene	400	<6	<6	<6	<6	<6	<6	<6	<6	<5	<5	<5	<6	<5	<5	13
1,1-Dichloroethane	200	<6	<6	<6	<6	<6	<6	<6	<6	<5	<5	<5	4 J	<5	<5	70
Chloroform	300	<6	<6	<6	<6	<6	<6	<6	<6	<5	1 J	<5	<6	<5	<5	1 J
1,2-Dichloroethane	100	<6	<6	<6	<6	<6	<6	<6	<6	<5	<5	<5	<6	<5	<5	<6
1,1,1-Trichloroethane	800	<6	<6	<6	<6	<6	<6	<6	<6	<5	10	<5	<6	<5	<5	***980 E***
Carbon Tetrachloride	NA	<6	<6	<6	<6	<6	<6	<6	<6	<5	2 J	<5	<6	<5	<5	140
Bromodichloromethane	NA	<6	<6	<6	<6	<6	<6	<6	<6	<5	<5	<5	<6	<5	<5	<6
1,2-Dichloropropene	NA	<6	<6	<6	<6	<6	<6	<6	<6	<5	<5	<5	<6	<5	<5	<6
cis 1,3-Dichloropropene	NA	<6	<6	<6	<6	<6	<6	<6	<6	<5	<5	<5	<6	<5	<5	<6
Trichloroethene	700	<6	<6	<6	<6	<6	4 J	2 J	<6	<5	20	4 J	2 J	9	21	***19,000 JD***
Benzene	60	<6	<6	<6	<6	<6	<6	<6	<6	<5	<5	<5	2 J	<5	<5	<6
Dibromochloromethane	NA	<6	<6	<6	<6	<6	<6	<6	<6	<5	<5	<5	<6	<5	<5	<6
trans 1,3-Dichloropropene	NA	<6	<6	<6	<6	<6	<6	<6	<6	<5	<5	<5	<6	<5	<5	<6
1,1,2-Trichloroethane	NA	<6	<6	<6	<6	<6	<6	<6	<6	<5	<5	<5	<6	<5	<5	<6
Bromoform	NA	<6	<6	<6	<6	<6	<6	<6	<6	<5	<5	<5	<6	<5	<5	<6
Tetrachloroethene	1,400	<6	1 J	<6	<6	<6	44	10	2 J	<5	480 D	22	4 J	180 D	10	***950,000 D***
1,1,2,2-Tetrachloroethane	600	<6	<6	<6	<6	<6	<6	<6	<6	<5	<5	<5	<6	<5	<5	<6
Toluene	1,500	<6	<6	<6	<6	<6	<6	<6	<6	<5	<5	<5	22	<5	<5	180
Chlorobenzene	1,700	<6	<6	<6	<6	<6	<6	<6	<6	<5	<5	<5	<6	<5	<5	<6
Ethylbenzene	5,500	<6	<6	<6	<6	<6	<6	<6	<6	<5	<5	<5	4 J	<5	<5	120
Trichlorofluoromethane	NA	<11	<11	<11	<11	<11	<12	<11	<12	<10	<11	<11	<11	<11	<11	<11
2-Chloroethylvinylether	NA	<11	<11	<11	<11	<11	<12	<11	<12	<10	<11	<11	<11	<11	<11	<11
trans-1,2-Dichloroethene	300	<6	<6	<6	<6	<6	<6	<6	<6	<5	<5	<5	4 J	<5	<5	24
1,3-Dichlorobenzene		<11	<11	<11	<11	<11	<12	<11	<12	<10	<11	<11	<11	<11	<11	<11
1,4-Dichlorobenzene		<11	<11	<11	<11	<11	<12	<11	<12	<10	<11	<11	<11	<11	<11	<11
1,2-Dichlorobenzene		<11	<11	<11	<11	<11	<12	<11	<12	<10	<11	<11	<11	<11	<11	<11
m/p-Xylene	1,200	<6	<6	<6	3 J	<6	<6	<6	<6	<5	<5	<5	9	<5	<5	490 E
o-Xylene	1,200	<6	<6	<6	1 J	<6	<6	<6	<6	<5	<5	<5	8	<5	<5	72
cis-1,2-Dichloroethene	300	1 J	2 J	<6	1 J	9	6	7	4 J	<5	25	15	13	6	13	***4,100 E***
Total VOCs		3	5	2	7	13	56	21	8	2	541	45	77	198 D	47	975,211 DE
Total TICs		87 J	33 J	ND	ND	11 J	25 J	ND		22 JN	11 JN	12 JN	5,140 J	7 J	ND	1,371 J

Notes:

* Recommended Soil Clean-up Objectives (RSCO's) defined in NYSDEC Technical and Administrative Guidance Memorandum (TAGM) HWR-94-4046, as amended.
** RSCO for trans-1,2-Dichloroethene used.
*** RSCO for total Xylenes used.
NA = Not Available
J = Estimated value
B = Analyte is found in associated blank as well as in the sample
E = Compound whose concentrations exceeded the calibration range of the GC/MS for that specific analysis. The sample was diluted and re-analyzed.
D = Compound is identified at a secondary dilution factor.
<## = Compound was analyzed for but not detected. The ## represents the sample quantitation limit (This is similar to the U flag).

Table 3-7A

SB-5 Area Pilot Test
(Additional Delineation Data)

Parameter	NYSDEC HWR-94-4046 RSCO's	5-SB-17 0'-4' 6/26/2000	5-SB-18 0'-4' 6/26/2000	5-SB-21 0'-4' 6/26/2000	5-SB-22 0'-4' 6/26/2000	CONF-1 0'-4' 3/14/2001	CONF-2 0'-4' 3/14/2001	CONF-3 0'-4' 3/14/2001	CONF-4 0'-4' 3/14/2001	CONF-5 0'-4' 3/14/2001
Chloromethane	NA	<62	<12	<13	<11	<12	<57	<13	<12	<12
Bromomethane	NA	<62	<12	<13	<11	<12	<57	<13	<12	<12
Vinyl Chloride	200	<62	<12	<13	<11	<12	<57	<13	<12	<12
Chloroethane	1,900	<62	<12	<13	<11	<12	<57	<13	<12	<12
Methylene Chloride	100	32 JB	5 JB	7 JB	7 JB	3 JB	14 JB	3 JB	3 JB	4 JB
Acetone	200	<62	32	59	54	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported
Carbon Disulfide	2,700	<62	2 J	3 J	<11	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported
1,1-Dichloroethene	400	<62	<12	<13	<11	<6	<28	<6	<6	<6
1,1-Dichloroethane	200	13 J	<12	2 J	2 J	<6	<28	<6	<6	<6
1,2-Dichlorethene (total)	300	13 J	5 J	3 J	65	<6	<28	<6	<6	<6
2-Butanone	300	<62	9 J	19	17	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported
Chloroform	300	<62	<12	<13	<11	<6	<28	<6	<6	<6
1,2-Dichloroethane	100	<62	<12	<13	<11	<6	<28	<6	<6	<6
1,1,1-Trichloroethane	800	<62	<12	<13	1 J	<6	36	<6	<6	<6
Carbon Tetrachloride	NA	<62	<12	<13	<11	<6	<28	<6	<6	<6
Bromodichloromethane	NA	<62	<12	<13	<11	<6	<28	<6	<6	<6
1,2-Dichloropropene	NA	<62	<12	<13	<11	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported
cis 1,3-Dichloropropene	NA	<62	<12	<13	<11	<26	<28	Not Reported	Not Reported	Not Reported
Trichloroethene	700	<62	1 J	<13	2 J	<6	790	<6	<6	<6
Benzene	60	<62	<12	<13	<11	<6	<28	<6	<6	<6
Dibromochloromethane	NA	<62	<12	<13	<11	<6	<28	<6	<6	<6
trans 1,3-Dichloropropene	NA	<62	<12	<13	<11	<6	<28	<6	<6	<6
1,1,2-Trichloroethane	NA	<62	<12	<13	<11	<6	<28	<6	<6	<6
Bromoform	NA	<62	<12	<13	<11	<6	<28	<6	<6	<6
4-Methyl-2-Pentanone	1,000	<62	<12	<13	<11	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported
2- Hexanone	NA	<62	<12	<13	<11	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported
Tetrachloroethene	1,400	<62	<12	<13	29	21	210,000 D	<6	18	12
1,1,2,2-Tetrachloroethane	600	<62	<12	<13	<11	<6	<28	<6	<6	<6
Toluene	1,500	36 J	<12	25	4 J	<6	9 J	<6	<6	<6
Chlorobenzene	1,700	<62	<12	<13	<11	<6	<28	<6	<6	<6
Ethylbenzene	5,500	76	<12	15	<11	<6	27 J	<6	<6	<6
Xylenes (total)	1,200	1,000	<6	73	9 J	<6	148	<6	<6	<6
Trichlorofluoromethane	NA	Not Reported	Not Reported	Not Reported	Not Reported	<12	<57	<13	<12	<12
1,2-Dichloropropane	NA	Not Reported	Not Reported	Not Reported	Not Reported	<6	<28	<6	<6	<6
1,3-Dichlorobenzene	1,600	Not Reported	Not Reported	Not Reported	Not Reported	<12	<57	<13	<12	<12
1,4-Dichlorobenzene	8,500	Not Reported	Not Reported	Not Reported	Not Reported	<12	<57	<13	<12	<12
1,2-Dichlorobenzene	7,900	Not Reported	Not Reported	Not Reported	Not Reported	<12	<57	<13	<12	<12
2-Chloroethyl Vinyl Ether	NA	Not Reported	Not Reported	Not Reported	Not Reported	<12	<57	<13	<12	<12
Total VOCs		1,170	54	206	190	24	211,024	3	21	16
Freon TICs		ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes:

* Recommended Soil Clean-up Objectives (RSCO's) defined in NYSDEC Technical and Administrative Guidance Memorandum (TAGM) HWR-94-4046, as amended.
** RSCO for trans-1,2-Dichloroethene used.
*** RSCO for total Xylenes used.
NA = Not Available
J = Estimated value
B = Analyte is found in associated blank as well as in the sample
E = Compound whose concentrations exceeded the calibration range of the GC/MS for that specific analysis. The sample was diluted and re-analyzed.
D = Compound is identified at a secondary dilution factor.
<## = Compound was analyzed for but not detected. The ## represents the sample quantitation limit (This is similar to the U flag).

TABLE 3-9
SUMMARY OF GROUNDWATER AND SURFACE WATER ELEVATIONS

(NYSDEC Phase I RI)

Location	Well Number	Reference Elev. (ft.)	Adjusted Ref. Elev. (ft.)	February 26, 1998		March 11, 1998		March 12, 1998		March 13, 1998		March 19, 1998	
				Depth(ft.)	Elev (ft.)	Depth(ft.)	Elev (ft.)	Depth	Elev (ft.)	Depth(ft.)	Elev (ft.)	Depth(ft.)	Elev (ft.)
Pall Corporation	MW-1P	55.71	87.53	4.32	83.21	5.91	81.62	4.28	83.25	4.38	83.15	3.74	83.79
	MW-2P	54.17	85.99	3.09	82.90	2.89	83.10	3.05	82.94	3.02	82.97	2.33	83.66
	MW-3P	53.54	85.34	3.12	82.22	2.87	82.47	2.60	82.74	2.73	82.61	2.57	82.77
	MW-4P	52.58	84.43	2.94	81.49	1.84	82.59	1.92	82.51	2.06	82.37	See Note 5	
	MW-5P	51.19	83.11	0.94	82.17	0.73	82.38	0.83	82.28	0.96	82.15	0.40	82.71
	MW-7P	56.42	88.26	3.09	85.17	3.13	85.13	3.17	85.09	3.27	84.99	2.55	85.71
August Thomson	MW-1A	53.52	85.36	2.81	82.55	2.58	82.78	2.62	82.74	2.84	82.52	2.24	83.12
	MW-2A	50.02	81.85	1.32	80.53	1.18	80.67	1.11	80.74	1.40	80.45	0.62	81.23
Associated Properties	MW-1H	57.89	89.72	6.71	83.01	9.52	80.20	6.69	83.03	6.82	82.90	6.26	83.46
	MW-2H	58.29	90.12	7.17	82.95	6.92	83.20	6.94	83.18	7.24	82.88	7.04	83.08
Pall Corporation	SGB-2p	55.44	87.27	NM	-	3.92	83.35	4.10	83.17	NM	-	3.64	83.63
	SBG-11p	55.91	87.74	NM	-	NM	-	2.87	84.87	NM	-	2.76	84.98
	SGB-13p	55.19	87.02	NM	-	NM	-	3.41	83.61	NM	-	3.21	83.81
	SGB-15p	57.69	89.52	7.12	82.40	NM	-	7.12	82.40	NM	-	6.65	82.87
	SGB-17p	54.61	86.44	NM	-	3.39	83.05	3.44	83.00	NM	-	2.50	83.94
	SGB-18p	52.57	84.40	2.17	82.23	2.01	82.39	2.22	82.18	NM	-	1.33	83.07
	SGB-26p	53.68	85.51	NM	-	2.62	82.89	2.40	83.11	NM	-	2.27	83.24
	SGB-32p	52.30	84.13	NM	-	1.41	82.72	1.52	82.61	NM	-	1.22	82.91
	SGB-34p	52.39	84.22	NM	-	1.94	82.28	2.03	82.19	NM	-	1.56	82.66
Stream Guages	SG-1	56.40	88.23	3.60	84.63	NM	-	3.64	84.59	NM	-	2.78	85.45
	SG-2	52.58	84.41	1.24	83.17	NM	-	1.33	83.08	NM	-	0.62	83.79
	SG-3	51.66	83.49	1.24	82.25	NM	-	1.25	82.24	NM	-	0.28	83.21
	SG-4	51.56	83.39	3.91	79.48	NM	-	3.80	79.59	NM	-	3.13	80.26

Notes:

1) See Figure No. 2 for Locations.
2) Survey information provided by YEC.
3) Reference elevation based on the 1929 adjustment of the National Geodetic Vertical Datum. Adjusted elevation referenced to NC Datum based upon 1999 site survey data.
4) Depth measurements referenced to the top of the PVC riser for monitoring wells and piezometers, and top of lath for stream gauge locations.
5) The well was covered with water due to heavy rainfall event.
6) NM = Not Measured.

Table based upon data originally presented by NYSDEC in "Focused Remedial Investigation Report", April 1999

TABLE 3-9 (continued)

Groundwater Elevation Gauging Results
(Phase II RI Groundwater Investigation - Shallow Monitoring Wells)

Location	WELL NO.	Top of Casing Elevation (ft) - See Note 2	Depth to Water (ft) - 5/6/99	Groundwater Elevation (ft) 5/6/99	Depth to Water (ft) - 6/24/99	Groundwater Elevation (ft) 6/24/99	Depth to Water (ft) - 1/13/00	Groundwater Elevation (ft) 1/13/00
Pall	MW-1P	87.53	4.90	82.63	5.80	81.73	5.64	81.89
Corp.	MW-2P	85.99	3.64	82.35	4.49	81.5	4.08	81.91
	MW-3P	85.34		NM	4.08	81.26	4.02	81.32
	MW-4P	84.43	2.56	81.87	3.35	81.08	3.98	80.45
	MW-5P	83.11	1.57	81.54	2.30	80.81	NM	
	MW-7P	88.26	3.63	84.63	4.70	83.56	4.67	83.59
	MW-8PS	88.02	4.89	83.13	5.85	82.17	6.09	81.93
	MW-10PS	82.89					2.97	79.92
	MW-11PS						2.38	
	MW-12PS	83.68					2.75	80.93
	MW-13PS	86.95	7.00	79.95	7.45	79.5	4.68	82.27
August	MW-1A	85.36	3.62	81.74	4.02	81.34	3.81	81.55
Thomsen	MW-2A	81.85	1.65	80.2	2.40	79.45	1.87	79.98
Associated	MW-1H	89.72	7.15	82.57		NM		
Draperies	MW-2H	90.12	7.51	82.61		NM		
Photocircuits	MW-3			85.3		NM		
Corp.	MW-4			85.42		NM		
	MW-7			85.94		NM		
	MW-9			82.99		NM		
45A Site	MW-2S			84.7		NM		
	MW-3S			82.86		NM		
City of G.C.	MW-1GS	83.11				NM	3.65	79.46
	MW-2GS	80.39				NM	1.24	79.15
	GC-3S					NM		

Notes:

1) Survey information for Photocircuits and 45A site wells provided by NYSDEC. Pall & August Thomsen wells by Sidney Bowne.
2) Original elevation based on the 1929 adjustment of the National Geodetic Vertical Datum.
Adjusted elevation referenced to NC Datum based upon 1999 site survey data.
3) Depth measurements referenced to the top of the PVC riser for monitoring wells and piezometers, and top of lath for stream gauge locations.
4) NM = Not Measured.

TABLE 3-9 (continued)

Groundwater Elevation Gauging Results
(Phase II RI Groundwater Investigation - Intermediate Monitoring Wells)

Location	WELL NO.	Top of Casing Elevation (ft) - See Note 2	Depth to Water (ft) - 5/6/99	Groundwater Elevation (ft) 5/6/99	Depth to Water (ft) - 6/24/99	Groundwater Elevation (ft) 6/24/99	Depth to Water (ft) - 1/13/00	Groundwater Elevation (ft) 1/13/00
Pall	MW-1PI	87.64	Not Installed	Not Installed	Not Installed	Not Installed	5.87	81.77
Corp.	MW-4PI	84.68	Not Installed	Not Installed	Not Installed	Not Installed	4.91	79.77
	MW-5PI	83.11	Not Installed	Not Installed	Not Installed	Not Installed	2.13	80.98
	MW-6PI	88.50	Not Installed	Not Installed	Not Installed	Not Installed	5.12	83.38
	MW-10PI	83.26	Not Installed	Not Installed	Not Installed	Not Installed	3.10	80.16
	MW-11PI		Not Installed	Not Installed	Not Installed	Not Installed	2.82	
	MW-12PI	84.08	Not Installed	Not Installed	Not Installed	Not Installed	3.73	80.35
	MW-13PI	86.93	Not Installed	Not Installed	Not Installed	Not Installed	4.48	82.45
	MW-16PI	89.66	Not Installed	Not Installed	Not Installed	Not Installed	8.07	81.59
August Thom.	MW--2AI	82.26	Not Installed	Not Installed	Not Installed	Not Installed	2.33	79.93
Photocircuits	?							
Corp.	?							
	?							
	?							
45A Site	?							
	?							
City of G.C.	MW-1GI	83.20	Not Installed	Not Installed	Not Installed	Not Installed	3.16	80.04
	MW-2GI	80.57	Not Installed	Not Installed	Not Installed	Not Installed	0.67	79.90
	GC-3I							

Notes:
1) Survey information for Photocircuits and 45A site wells provided by NYSDEC. Pall & August Thomsen wells by Sidney Bowne.
2) Original elevation based on the 1929 adjustment of the National Geodetic Vertical Datum.
Adjusted elevation referenced to NC Datum based upon 1999 site survey data.
3) Depth measurements referenced to the top of the PVC riser for monitoring wells and piezometers, and top of lath for stream gauge locations.
4) NM = Not Measured.

TABLE 3-9 (continued)

Groundwater Elevation Gauging Results
(Phase II RI Groundwater Investigation - Deep Monitoring Wells)

Location	WELL NO.	Top of Casing Elevation (ft) - See Note 2	Depth to Water (ft) - 5/6/99	Groundwater Elevation (ft) 5/6/99	Depth to Water (ft) - 6/24/99	Groundwater Elevation (ft) 6/24/99	Depth to Water (ft) - 1/13/00	Groundwater Elevation (ft) 1/13/00
Pall	MW-1PD	87.42	Not Installed	Not Installed	Not Installed	Not Installed	5.69	81.73
Corp.	MW-4PD	84.75	Not Installed	Not Installed	Not Installed	Not Installed	3.84	80.91
	MW-5PD	83.29	Not Installed	Not Installed	Not Installed	Not Installed	2.69	80.6
	MW-6PD	89.19	Not Installed	Not Installed	Not Installed	Not Installed	5.44	83.75
	MW-10PD	83.79	Not Installed	Not Installed	Not Installed	Not Installed	3.31	80.48
	MW-11PD		Not Installed	Not Installed	Not Installed	Not Installed	2.64	
	MW-12PD	84.10	Not Installed	Not Installed	Not Installed	Not Installed	3.38	80.72
	MW-13PD	87.06	Not Installed	Not Installed	Not Installed	Not Installed	5.19	81.87
	MW-14PD	90.08	Not Installed	Not Installed	Not Installed	Not Installed	6.2	83.88
	MW-15PD	87.89	Not Installed	Not Installed	Not Installed	Not Installed	NM	
	MW-16PD	89.65	Not Installed	Not Installed	Not Installed	Not Installed	8.16	81.49
August Thom.	MW--2AD	82.35	Not Installed	Not Installed	Not Installed	Not Installed	1.98	80.37
Photocircuits	?							
Corp.	?							
	?							
	?							
45A Site	?							
	?							
City of G.C.	MW-1GD	83.35	Not Installed	Not Installed	Not Installed	Not Installed	3.24	80.11
	MW-2GD	80.56	Not Installed	Not Installed	Not Installed	Not Installed	0.3	80.26
	GC-3D							

Notes:

1) Survey information for Photocircuits and 45A site wells provided by NYSDEC. Pall & August Thomsen wells by Sidney Bowne.
2) Original elevation based on the 1929 adjustment of the National Geodetic Vertical Datum. Adjusted elevation referenced to NC Datum based upon 1999 site survey data.
3) Depth measurements referenced to the top of the PVC riser for monitoring wells and piezometers, and top of lath for stream gauge locations.
4) NM = Not Measured.

Sheet 3 of 3

TABLE 3-8

SB-7 AREA SOIL SAMPLE RESULTS (ug/kg)
(Samples Collected August 1999)

Parameter	NYSDEC HWR-94-4046 RSCO's	7-SB-1 0'-4' 8/25/1999	7-SB-2 0'-4' 8/25/1999	7-SB-3 0'-4' 8/25/1999	7-SB-4 0'-4' 8/25/1999	7-SB-5 0'-4' 8/25/1999	7-SB-6 0'-4' 8/25/1999	7-SB-8 0'-4' 8/25/1999	7-SB-9 0'-4' 8/25/1999	7-SB-10 0'-4' 8/25/1999	7-SB-11 0'-4' 8/25/1999	7-SB-12 0'-4' 8/25/1999	7-SB-13 0'-4' 8/25/1999	7-SB-14 0'-4' 8/25/1999	7-SB-15 0'-4' 8/25/1999	7-SB-16 0'-4' 8/25/1999	7-SB-17 0'-4' 8/25/1999	7-SB-18 0'-4' 8/25/1999	7-SB-19 0'-4' 8/25/1999
Chloromethane	NA	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11
Bromomethane	NA	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11
Vinyl Chloride	200	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	17	<11	<11	<11	<11	<11	<11
Chloroethane	1,900	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11
Methylene Chloride	100	2 J	1 J	2 J	<6	1 J	1 J	1 J	4 J	1 J	2 J	3 J	2 J	2 J	2 J	<5	2 J	<5	2 J
1,1-Dichloroethene	400	<6	<5	<6	<6	<5	<6	<5	<5	<5	<6	<5	<6	<5	<5	<5	<5	<5	<5
1,1-Dichloroethane	200	<6	<5	<6	<6	<5	<6	<5	<5	<5	<6	<5	<6	<5	<5	<5	<5	<5	<5
Chloroform	300	<6	<5	<6	<6	<5	<6	<5	<5	<5	<6	<5	<6	<5	<5	<5	<5	<5	<5
1,2-Dichloroethane	100	<6	<5	<6	<6	<5	<6	<5	<5	<5	<6	<5	<6	<5	<5	<5	<5	<5	<5
1,1,1-Trichloroethane	800	<6	<5	<6	<6	<5	<6	<5	<5	<5	<6	<5	<6	<5	<5	<5	<5	<5	<5
Carbon Tetrachloride	600	<6	<5	<6	<6	<5	<6	<5	<5	<5	<6	<5	<6	<5	<5	<5	<5	<5	<5
Bromodichloromethane	NA	<6	<5	<6	<6	<5	<6	<5	<5	<5	<6	<5	<6	<5	<5	<5	<5	<5	<5
1,2-Dichloropropene	NA	<6	<5	<6	<6	<5	<6	<5	<5	<5	<6	<5	<6	<5	<5	<5	<5	<5	<5
cis 1,3-Dichloropropene	NA	<6	<5	<6	<6	<5	<6	<5	<5	<5	<6	<5	<6	<5	<5	<5	<5	<5	<5
Trichloroethene	700	<6	<5	1 J	4 J	1 J	2 J	<5	32	2 J	4 J	<5	<6	<5	<5	<5	11	65	1 J
Benzene	60	<6	<5	<6	<6	<5	<6	<5	<5	<5	<6	<5	<6	<5	<5	<5	<5	<5	<5
Dibromochloromethane	NA	<6	<5	<6	<6	<5	<6	<5	<5	<5	<6	<5	<6	<5	<5	<5	<5	<5	<5
trans 1,3-Dichloropropene	NA	<6	<5	<6	<6	<5	<6	<5	<5	<5	<6	<5	<6	<5	<5	<5	<5	<5	<5
1,1,2-Trichloroethane	NA	<6	<5	<6	<6	<5	<6	<5	<5	<5	<6	<5	<6	<5	<5	<5	<5	<5	<5
Bromoform	NA	<6	<5	<6	<6	<5	<6	<5	<5	<5	<6	<5	<6	<5	<5	<5	<5	<5	<5
Tetrachloroethene	1,400	4 JB	4 JB	9 B	22 B	8 B	7 B	6 B	250 B	20 B	13 B	8 B	8 B	4 JB	3 JB	3 JB	27 B	19 B	5 B
1,1,2,2-Tetrachloroethane	600	<6	<5	<6	<6	<5	<6	<5	<5	<5	<6	<5	<6	<5	<5	<5	<5	<5	<5
Toluene	1,500	<6	<5	<6	<6	<5	<6	<5	<5	<5	<6	<5	<6	<5	<5	<5	<5	<5	<5
Chlorobenzene	1,700	<6	<5	<6	<6	<5	<6	<5	<5	<5	<6	<5	<6	<5	<5	<5	<5	<5	<5
Ethylbenzene	5,500	<6	<5	<6	<6	<5	<6	<5	<5	<5	<6	<5	<6	<5	<5	<5	<5	<5	<5
Trichlorofluoromethane	NA	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11
2-Chloroethylvinylether	NA	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11
trans-1,2-Dichloroethene	300	<6	<5	<6	<6	<5	<6	<5	<5	<5	<6	<5	<6	<5	<5	<5	<5	<5	<5
1,3-Dichlorobenzene	1,600	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11
1,4-Dichlorobenzene	8,500	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11
1,2-Dichlorobenzene	7,900	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11
m/p-Xylene	1,200	<6	<5	<6	<6	<5	<6	<5	<5	<5	<6	<5	<6	<5	<5	<5	<5	<5	<5
o-Xylene	1,200	<6	<5	<6	<6	<5	<6	<5	<5	<5	<6	<5	<6	<5	<5	<5	<5	<5	<5
cis-1,2-Dichloroethene	300	<6	2 J	2 J	22	2 J	<6	<5	20	<5	<6	<5	<6	<5	2 J	<5	20	7	2 J
Total VOCs		6	7	14	48	12	10	7	306	23	19	11	27	6	7	3	60	91	10
Total TICs		6 J	12	10 JN	136 JN	7 JN	ND	6 JN	53 JN	ND	ND	596 J	13 JN	ND	ND	ND	ND	ND	ND

Notes:

* Recommended Soil Clean-up Objectives (RSCO's) defined in NYSDEC Technical and Administrative Guidance Memorandum (TAGM) HWR-94-4046, as amended.
** RSCO for trans-1,2-Dichloroethene used.
*** RSCO for total Xylenes used.
NA = Not Available
J = Estimated value
B = Analyte is found in associated blank as well as in the sample
E = Compound whose concentrations exceeded the calibration range of the GC/MS for that specific analysis. The sample was diluted and re-analyzed.
D = Compound is identified at a secondary dilution factor.
<## = Compound was analyzed for but not detected. The ## represents the sample quantitation limit (This is similar to the U flag).

Table 3-10
Groundwater Sample Results - Shallow Groundwater Monitoring Wells
(Samples collected 4/99)

All results in ug/l except as noted.

Parameter	NYSDEC Class GA GW Quality Std. (ug/l)	Monitoring Wells MW-1A (4/6/99)	MW-1P (4/5/99)	MW-2A (4/2/99)	MW-2P (4/6/99)	MW-3P (4/6/99)	MW-4P (4/2/99)	MW-5P (4/1/99)	MW-7P (4/6/99)	MW-8PS (4/5/99)	MW-10PS (4/1/99)
Chloromethane	5	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromomethane	5	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Vinyl Chloride	2	26	<10	<10	9 J	50	170	250 D	<10	<10	190 D
Chloroethane	5*	<10	<10	<10	<10	1 J	<10	3 J	<10	<10	1 J
Methylene Chloride	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1-Dichloroethene	5	<5	<5	<5	<5	<5	<5	9	<5	<5	12
1,1-Dichlorethane	5	1 J	<5	2 J	<5	14	17	20	<5	5	17
Chloroform	7	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,2-Dichloroethane	0.6	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1,1-Trichloroethane	5	<5	<5	1 J	<5	<5	<5	3 J	<5	<5	1 J
Carbon Tetrachloride	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Bromodichloromethane	50*	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,2-Dichloropropane	1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
cis-1,3-Dichloropropene	0.4	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Trichloroethene	5	12	<5	13	2 J	2 J	4 J	230 D	<5	1 J	120
Benzene	1	<5	<5	<5	<5	<5	<5	<5	<5	<5	1 J
Dibromochloromethane	50*	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
trans-1,3-Dichloropropene	0.4	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1,2-Trichloroethane	1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Bromoform	50*	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Tetrachloroethene	5	10	<5	200 E	<5	<5	1 J	110 D	<5	2 J	51
1,1,2,2-Tetrachloroethane	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Toluene	5	<5	<5	<5	<5	1 J	5	8	<5	<5	<5
Chlorobenzene	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	5 J
Ethylbenzene	5	<5	<5	<5	<5	<5	2 J	2 J	<5	<5	<5
Trichlorofluoromethane	5	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
2-Chlorovinylethylether	NA	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
trans-1,2-Dichloroethene	5	<5	<5	<5	<5	3 J	5 J	57	<5	<5	25
1,3-Dichlorobenzene	3	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,4-Dichlorobenzene	3	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,2-Dichlorobenzene	3	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
m/p-Xylene	5	<5	<5	<5	<5	<5	2 J	3 J	<5	<5	<5
o-Xylene	5	<5	<5	<5	<5	<5	2 J	5 J	<5	<5	<5
cis-1,2-Dichlorethene	5	22	<5	6	27	82	350 E	3,600 ED	<5	10	2,100 ED
Total TICs	NA	34 JN	0	500 JN	0	45 JN	158 JN	540 IND	0	0	278 JN
Total VOCs	NA	71	0	222	38	153	558	4,300	0	18	2,523

Notes:

"Shallow" groundwater is defined as wells screened in the interval from the top of the water table to a maximum of 15 feet into the water table.
TICs = Tentatively Identified Compounds
NA = Not Available
Total VOCs does not include TICs
J = Estimated value
B = Analyte is found in associated blank as well as in the sample
E = Compound whose concentrations exceeded the calibration range of the GC/MS for that specific analysis. The sample was diluted and re-analyzed.
D = Compound is identified at a secondary dilution factor.
N = presumptive evidence of a compound, only applicable to TICs.
<## = Compound was analyzed for but not detected. The ## represents the sample quantitation limit (This is similar to the U flag).
* Indicates a guidance value, not a standard.

Table 3-11
Groundwater Sample Results - Intermediate Groundwater Monitoring Wells
(Samples collected 4/99)

All results in ug/l except as noted.

		Monitoring Wells						
Parameter	**NYSDEC Class GA GW Quality Std. (ug/l)**	**MW-1PI (4/5/99)**	**MW-2A1 (4/2/99)**	**MW-4PI (4/2/99)**	**MW-5PI (4/1/99)**	**MW-6PI (4/6/99)**	**MW-8PI (4/6/99)**	**MW-10PI (4/1/99)**
Chloromethane	5	<10	1 J	<10	<10	<10	<10	<10
Bromomethane	5	<10	<10	<10	<10	<10	<10	<10
Vinyl Chloride	2	<10	<10	20	6 J	68	14	4 J
Chloroethane	5*	<10	<10	<10	<10	1 J	<10	<10
Methylene Chloride	5	<5	<5	<5	<5	<5	<5	<5
1,1-Dichloroethene	5	2 J	43	<5	2 J	26	18	5 J
1,1-Dichlorethane	5	8	20	6	28	82	28	42
Chloroform	7	<5	<5	<5	<5	<5	<5	<5
1,2-Dichloroethane	0.6	<5	1 J	<5	<5	22	4 J	<5
1,1,1-Trichloroethane	5	<5	36	<5	2 J	<5	10	4 J
Carbon Tetrachloride	5	<5	<5	<5	<5	<5	<5	<5
Bromodichloromethane	50*	<5	<5	<5	<5	<5	<5	<5
1,2-Dichloropropane	1	<5	<5	<5	<5	<5	<5	<5
cis-1,3-Dichloropropene	0.4	<5	<5	<5	<5	<5	<5	<5
Trichloroethene	5	47	250 D	8	27	150	49	26
Benzene	1	<5	<5	<5	<5	4 J	<5	<5
Dibromochloromethane	50*	<5	<5	<5	<5	<5	<5	<5
trans-1,3-Dichloropropene	0.4	<5	<5	<5	<5	<5	<5	<5
1,1,2-Trichloroethane	1	<5	<5	<5	<5	1 J	<5	<5
Bromoform	50*	<5	<5	<5	<5	<5	<5	<5
Tetrachloroethene	5	26	60	51	38	51	20	38
1,1,2,2-Tetrachloroethane	5	<5	<5	<5	<5	<5	<5	<5
Toluene	5	<5	3 J	2 J	1 J	1 J	2 J	10
Chlorobenzene	5	<5	<5	<5	<5	<5	<5	<5
Ethylbenzene	5	<5	<5	<5	<5	<5	2 J	<5
Trichlorofluoromethane	5	<10	<10	<10	<10	<10	<10	<10
2-Chlorovinylethylether	NA	<10	<10	<10	<10	<10	<10	<10
trans-1,2-Dichloroethene	5	<5	<5	<5	<5	4 J	<5	<5
1,3-Dichlorobenzene	3	<10	<10	<10	<10	<10	<10	<10
1,4-Dichlorobenzene	3	<10	<10	<10	<10	<10	<10	<10
1,2-Dichlorobenzene	3	<10	<10	1 J	<10	<10	<10	<10
m/p-Xylene	5	<5	<5	<5	<5	<5	<5	<5
o-Xylene	5	<5	<5	<5	<5	<5	<5	<5
cis-1,2-Dichlorethene	5	59	200 D	30	92	920 E	96	52
Total TICs	NA	16 JN	0	605 JN	21 JN	45 JN	9 JN	0
Total VOCs	NA	142	614	118	196	1,330	243	181

Notes:

"Intermediate" groundwater is defined as wells screened in the interval of approximatelt 40 ft. to 50 ft. below grade (about 33 to 43 feet below the top of the water table)
TICs = Tentatively Identified Compounds
NA = Not Available
Total VOCs does not include TICs
J = Estimated value
B = Analyte is found in associated blank as well as in the sample
E = Compound whose concentrations exceeded the calibration range of the GC/MS for that specific analysis. The sample was diluted and re-analyzed.
D = Compound is identified at a secondary dilution factor.
N = presumptive evidence of a compound, only applicable to TICs.
<## = Compound was analyzed for but not detected. The ## represents the sample quantitation limit (This is similar to the U flag).
* Indicates a guidance value, not a standard.

Table 3-12
Groundwater Sample Results - Deep Groundwater Monitoring Wells
(Samples collected 4/99)

All results in ug/l except as noted.

Parameter	NYSDEC Class GA GW Quality Std. (ug/l)	MW-1PD (4/5/99)	MW-2AD (4/2/99)	MW-4PD (4/2/99)	MW-5PD (4/1/99)	MW-6PD (4/6/99)	MW-10PD (4/1/99)
Chloromethane	5	<10	<10	<10	<10	<10	<10
Bromomethane	5	<10	<10	<10	<10	<10	<10
Vinyl Chloride	2	<10	<10	<10	26	24	<10
Chloroethane	5*	<10	<10	<10	<10	<10	<10
Methylene Chloride	5	<5	<5	<5	<5	<5	<5
1,1-Dichloroethene	5	2 J	14	5	21	23	3 J
1,1-Dichlorethane	5	7	6	3 J	18	58	5 J
Chloroform	7	<5	<5	<5	<5	<5	<5
1,2-Dichloroethane	0.6	<5	<5	<5	<5	12	<5
1,1,1-Trichloroethane	5	<5	14	6	25	6	3 J
Carbon Tetrachloride	5	<5	<5	<5	<5	<5	<5
Bromodichloromethane	50*	<5	<5	<5	<5	<5	<5
1,2-Dichloropropane	1	<5	<5	<5	<5	<5	<5
cis-1,3-Dichloropropene	0.4	<5	<5	<5	<5	<5	<5
Trichloroethene	5	47	140	62	270 D	53	120
Benzene	1	<5	<5	<5	<5	<5	<5
Dibromochloromethane	50*	<5	<5	<5	<5	<5	<5
trans-1,3-Dichloropropene	0.4	<5	<5	<5	<5	<5	<5
1,1,2-Trichloroethane	1	<5	<5	<5	<5	<5	<5
Bromoform	50*	<5	<5	<5	<5	<5	<5
Tetrachloroethene	5	4 J	15	10	54	32	8
1,1,2,2-Tetrachloroethane	5	<5	<5	<5	<5	<5	<5
Toluene	5	<5	2 J	2 J	30	1 J	6
Chlorobenzene	5	<5	<5	<5	4 J	<5	<5
Ethylbenzene	5	<5	<5	<5	<5	<5	<5
Trichlorofluoromethane	5	<10	<10	<10	<10	<10	<10
2-Chlorovinylethylether	NA	<10	<10	<10	<10	<10	<10
trans-1,2-Dichloroethene	5	<5	<5	<5	1 J	2 J	<5
1,3-Dichlorobenzene	3	<10	<10	<10	<10	<10	<10
1,4-Dichlorobenzene	3	<10	<10	<10	<10	<10	<10
1,2-Dichlorobenzene	3	<10	<10	<10	<10	<10	<10
m/p-Xylene	5	<5	<5	<5	5 J	<5	<5
o-Xylene	5	<5	<5	<5	1 J	<5	<5
cis-1,2-Dichlorethene	5	75	96	36	240 D	220 E	58
Total TICs	NA	45 JN	0	0	49 J	0	0
Total VOCs	NA	135	287	124	695	431	203

Notes:

"Deep" groundwater is defined as wells screened in the interval of approximatelt 90 ft. to 100 ft.
below grade (about 83 to 93 feet below the top of the water table)
TICs = Tentatively Identified Compounds
NA = Not Available
Total VOCs does not include TICs
J = Estimated value
B = Analyte is found in associated blank as well as in the sample
E = Compound whose concentrations exceeded the calibration range of the GC/MS for that specific analysis.
The sample was diluted and re-analyzed.
D = Compound is identified at a secondary dilution factor.
N = presumptive evidence of a compound, only applicable to TICs.
<## = Compound was analyzed for but not detected. The ## represents the sample quantitation limit (This is similar to the U flag).
**Indicates a guidance value, not a standard.

Table 3-13
Groundwater Sample Results - Shallow Groundwater Monitoring Wells
(Samples collected 1/00)

All results in ug/l except as noted.

Parameter	NYSDEC Class GA GW Quality Std. (ug/l)	MW-1A (1/21/00)	MW-1P (1/18/00)	MW-2A (1/14/00)	MW-2P (1/18/00)	MW-3P (1/17/00)	MW-4P (1/17/00)	MW-5P (1/14/00)	MW-7P (1/17/00)	MW-8PS (1/18/00)	MW-10PS (1/14/00)	MW-11PS (1/14/00)	MW-12PS (1/17/00)	MW-13PS (1/17/00)
Chloromethane	5	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromomethane	5	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Vinyl Chloride	2	50	2 J	<10	<10	2 J	130	3 J	<10	<10	350 D	16	130	2 J
Chloroethane	5*	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Methylene Chloride	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1-Dichloroethene	5	<5	<5	6	<5	<5	6	<5	<5	<5	10	<5	14	2 J
1,1-Dichlorethane	5	<5	3 J	9	<5	20	12	18	<5	<5	16	3 J	10	19
Trichlorofluoromethane	5	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
trans-1,2-Dichloroethene	5	<5	<5	<5	<5	3 J	6	<5	<5	<5	22	<5	3 J	2 J
Chloroform	7	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,2-Dichloroethane	0.6	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1,1-Trichloroethane	5	<5	<5	4 J	<5	<5	<5	1 J	<5	<5	<5	<5	25	6
Carbon Tetrachloride	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
2-Chlorovinylethylether	NA	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromodichloromethane	50*	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,2-Dichloropropane	1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
cis-1,3-Dichloropropene	0.4	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Trichloroethene	5	4 J	<5	75	8	<5	210	45	2 J	<5	140	2 J	1,600 D	35
Benzene	1	<5	<5	<5	<5	<5	3 J	<5	<5	<5	<5	3	3 J	<5
Dibromochloromethane	50*	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
trans-1,3-Dichloropropene	0.4	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1,2-Trichloroethane	1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Bromoform	50*	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Tetrachloroethene	5	6	<5	160	3 J	<5	43	180	<5	<5	36	<5	470 D	18
1,1,2,2-Tetrachloroethane	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Toluene	5	<5	<5	<5	<5	<5	4 J	<5	<5	<5	<5	<5	1 J	<5
Chlorobenzene	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	4 J	<5	<5	<5
Ethylbenzene	5	<5	<5	<5	<5	<5	2 J	<5	<5	<5	<5	<5	<5	<5
m/p-Xylene	5	<5	<5	<5	<5	<5	2 J	<5	<5	<5	<5	<5	<5	<5
o-Xylene	5	<5	<5	<5	<5	<5	2 J	<5	<5	<5	<5	<5	<5	<5
1,3-Dichlorobenzene	3	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,4-Dichlorobenzene	3	<10	<10	<10	<10	<10	2 J	<10	<10	<10	<10	<10	<10	<10
1,2-Dichlorobenzene	3	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
cis-1,2-Dichlorethene	5	<10	<10	61 JN	10 JN	<10	490 JN	63 JN	<10	<10	2,500 JN	63 JN	750 JN	51 JN
Total "Freon" TICs	NA	0	0	1,740 JN	0	0	37 JN	47 JN	0	0	1,230 JN	0	2,278 JN	0
Total VOCs	NA	60	5	315	21	25	912	310	2	0	3,078	87	3,006	135

Notes:

"Shallow" groundwater is defined as wells screened in the interval from the top of the water table to a maximum of 15 feet into the water table.
TICs = Tentatively Identified Compounds, 1,2-DCE listed individually as a VOC because of its importance at the site.
NA = Not Available
Total VOCs does not include TICs
J = Estimated value
B = Analyte is found in associated blank as well as in the sample
E = Compound whose concentrations exceeded the calibration range of the GC/MS for that specific analysis. The sample was diluted and re-analyzed.
D = Compound is identified at a secondary dilution factor.
N = presumptive evidence of a compound, only applicable to TICs.
<## = Compound was analyzed for but not detected. The ## represents the sample quantitation limit (This is similar to the U flag).
* Indicates a guidance value, not a standard.
ND = Tentatively identified compound that was not detected, Actual MDL not available but likely <10 ug/l based upon similar sample matrices.

Table 3-14
Groundwater Sample Results - Intermediate Groundwater Monitoring Wells
(Samples collected 1/00)

All results in ug/l except as noted.

Parameter	NYSDEC Class GA GW Quality Std. (ug/l)	MW-1PI (1/18/00)	MW-2AI (1/14/00)	MW-4PI (1/17/00)	MW-5PI (1/14/00)	MW-6P (1/17/00)	MW-8PI (1/18/00)	MW-10PI (1/14/00)	MW-11PI (1/14/00)	MW-12PI (1/17/00)	MW-13PI (1/17/00)	MW-16PCI (1/21/00)
Chloromethane	5	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromomethane	5	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Vinyl Chloride	2	<10	<10	<10	3 J	<10	20	38	<10	6 J	11	<10
Chloroethane	5*	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Methylene Chloride	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1-Dichloroethene	5	1 J	43	<5	<5	2 J	31	3 J	<5	4 J	16	<5
1,1-Dichlorethane	5	9	51	4 J	18	4 J	49	48	5 J	27	41	<5
Trichlorofluoromethane	5	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
trans-1,2-Dichloroethene	5	<5	<5	<5	<5	<5	1 J	4 J	<5	<5	2 J	<5
Chloroform	7	<5	2 J	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,2-Dichloroethane	0.6	<5	2 J	<5	<5	<5	8	<5	<5	<5	14	<5
1,1,1-Trichloroethane	5	<5	18	<5	1 J	4 J	18	3 J	<5	<5	5	<5
Carbon Tetrachloride	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
2-Chlorovinylethylether	NA	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromodichloromethane	50*	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,2-Dichloropropane	1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
cis-1,3-Dichloropropene	0.4	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Trichloroethene	5	30	330 D	8	45	9	68	200	14	190 D	69	<5
Benzene	1	<5	<5	<5	<5	<5	<5	<5	<5	<5	1 J	<5
Dibromochloromethane	50*	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
trans-1,3-Dichloropropene	0.4	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1,2-Trichloroethane	1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Bromoform	50*	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Tetrachloroethene	5	20	51	6	180	4 J	37	590 D	59	1,700 D	15	<5
1,1,2,2-Tetrachloroethane	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Toluene	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chlorobenzene	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Ethylbenzene	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
m/p-Xylene	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
o-Xylene	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,3-Dichlorobenzene	3	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,4-Dichlorobenzene	3	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,2-Dichlorobenzene	3	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
cis-1,2-Dichlorethene	5	40 JN	370 JN	8 JN	63 JN	14 JN	100 JN	350 JN	9 JN	82 JN	280 JN	<10
Total "Freon" TICs	NA	13 JN	1,740 JN	2,358 JN	47 JN	21	0	347 JN	0	33 JN	0	0
Total VOCs	NA	100	867	26	310	37	332	1,236	87	2,009	454	0

Notes:

"Shallow" groundwater is defined as wells screened in the interval from the top of the water table to a maximum of 15 feet into the water table.
TICs = Tentatively Identified Compounds, 1,2-DCE listed individually as a VOC because of its importance at the site.
NA = Not Available
Total VOCs does not include TICs
J = Estimated value
B = Analyte is found in associated blank as well as in the sample
E = Compound whose concentrations exceeded the calibration range of the GC/MS for that specific analysis. The sample was diluted and re-analyzed.
D = Compound is identified at a secondary dilution factor.
N = presumptive evidence of a compound, only applicable to TICs.
<## = Compound was analyzed for but not detected. The ## represents the sample quantitation limit (This is similar to the U flag).
* Indicates a guidance value, not a standard.
ND = Tentatively identified compound that was not detected, Actual MDL not available but likely <10 ug/l based upon similar sample matrices.

Table 3-15
Groundwater Sample Results - Deep Groundwater Monitoring Wells
(Samples collected 1/00)

All results in ug/l except as noted.

Parameter	NYSDEC Class GA GW Quality Std. (ug/l)	MW-1PD (1/18/00)	MW-2AD (1/14/00)	MW-4PD (1/17/00)	MW-5PD (1/14/00)	MW-6PD (1/17/00)	MW-10PD (1/14/00)	MW-11PD (1/14/00)	MW-12PD (1/17/00)	MW-13PD (1/17/00)	MW-14PCD (1/21/00)	MW-15PCD (3/10/01)	MW-16PCD (1/21/00)
Chloromethane	5	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromomethane	5	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Vinyl Chloride	2	<10	<10	<10	210 JD	250 D	<10	3 J	<10	<10	59	33	<10
Chloroethane	5*	<10	<10	<10	<10	3 J	<10	<10	<10	<10	<10	4 J	<10
Methylene Chloride	5	<5	<5	<5	2 J	<5	<5	<5	<5	<5	<5	<5	<5
1,1-Dichloroethene	5	<5	<5	50	350 JD	81	16	15	13	12	15	47	2 J
1,1-Dichlorethane	5	<5	2 J	27 J	160	140	12	16	16	15	<10	170	<5
Trichlorofluoromethane	5	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
trans-1,2-Dichloroethene	5	<5	<5	2 J	12	12	<5	<5	1 J	<5	<5	NA	<5
Chloroform	7	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,2-Dichloroethane	0.6	<5	<5	2 J	8	23	<5	<5	<5	1 J	<5	4 J	<5
1,1,1-Trichloroethane	5	<5	2 J	44	420 JD	<5	16	20	8	7	5	6	<5
Carbon Tetrachloride	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
2-Chlorovinylethylether	NA	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromodichloromethane	50*	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,2-Dichloropropane	1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
cis-1,3-Dichloropropene	0.4	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Trichloroethene	5	9	70	930 D	8,700 D	110	490 D	160	580 D	190	7	320 D	32
Benzene	1	<5	<5	<5	5 J	7	<5	<5	<5	<5	<5	<5	<5
Dibromochloromethane	50*	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
trans-1,3-Dichloropropene	0.4	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1,2-Trichloroethane	1	<5	<5	<5	4 J	1 J	<5	<5	<5	<5	<5	<5	<5
Bromoform	50*	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Tetrachloroethene	5	<5	2 J	65	740 JD	24	26	16	17	27	2 J	30	4 J
1,1,2,2-Tetrachloroethane	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Toluene	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chlorobenzene	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Ethylbenzene	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
m/p-Xylene	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	13	<5	<5
o-Xylene	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	8	<5	<5
1,3-Dichlorobenzene	3	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,4-Dichlorobenzene	3	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,2-Dichlorobenzene	3	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
cis-1,2-Dichlorethene	5	<10 JN	48 JN	450 JN	2,100 JN	1,100 JN	99 JN	110 JN	360 JN	150 JN	86 JN	810 JN	23 JN
Total "Freon" TICs	NA	6 JN	0	0 JN	35 JN	0	0 JN	6 JN	10 JN	16 JN	0	0	0
Total VOCs	NA	9	124	1,570	12,711	1,751	659	340	995	402	195	1,424	61

Notes:

"Shallow" groundwater is defined as wells screened in the interval from the top of the water table to a maximum of 15 feet into the water table.
TICs = Tentatively Identified Compounds, 1,2-DCE listed individually as a VOC because of its importance at the site.
NA = Not Available
Total VOCs does not include TICs
J = Estimated value
B = Analyte is found in associated blank as well as in the sample
E = Compound whose concentrations exceeded the calibration range of the GC/MS for that specific analysis. The sample was diluted and re-analyzed.
D = Compound is identified at a secondary dilution factor.
N = presumptive evidence of a compound, only applicable to TICs.
<## = Compound was analyzed for but not detected. The ## represents the sample quantitation limit (This is similar to the U flag).
* Indicates a guidance value, not a standard.
ND = Tentatively identified compound that was not detected, Actual MDL not available but likely <10 ug/l based upon similar sample matrices.

Table 3-16
Groundwater Sample Results - Shallow Groundwater Monitoring Wells
(Samples collected December 2000)

All results in ug/l except as noted.

Parameter	NYSDEC Class GA GW Quality Std. (ug/l)	MW-1A 12/6/2000	MW-1P 12/6/2000	MW-2A 12/7/2000	MW-3P 12/6/2000	MW-4P 12/6/2000	MW-5PS 12/7/2000	MW-7P 12/5/2000	MW-8PS 12/5/2000	MW-10PS 12/7/2000	MW-11PS 12/7/2000	MW-12PS 12/7/2000	MW-13PS 12/6/2000
Chloromethane	5	<10	<10	<10	<20	<10	<10	<10	<10	<10	<10	<10	<10
Bromomethane	5	<10	<10	<10	<20	<10	<10	<10	<10	<10	<10	<10	<10
Vinyl Chloride	2	27	<10	8 J	360 D	84	100	<10	<10	190	8 J	67	2 J
Chloroethane	5*	<10	<10	<10	<20	<10	<10	<10	<10	<10	<10	<10	<10
Methylene Chloride	5	<10	<10	<10	<20	<10	<10	<10	<10	<10	<10	<10	<10
1,1-Dichloroethene	5	<10	<10	6 J	<20	<10	11	<10	<10	13	<10	14	2 J
1,1-Dichlorethane	5	1 J	<10	2 J	18 JD	8 J	8 J	<10	<10	10	2 J	6 J	9 J
Chloroform	7	<10	<10	<10	<20	<10	<10	<10	2 J	<10	<10	<10	<10
1,2-Dichloroethane	0.6	<10	<10	<10	<20	<10	<10	<10	<10	2 J	<10	<10	<10
1,1,1-Trichloroethane	5	<10	<10	10 J	<20	<10	<10	<10	<10	<10	<10	18	2 J
Carbon Tetrachloride	5	<10	<10	<10	<20	<10	<10	<10	<10	<10	<10	<10	<10
Bromodichloromethane	50*	<10	<10	<10	<20	<10	<10	<10	<10	<10	<10	<10	<10
1,2-Dichloropropane	1	<10	<10	<10	<20	<10	<10	<10	<10	<10	<10	<10	<10
cis-1,3-Dichloropropene	0.4	<10	<10	<10	<20	<10	<10	<10	<10	<10	<10	<10	<10
Trichloroethene	5	7 J	<10	270 D	<20	5 J	120	<10	<10	360 D	2 J	1,700 D	23
Benzene	1	1 J	<10	<10	<20	2 J	<10	<10	<10	1 J	<10	<10	<10
Dibromochloromethane	50*	<10	<10	<10	<20	<10	<10	<10	<10	<10	<10	<10	<10
trans-1,3-Dichloropropene	0.4	<10	<10	<10	<20	<10	<10	<10	<10	<10	<10	<10	<10
1,1,2-Trichloroethane	1	<10	<10	<10	<20	<10	<10	<10	<10	<10	<10	<10	<10
Bromoform	50*	<10	<10	<10	<20	<10	<10	<10	<10	<10	<10	<10	<10
Tetrachloroethene	5	24	<10	580 D	<20	5 J	83	<10	<10	63	<10	220 JD	4 J
1,1,2,2-Tetrachloroethane	5	<10	<10	<10	<20	<10	<10	<10	<10	<10	<10	<10	<10
Toluene	5	<10	3 J	<10	<20	2 J	3 J	<10	<10	<10	<10	<10	<10
Chlorobenzene	5	<10	<10	<10	<20	<10	<10	<10	<10	<10	<10	<10	<10
Ethylbenzene	5	<10	<10	<10	<20	<10	<10	<10	<10	<10	<10	<10	<10
Acetone	5	1 J	<10	<10	<20	<10	<10	<10	<10	<10	<10	<10	<10
Carbon Disulfide	NA	<10	<10	<10	<20	<10	<10	5 J	<10	<10	<10	<10	<10
1,2-Dichloroethene (total)	5	33	<10	100	150 D	170	1,500 D	2 J	<10	1,100 D	8 J	550 D	47
2-Butanone	NA	<10	<10	<10	<20	<10	<10	<10	<10	<10	<10	<10	<10
4-Methyl-2-Pentanone	NA	<10	<10	<10	<20	<10	<10	<10	<10	<10	<10	<10	<10
2-Hexanone	50	<10	<10	<10	<20	<10	<10	<10	<10	<10	<10	<10	<10
Styrene	5	<10	<10	<10	<20	<10	<10	<10	<10	<10	<10	<10	<10
Xylene (total)	5	<10	<10	<10	<20	<10	<10	<10	<10	<10	<10	<10	<10
1,1,2-Trichlorotrifluoroethane	5	<10	<10	1,200 D	<20	14	440 D	<10	<10	890 D	<10	1,200 D	<10
Total "Freon" TICs	NA	0	0	40	13 JND	36 JN	210 JN	0	0	97 JN	0	0	0
Total VOCs	NA	94	3	2,176	528	290	2,265	7	2	2,629	20	3,775	89

Table 3-17
Groundwater Sample Results - Intermediate Groundwater Monitoring Wells
(Samples collected December 2000)

All results in ug/l except as noted.

Parameter	NYSDEC Class GA GW Quality Std. (ug/l)	MW-1PI 12/05/00	MW-2AI 12/07/00	MW-4PI 12/06/00	MW-5PI 12/07/00	MW-6P 12/05/00	MW-8PI 12/05/00	MW-10PI 12/07/00	MW-11PI 12/07/00	MW-12PI 12/07/00	MW-13PI 12/06/00	MW-16PCI 12/05/00
Chloromethane	5	<10	<10	<10	<10	<10	<10	<10	<10	<10	<20	<10
Bromomethane	5	<10	<10	<10	<10	<10	<10	<10	<10	<10	<20	<10
Vinyl Chloride	2	2 J	<10	2 J	4 J	39	4 J	50	22	4 J	26 D	<10
Chloroethane	5*	<10	<10	<10	<10	<10	<10	<10	1 J	<10	<20	<10
Methylene Chloride	5	<10	<10	<10	<10	<10	<10	<10	<10	<10	<20	<10
1,1-Dichloroethene	5	<10	1 J	<10	2 J	34	19	10 J	150	<10	16 JD	5 J
1,1-Dichlorethane	5	5 J	2 J	1 J	4 J	100 D	46	26	140	20	38 D	9 J
Chloroform	7	<10	<10	<10	<10	<10	<10	<10	<10	<10	<20	<10
1,2-Dichloroethane	0.6	<10	<10	<10	<10	12 J	7 J	15	3 J	<10	10 JD	<10
1,1,1-Trichloroethane	5	<10	<10	<10	2 J	4 J	8 J	<10	170	1 J	6 JD	<10
Carbon Tetrachloride	5	<10	<10	<10	<10	<10	<10	<10	<10	<10	<20	<10
Bromodichloromethane	50*	<10	<10	<10	<10	<10	<10	<10	<10	<10	<20	<10
1,2-Dichloropropane	1	<10	<10	<10	<10	<10	<10	<10	<10	<10	<20	<10
cis-1,3-Dichloropropene	0.4	<10	<10	<10	<10	<10	<10	<10	<10	<10	<20	<10
Trichloroethene	5	3 J	28	4 J	53	76 D	44	760 D	770 D	120	85 D	63
Benzene	1	<10	<10	<10	<10	<10	<10	<10	<10	<10	<20	<10
Dibromochloromethane	50*	<10	<10	<10	<10	<10	<10	<10	<10	<10	<20	<10
trans-1,3-Dichloropropene	0.4	<10	<10	<10	<10	<10	<10	<10	<10	<10	<20	<10
1,1,2-Trichloroethane	1	<10	<10	<10	<10	4 J	8 J	<10	<10	<10	<20	<10
Bromoform	50*	<10	<10	<10	<10	<10	<10	<10	<10	<10	<20	<10
Tetrachloroethene	5	<10	52	2 J	28	34	15	1,400 D	180 D	1,100 D	17 JD	6 J
1,1,2,2-Tetrachloroethane	5	<10	<10	<10	<10	<10	<10	<10	<10	<10	<20	<10
Toluene	5	<10	1 J	<10	<10	<10	<10	1 J	<10	<10	<20	1 J
Chlorobenzene	5	<10	<10	<10	<10	<10	<10	<10	<10	<10	<20	<10
Ethylbenzene	5	<10	<10	<10	<10	<10	<10	<10	<10	<10	<20	<10
Acetone	5	<10	2 J	<10	<10	<10	<10	<10	<10	<10	<20	<10
Carbon Disulfide	NA	9 J	<10	<10	<10	<10	<10	<10	<10	<10	<20	<10
1,2-Dichloroethene (total)	5	6 J	22	8 J	35	410 D	130	2,400 D	580 D	56	390 D	70
2-Butanone	NA	<10	<10	<10	<10	<10	<10	<10	<10	<10	<20	<10
4-Methyl-2-Pentanone	NA	<10	<10	<10	<10	<10	<10	<10	<10	<10	<20	<10
2-Hexanone	50	<10	<10	<10	<10	<10	<10	<10	<10	<10	<20	<10
Styrene	5	<10	<10	<10	<10	<10	<10	<10	<10	<10	<20	<10
Xylene (total)	5	<10	<10	<10	<10	<10	<10	<10	<10	<10	<20	<10
1,1,2-Trichlorotrifluoroethane	5	<10	67	120	9 J	<10	<10	290 JD	35	550 D	<20	<10
Total TICs	NA	0	0	13 JN	0	0	0	87 JN	0	15 JN	0	0
Total VOCs	NA	25 J	175	137	137	713	281	4,952	2,051	1,851	588	154

Table 3-18
Groundwater Sample Results - Deep Groundwater Monitoring Wells
(Samples collected December 2000)

All results in ug/l except as noted.

Parameter	NYSDEC Class GA GW Quality Std. (ug/l)	MW-1PD 12/06/00	MW-2AD 12/07/00	MW-4PD 12/06/00	MW-5PD 12/07/00	MW-6PD 12/05/00	MW-10PD 12/07/00	MW-11PD 12/07/00	MW-12PD 12/07/00	MW-13PD 12/06/00	MW-14PCD 12/05/00	MW-15PCD 12/05/00	MW-16PCD 12/05/00
Chloromethane	5	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromomethane	5	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Vinyl Chloride	2	7 J	<10	<10	29	170 JD	<10	6 J	<10	2 J	91	12	<10
Chloroethane	5*	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	4 J	<10
Methylene Chloride	5	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,1-Dichloroethene	5	3 J	1 J	1 J	22	66	4 J	1 J	14	10	6 J	41	<10
1,1-Dichlorethane	5	9 J	2 J	<10	24	120	4 J	10	24	15	39	160	3 J
Chloroform	7	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,2-Dichloroethane	0.6	<10	<10	<10	<10	16	<10	<10	1 J	<10	<10	3 J	<10
1,1,1-Trichloroethane	5	<10	2 J	<10	20	<10	2 J	<10	7 J	3 J	<10	4 J	<10
Carbon Tetrachloride	5	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromodichloromethane	50*	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,2-Dichloropropane	1	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
cis-1,3-Dichloropropene	0.4	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Trichloroethene	5	26	57	39	420 D	130	100	31	990 D	180	100	170	<10
Benzene	1	<10	<10	<10	<10	5 J	<10	<10	<10	<10	<10	<10	<10
Dibromochloromethane	50*	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
trans-1,3-Dichloropropene	0.4	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,1,2-Trichloroethane	1	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	4 J	<10
Bromoform	50*	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Tetrachloroethene	5	2 J	3 J	2 J	260 D	21	6 J	83	21	18	13	22	<10
1,1,2,2-Tetrachloroethane	5	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Toluene	5	2 J	1 J	1 J	<10	<10	2 J	<10	1 J	2 J	2 J	<10	<10
Chlorobenzene	5	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Ethylbenzene	5	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Acetone	5	<10	<10	<10	<10	<10	<10	<10	<10	<10	3 J	<10	3 J
Carbon Disulfide	NA	<10	<10	<10	<10	<10	<10	<10	<10	<10	3 J	<10	43
1,2-Dichloroethene (total)	5	78	39	29	380 D	1,700 D	31	98	880 D	200	1,600 D	390 D	2 J
2-Butanone	NA	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
4-Methyl-2-Pentanone	NA	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
2-Hexanone	50	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Styrene	5	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Xylene (total)	5	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,1,2-Trichlorotrifluoroethane	5	<10	3 J	<10	49	<10	<10	12	3 J	<10	<10	<10	<10
Total TICs	NA	0	0	0	20 JN	0	0	0	0	0	0	0	0
Total VOCs	NA	127 J	108	72	1,204	2,228	149	241	1,941	430	1,857	810	51

TABLE 5-1
DETAILED EVALUATION OF ALTERNATIVES SUMMARY

Technology	Compliance with SCGs	Protection of Human Health & Environment	Reduction of Toxicity, Mobility or Volume	Short-Term Effectiveness	Long-Term Effectiveness	Implementability	Cost (+/- 20%)
ALTERNATIVE 1 No Action / Site Controls (NA/SC)	NA/SC will not be compliant with SCGs unless upgradient remedial actions are initiated and a monitored natural attenuation program is initiated and completed. SCG waivers would have to be approved.	A site-specific risk assessment would have to be completed before this criterion could be fully assessed because of the relatively high concentrations for residuals. No action would not be protective of human health or the environment given the current information available.	NA/SC can result in a reduction in mobility (e.g., hydraulic control) and can result in a reduction in volume (attenuation). Reductions in toxicity are not significant without active remediation of "hot spots" and upgradient sources. A relatively long period of time would be required for significant reductions of toxicity, mobility, or volume.	NA/SC will not result in initial reductions in toxicity or volume, but will also not present any significant health and safety concerns or short-term, adverse impacts to the community or site workers.	NA/SC may be effective in the long-term if coupled with active remediation of localized hot spots. The long-term effectiveness is likely to be the greatest for deeper groundwater zones if more shallow zones are aggressively treated and if upgradient remedial actions are successful.	The NA/SC alternative is easily implemented from a technical perspective but may not be administratively feasible unless considered in conjunction with more aggressive, "hot spot" and upgradient remediation approaches. One of the only implementable and effective remedies to address deeper groundwater impacts. Community issues are likely to be significant under this scenario.	Cost assuming NA/SC with continued monitoring for 30 years approximately $678,000 dollars
ALTERNATIVE 2 Air Sparging / Soil Vapor Extraction (AS/SVE)	AS/SVE has been demonstrated to meet groundwater standards at similar sites and can comply with SCGs if properly designed and implemented. Pilot testing is required. SCG waivers may be required to deal with low concentration residuals.	AS/SVE has been demonstrated at similar sites to be protective of human health and the environment if vapors are captured and treated properly.	AS/SVE has been demonstrated to reduce toxicity through concentration decreases and reduce volume through a corresponding reduction in the mass of contaminants in the subsurface. Although sparging may mobilize contaminants, proper SVE systems for vapor recovery eliminate any significant increase in mobility. Use of sparge barrier type systems can be used to minimize contaminant mobility as well and as a means of hydraulic control.	AS/SVE typically is most effective during the initial months of operation and therefore is very effective in the short-term. There are no major health and safety concerns relative to the other technologies being considered and there should be no adverse impacts to the community during implementation	AS/SVE has a demonstrated record of being effective in the long-term; however, rebound is common immediately after system shutdown and restart of remediation systems may be required prior to an ultimate, permanent decrease in contaminant concentrations. The long-term effectiveness of all remedies is highly dependent upon the successful completion of an upgradient remedial program.	AS/SVE is technically implementable; however, the shallow depth to water necessitates that proper water handling be incorporated into the design (e.g., use of horizontal SVE wells may be required and an automated water handling system should be considered). Administratively, the technology is well respected and has a proven record of accomplishment. Permitting issues are minimal and community acceptance should not pose a problem.	Costs estimated at approximately $3.13 MM
ALTERNATIVE 3 *In-situ* Chemical Treatment / Oxidation (CT/O)	CT/O is capable of complying with SCGs; however, pilot testing would be essential. SCG waivers may be required to deal with low composition residuals or decomposition products.	CT/O has been demonstrated at similar sites to be protective of human health and the environment if properly designed and implemented.	CT/O has been demonstrated to reduce toxicity through concentration decreases and reduce volume through mass reductions. Contaminant mobility would be minimized through design of treatment barriers and injection systems that allow the reactions necessary to take place in a migrating plume (i.e., remediating as migration continues).	CT/O can result in rapid remediation of contaminants in many instances (e.g. potassium permanganate injection) and may yield significant short-term benefits. Health and safety must be factored into the design and is critical for more aggressive oxidizers (e.g., Fenton's Reaction)	CT/O can result in long-term and permanent reduction in contaminant concentrations if properly designed and implemented. However, the long-term effectiveness of all remedies is highly dependent upon the successful completion of an upgradient remedial program.	CT/O is technically implementable at shallow and possibly intermediate groundwater depths. Chemical mixing may be problematic and must be addressed during pilot testing and remedial design. Administratively, the technology would likely be acceptable, but more effort would likely be required for technology demonstrations and pilot testing.	Costs estimated at approximately $760,000.

Table 5-1 (continued)

Technology	Compliance with SCGs	Protection of Human Health & Environment	Reduction of Toxicity, Mobility or Volume	Short-Term Effectiveness	Long-Term Effectiveness	Implementability	Cost (+/- 20%)
ALTERNATIVE 4 Groundwater Extraction and Treatment (Pump and Treat)	Although possible, compliance with SCGs using pump and treat technologies is not probable without decades of operation and maintenance and significant treatment costs. SCG waivers may be req'd. for low concentration residuals.	Pump and treat has been demonstrated at similar sites to be protective of human health and the environment provided that proper above ground treatment processes are employed prior to injection or disposal of treated waters.	Pump and treat can result in a reduction in toxicity through concentration decreases and a reduction in mobility if the system is properly designed for hydraulic control. Contaminant volume can also be reduced; however, the duration of the remedy may be long.	Pump and treat technologies will not have any significant short-term benefit other than initiation of hydraulic control. Health and safety issues are dependent upon the treatment technologies employed.	The long-term effectiveness of pump and treat systems has been highly variable with some systems working and others never achieving any significant, permanent reductions in contaminant concentrations. At best, the long-term effectiveness of pump and treat systems would have to be considered questionable.	Pump and treat systems could be implemented easily without any significant site constraints. Regulatory acceptance is likely; however, the long duration of pump and treat (i.e., decades may be required) make this remedy difficult to implement because of site operational issues. Discharge of the large volume of waters that would be required may make water management and discharge permitting difficult. Costs are prohibitive.	Costs estimated at approximately $11.6 MM (20 years O&M) and $8.5MM (10 years O&M).
Thermal Desorption / Thermal Enhancements of Alternatives 2, 3, and 5.	Thermal Desorption would be capable of meeting SCGs, but would have to be coupled with one of the other technologies (e.g., sparging, DPHVE, pump and treat, etc.). Residuals may not be an issue if properly designed and implemented.	Thermal Desorption / enhancement approaches have been demonstrated at similar sites to be protective of human health and the environment if offgas treatment is properly designed and implemented.	Thermal Desorption, when used in conjunction with the other treatment approaches, can result in a reduction in toxicity and volume. Mobility is not significantly impacted by ex-situ thermal Desorption, but may be impacted if implemented in-situ. Proper vapor and liquid recovery may be req'd if implemented in-situ to prevent contaminant migration.	Thermal Desorption typically results in initial, high contaminant removal rates. Use of thermal systems can create H&S concerns (e.g., steam pressures, thermal energy buildup, etc.) that can be mitigated through proper design and implementation.	Thermal systems tend to be effective for the long-term for the more volatile fractions of the total contaminant mass. If used appropriately in conjunction with other technologies, thermal desorption is anticipated to result in a permanent reduction in contaminant concentrations.	In-situ thermal systems could be implemented in conjunction with other technologies; however, utility concerns may create limitations on where and how the technology can be implemented (e.g., stem injection may not be practical in areas with numerous subsurface utilities). Deep groundwater treatment in-situ using thermal methods is difficult and costly to implement.	Not Applicable at this time.

**** Effectiveness categories assume upgradient source removal and remediation to be completed by other parties. Without upgradient source removal and remediation, there are no effective remedies.**

Recommended Technology Summary:

- *In-situ* Chemical Oxidation is recommended by Pall to address shallow and intermediate groundwater areas of concern. *In-situ* Chemical Oxidation (or any other remedy) should only be implemented in conjunction with a well-defined plan to address upgradient source areas by other parties. Permanganate injection is to be limited to on-site areas of elevated concentrations and installed as a barrier system at the northern (downgradient) property line to ensure migration control and protection of human health and the environment off-site through reduction in toxicity, mobility, and volume of contaminants of concern.

- Natural attenuation with site controls is recommended for deep groundwater in conjunction with permanganate injection in shallow and intermediate groundwater, and upgradient remediation by other parties. Deep groundwater remediation is not addressed by Pall because of the documented, upgradient source and because of the limited remedial technologies available that will be effective and implementable. Site controls to be implemented may include deed restrictions (non-use of underlying groundwater for a specified period of time). The need for active or passive, deep groundwater remediation will be re-evaluated following implementation of the on-site shallow and intermediate remedies, and completion of the upgradient remediation program for shallow, intermediate, and deep groundwater by others.

Table 5-2

Alternative No. 1: No Action for Soil or Groundwater with Continued Groundwater Monitoring for Thirty (30) Years

Cost Estimate Summary

1.0 CAPITAL COSTS		
1.1 Direct Costs		
1.1.1 Construction	$	-
1.1.2 Equipment	$	2,000
1.1.3 Land & Site Costs	$	2,000
1.1.4 Buildings & Services	$	1,000
1.1.5 Relocation & Restoration	$	-
1.1.6 Waste Disposal	$	-
Direct Capital Cost Sub-Total:	*$*	*5,000*
1.2 Indirect Costs		
1.2.1 Engineering & Design (10% of capital)	$	10,000
1.2.2 Licenses & Permits	$	-
1.2.3 System Start-up	$	1,000
Indirect Capital Cost Sub-Total:	*$*	*11,000*
CAPITAL COST SUB-TOTAL:	**$**	**16,000**
2.0 ANNUAL O&M COSTS		
2.1 Operating Labor	$	10,000
2.2 Maintenance Materials & Equipment	$	2,500
2.3 Energy & Utilities	$	500
2.4 Waste Disposal	$	4,000
2.5 Analytical Fees	$	7,000
2.6 Engineering & Professional Oversight	$	2,500
2.7 Periodic Reporting	$	10,000
ANNUAL O&M SUB-TOTAL:	*$*	*36,500*
NUMBER OF YEARS OF O&M:	*30*	
PRESENT WORTH, O&M SUB-TOTAL:	**$**	***573,314***
Contingency Fees (15% of Capital and O&M Costs)	*$*	*88,397*
TOTAL PROJECT COST ESTIMATE:	**$**	**677,711**

* Cost assumes annual groundwater monitoring (VOCs only), 25 wells per event.

Table 5-3

Alternative No. 2: AS/SVE for Shallow and Intermediate Groundwater
With No Action for Deep Groundwater
Cost Estimate Summary

1.0 CAPITAL COSTS		
1.1 Direct Costs		
1.1.1 Construction	$	481,080
1.1.2 Equipment	$	320,680
1.1.3 Land & Site Costs	$	10,000
1.1.4 Buildings & Services	$	87,600
1.1.5 Relocation & Restoration	$	50,000
1.1.6 Waste Disposal	$	100,000
Direct Capital Cost Sub-Total:	***$***	***1,049,360***
1.2 Indirect Costs		
1.2.1 Engineering & Design (10% of capital)	$	104,936
1.2.2 Licenses & Permits	$	16,000
1.2.3 System Start-up	$	25,000
Indirect Capital Cost Sub-Total:	***$***	***145,936***
CAPITAL COST SUB-TOTAL:	**$**	**1,195,296**
2.0 ANNUAL O&M COSTS		
2.1 Operating Labor	$	45,000
2.2 Maintenance Materials & Equipment	$	50,000
2.3 Energy & Utilities	$	175,000
2.4 Waste Disposal	$	155,000
2.5 Analytical Fees	$	30,000
2.6 Engineering & Professional Oversight	$	40,000
2.7 Periodic Reporting	$	40,000
ANNUAL O&M SUB-TOTAL:	***$***	***535,000***
NUMBER OF YEARS OF O&M:		***3***
PRESENT WORTH, O&M SUB-TOTAL:	**$**	**1,526,088**
Contingency Fees (15% of Capital and O&M Costs)	$	408,208
TOTAL PROJECT COST ESTIMATE:	**$**	**3,129,591**

Cost excludes upgradient remediation & monitoring for deep groundwater assumed to be by others.

Table 5-4
Alternative No. 3: Chemical Oxidation for Shallow & Intermediate Groundwater With No Action for Deep Groundwater
Cost Estimate Summary

1.0 CAPITAL COSTS		
1.1 Direct Costs		
1.1.1 Construction / Injection System	$	25,000
1.1.2 Equipment & Drilling	$	80,000
1.1.3 Land and Site Costs	$	2,000
1.1.4 Buildings & Services	$	5,000
1.1.5 Relocation & Restoration	$	2,000
1.1.6 Waste Disposal	$	5,000
Direct Capital Cost Sub-Total:	***$***	***119,000***
1.2 Indirect Costs		
1.2.1 Engineering, Treatability & Design	$	50,000
1.2.2 Licenses & Permits	$	10,000
1.2.3 System Start-up	$	10,000
Indirect Capital Cost Sub-Total:	***$***	***70,000***
CAPITAL COST SUB-TOTAL:	**$**	**189,000**
2.0 ANNUAL O&M COSTS		
2.1 Operating Labor	$	30,000
2.2 Maintenance Materials (chemicals) & Equipment	$	100,000
2.3 Energy & Utilities	$	5,000
2.4 Waste Disposal	$	2,000
2.5 Analytical Fees	$	40,000
2.6 Engineering & Professional Oversight	$	25,000
2.7 Periodic Reporting	$	40,000
ANNUAL O&M SUB-TOTAL:	***$***	***242,000***
NUMBER OF YEARS OF O&M:	***2***	
PRESENT WORTH, O&M SUB-TOTAL:	**$**	**471,900**
Contingency Fees (15% of Capital and O&M Costs)	$	99,135
TOTAL PROJECT COST ESTIMATE:	**$**	**760,035**

Cost excludes natural attenuation monitoring for deep groundwater assumed to be by others.

Table 5-5
Alternative No. 4: Groundwater Extraction for Shallow and Intermediate Groundwater With No Action for Deep Groundwater
Cost Estimate Summary

1.0 CAPITAL COSTS		
1.1 Direct Costs		
1.1.1 Construction	$	612,900
1.1.2 Equipment	$	921,960
1.1.3 Land & Site Costs	$	50,000
1.1.4 Buildings & Services	$	492,000
1.1.5 Relocation & Restoration	$	36,000
1.1.6 Waste Disposal	$	40,000
Direct Capital Cost Sub-Total:	***$***	***2,152,860***
1.2 Indirect Costs		
1.2.1 Engineering & Design (10% of capital)	$	215,286
1.2.2 Licenses & Permits	$	40,000
1.2.3 System Start-up	$	50,000
Indirect Capital Cost Sub-Total:	***$***	***305,286***
CAPITAL COST SUB-TOTAL:	**$**	**2,458,146**
2.0 ANNUAL O&M COSTS		
2.1 Operating Labor	$	75,000
2.2 Maintenance Materials & Equipment	$	36,000
2.3 Energy & Utilities	$	315,000
2.4 Waste Disposal	$	50,000
2.5 Analytical Fees	$	30,000
2.6 Engineering & Professional Oversight	$	50,000
2.7 Periodic Reporting	$	40,000
ANNUAL O&M SUB-TOTAL:	***$***	***596,000***
NUMBER OF YEARS OF O&M:	***20***	
PRESENT WORTH, O&M SUB-TOTAL:	**$**	**7,646,848**
Contingency Fees (15% of Capital and O&M Costs)	$	1,515,749
TOTAL PROJECT COST ESTIMATE:	**$**	**11,620,743**