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RCRA Facility Investigation (RFI) Report
Dyno Nobel Facility
Port Ewen, New York

December 1999

Eckenfelder/Brown and Caldwell

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Dyno Nobel Facility
Port Ewen, New York

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RCRA FACILITY INVESTIGATION (RFI) REPORT, DYNO NOBEL FACILITY PORT EWEN, NEW YORK

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1.0 INTRODUCTION

A RCRA Facility Assessment (RFA) of the DYNO Nobel, Port Ewen, New York Facility was completed by A.T. Kearny in October, 1993 and was revised by ECKENFELDER INC., now Brown and Caldwell, in August 1994. The RFA identified 46 Solid Waste Management Units (SWMUs) and four Areas of Concern (AOCs). In addition, two additional SWMUs (Nos. 47 and 48) were identified after the RFA was complete. On April 15, 1996, DYNO Nobel entered into an Order on Consent with the New York State Department of Environmental Conservation (NYSDEC), which stipulated, among other things, that 25 SWMUs and/or AOCs be the subject of a RCRA Facility Investigation (RFI). Additionally, a RCRA Facility Assessment Sampling Visit (RFA-SV) documented in the Sampling Visit Report, DYNO Nobel Facility, Port Ewen, New York (ECKENFELDER INC., February 1997) indicated that 12 additional SWMUs or AOCs required further investigation as part of an RFI. In response to the Order on Consent and the results of the Sampling Visit, a work plan titled RCRA Facility Investigation Work Plan, DYNO Nobel Facility, Port Ewen, New York, (ECKENFELDER INC., April 1997) was submitted to and approved by the NYSDEC for the investigation of 38 SWMUs and/or AOCs as listed in Table 1-1 (note: SWMU 26 consists of four locations). Those SWMUs not identified in Table 1-1 were eliminated from further consideration during the RFA-SV and do not contain concentrations of organic or inorganic constituents above the established screening criteria.

The screening criteria (included on the inorganic analytical results tables in Section 6.0) are obtained from Appendix A of the USEPA Soil Screening Guidance: Technical Background Document, May 1996 and correspond to a migration to groundwater criteria for a Dilution-Attenuation Factor (DAF) of 20. These values are typically less than those established for ingestion and are consistent with the industrial use of the facility. Further, the DAF of 20 is most applicable to the site given the extensive clay deposits underlying the active portions of the facility. Where screening criteria where not given for a specific

analyte under the USEPA Guidance Document (i.e., aluminum, cobalt and copper), a screening level was obtained from the New Jersey Residential Screening Criteria (copper), or the NYSDEC TAGM HWR-94-4046 (aluminum and cobalt).

The USEPA Guidance document referenced above uses conservative, risk-based assumptions to develop the screening criteria. As stated in the Guidance document, these values are conservative and site-specific risk analysis may result in higher values. These values are thus used herein to identify those areas where concentrations of specific metals above the screening criteria may warrant further evaluation (i.e., as part of a corrective measures study). The areas identified in the text and figures of this report, therefore, only represent areas where further evaluation is warranted rather than where corrective action is required. The need and type of corrective action at each location will be determined as part of the Corrective Measures Study (CMS)

The following report presents the results of the RFI, which was completed in accordance with the approved work plan referenced above and its companion documents which include:

- Quality Assurance Project Plan For RFI Related Investigations at the DYNO Nobel Facility, Port Ewen, New York. ECKENFELDER INC., January 1995.

- Health and Safety Plan for RFI Work, DYNO Nobel Facility, Port Ewen, New York. ECKENFELDER INC., May 1995.

Section 2.0 presents a brief description of the SWMUs and AOCs addressed during the RFI. Section 3.0 then presents a summary of the work completed at the site to date and which formed the basis for the work completed as part of the RFI. These data, along with data collected during the RFI, are then used to summarize the site hydrogeology in Section 4.0. The field procedures used to collect the data are discussed in Section 5.0 followed by the results of the RFI work completed at each SWMU and AOC in

Section 6.0. Section 7.0 presents the QA/QC data collected during the RFI. The results of the investigation are then summarized in the context of the site hydrogeology in Section 8.0.

TABLE 1-1

SWMUs AND AOCs INVESTIGATED IN THE RFI

SWMU No.	SWMU Name
1	Shooting Pond
2	Buring Cage/Incinerator
3	Copper Wire Burning Area
4	Iron Wire Burning Area
5	Wire Burning Area III
6-7	Open Burning Pads
8	Former Burning Area
9	Waste Powder Catch Basins - Building 2037
10	Waste Powder Catch Basins - Building 2048
11	Waste Powder Catch Basins - Building 2049
13	Former Waste Powder Catch Basins - Lead Azide Building
15	Waste Powder Magazines
21	Lead Recycling Unit Area
22	Former Landfill
23	Former Dump
24	Former Wastewater Treatment Facility
26	Burnable Waste Satellite Accumulation Areas (4 locations)
27	Sanitary Sewer System
29	Drainage ditch (Downgrade of Building 2049)
30	Drainage Ditch (Downgrade of Building 2036)
32	Old Dump (near water tower)
33	Mercury Fulminate Tanks Area
34	Old Waste Burning Grounds (near Shooting Pond)
35	Stone Fence Dump
37	Shell Plant Drum Storage Area
38	Grenade Disposal Area
39	Former Washwater Discharge Area - Building 2009
40	Pilot Line Condensate Collection Sump
41	Detonator Production Building Condensate Collection Sumps
42	SAC Building Steam Collection Containers
46	Vacuum Line Condensate Collection Sumps (Building 2059)
47	Building 2058 Fuse Room
48	Mercury Fulminate Area

AOC	AOC Name
A	Kerosene Tank Leak
B	Open Burning Pads Area
C	Open Detonation Pit
D	Detonation Test Building

2.0 DESCRIPTION OF SWMUs AND AOCs

The SWMUs and AOCs to be addressed as part of the RFI, as defined by the Order on Consent and the Sampling Visit, are presented below. A description of the wastes handled at each unit is taken from the RFA. Acronyms used in the following descriptions and throughout the report are summarized in Table 2-1.

SWMU No. 1: Shooting Pond - The unit managed off-specification PETN, DDNP, HMX, PBX, RDX, lead azide, lead styphnate, detonation caps and devices, and sump powder waste. Interim Corrective Measures at this unit did not find any explosives at reactive quantities. However, as reported in the Sampling Visit Report, metals concentrations were found in the pond sediment above the screening criteria.

SWMU No. 2: Burning Cage Incinerator - This unit managed approximately 1,200 to 2,500 pounds of explosive contaminated waste per burn with approximately 500 pounds of ash generated at each of two to four burns per week.

SWMU No. 3: Copper Wire Burning Area - This unit managed (burned) scrap copper wire covered with plastic insulation until July 1993. The waste usually included some blasting caps. The waste potentially contained, or has in the past contained, arsenic, copper, cadmium, lead, mercury, selenium, silver, and chromium.

SWMU No. 4: Iron Wire Burning Area - This unit managed (burned) scrap iron wire covered with plastic insulation. The waste usually included some blasting caps. The waste potentially contained arsenic, barium, cadmium, lead, mercury, selenium, silver, and chromium.

SWMU No. 5: Wire Burning Area III - Facility personnel were not able to identify what waste had been burned at the unit. The unit showed dark stains and was littered with bits of paper and wire.

SWMU Nos. 6 and 7: Open Burning Pads - These units managed up to 500 pounds at a time of reactive and ignitable wastes which were not suitable for open detonation. The residual waste may have also contained arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, or tellurium.

SWMU No. 8: Former Burning Area - This unit managed reactive and ignitable wastes which were not suitable for open detonation. The residual waste may have contained arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, or tellurium.

SWMU No. 9: Waste Powder Catch Basins - Building 2037 - This unit managed waste powder (unknown type) in water.

SWMU No. 10: Waste Powder Catch Basins - Building 2048 - This unit managed waste PETN, RDX, HMX, PBX, and DDNP powder in water.

SWMU No. 11: Waste Powder Catch Basins - Building 2049 - This unit managed waste DDNP powder (unknown type) in water.

SWMU No. 12: Waste Powder Catch Basins - Weber City Building - This unit managed waste DDNP and PETN powder in water. As noted in the RFA, this area is no longer accessible due to recent building construction, and is therefore not addressed in this work plan.

SWMU No. 13: Former Waste Powder Catch Basins - Lead Azide Building - The unit managed waste lead azide powder in water (K046).

SWMU No. 15: Waste Powder Magazine - This unit managed waste detonators, waste powder, and waste powder wipes from production buildings throughout the facility.

SWMU No. 21: Lead Recycling Unit Area - This unit managed waste ignition powders and blasting cap components containing lead and selenium.

SWMU No. 22: Former Landfill - Potentially hazardous and non-hazardous wastes, including ash, flashed debris, and general building debris are reported to have been disposed in this unit.

SWMU No. 23: Former Dump - This unit managed used equipment, and used 55-gallon drums. This unit may also have potentially managed PCB-containing transformers.

SWMU No. 24: Former Wastewater Treatment Facility - This unit is known to have managed acidic wastewaters and waste degreaser solvents, and potentially explosive-containing process waters and explosive-containing waste oils.

SWMU No. 26: Burnable Waste Satellite Areas - These units consisted of open-topped metal dumpsters, which managed waste packaging materials possibly contaminated with explosive materials.

SWMU No. 27: Sanitary Sewer System - This system of underground sewer pipes managed non-hazardous sanitary waste and waste waters potentially contaminated with any of the explosive powders used on site.

SWMU No. 29: Drainage Ditch (Downgradient of Building 2049) - This unit managed process wastewaters containing potentially explosive material and may have managed waste degreaser solvents.

SWMU No. 30: Drainage Ditch (Downgradient of Building 2036) - This unit managed acidic process wastewaters potentially containing explosive material and waste degreaser solvents.

SWMU No. 32: Old Dump (near water tower) - The wastes managed by this unit are unknown. Miscellaneous metal debris and the remains of old drums were observed during the second VSI.

SWMU No. 33: Mercury Fulminate Tanks Area - This unit formally consisted of wooden tanks which managed a protective water bath that may have contained trace amounts of mercury fulminate.

SWMU No. 34: Old Waste Burning Grounds (near Shooting Pond) - This unit reportedly managed explosive wastes from on-site production areas.

SWMU No. 35: Stone Fence Dump - The wastes managed by this unit include metal drums and debris. It could not be determined if other materials have also been managed at the unit.

SWMU No. 37: Former Shell Plant Drum Storage Area - This unit managed waste degreaser solvents, including TCE and freon, in drums stored directly on the ground.

SWMU No. 38: Suspected Grenade Disposal Areas - This unit consists of two separate areas (designated north and south) which were suspected to contain grenade shells.

SWMU No. 39: Former Wash Water Discharge Area (Building 2009) - This unit managed PETN and DDNP powders in water.

SWMU No. 40: Pilot Line Condensate Collection Sump - This unit managed steam condensate that contained trace amounts of lead styphnate.

SWMU No. 41: Detonator Production Building Condensate Collection Sump - This unit managed steam condensate containing small amounts of explosive powders.

SWMU No. 42: SAC Building Steam Collection Canisters - This unit managed steam condensate containing fuse powders and DDNP.

SWMU No. 46: Vacuum Line Condensate Collection Sump - Building 2059 - This unit managed steam condensate that potentially contained trace amounts of antimony sulfide, barium salts, boron, HMX, RDX, dibutylphthalate, diphenylamine, graphite, latex, lead azide, lead dioxide, lead styphnate, nitrocellulose, nitroglycerin, PETN, potassium nitrate, stearic acid, tetrazene, tetryl, viton, and zirconium.

SWMU No. 47: Building 2058 Fuse Room - This unit consisted of a wooden box which collected wash water with ignition and fuse powders containing lead and selenium.

SWMU No. 48: Mercury Fulminate Area - This unit consists of a fill area for construction and demolition debris from various projects throughout the facility. The presence of mercury fulminate has been documented in this area.

AOC A: Kerosene Tank Leak - This AOC contains soil stained with a small amount of kerosene which has leaked from a storage tank.

AOC B: Open Burning Pads Area - This AOC is an area of soil to which waste explosive debris and kerosene has been released.

AOC C: Open Detonation Pit - This AOC consists of a metal sided pit which managed detonators and blasting caps produced at the facility.

AOC D: Detonation Test Building - This unit is used to test detonators and blasting caps produced at the facility.

TABLE 2-1

ACRONYMS USED WITHIN THIS RFI

AOC	=	Area of Concern
DDNP	=	Secondary Explosive (Diazodinitrophenol)
HMX	=	Secondary Explosive (Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetramine)
ICM	=	Interim Corrective Measures
LMNR	=	Lead Mononitroresorcinol
PETN	=	Secondary Explosive (Pentaerythritol tetranitrate)
QAPjP	=	Quality Assurance Project Plan
RCRA	=	Resource Conservation Recovery Act
RDX	=	Secondary Explosive (Hexahydro-1,3,5-trinitro-1,3,5-triazine)
RFA	=	RCRA Facility Assessment
RFI	=	RCRA Facility Investigation
SV	=	Sampling Visit
SWMU	=	Solid Waste Management Unit
TNT	=	2,4,6-Trinitrotoluene
TPH	=	Total Petroleum Hydrocarbons
VSI	=	Visual Site Inspection

3.0 PREVIOUS INVESTIGATIONS

Previous investigations of this facility have been under two independent programs: the Resource Conservation and Recovery Act (RCRA) and the New York State Superfund Program. The reports generated from these investigations are summarized in Table 3-1.

Investigations under the RCRA program have consisted of the completion of a RCRA Facility Assessment (RFA), which included a Preliminary Review (PR) of available relevant documents, and a visual site inspection (VSI). The PR and VSI were completed by A.T. Kearney Inc., under contract to the U.S. Environmental Protection Agency, and the results are reported in the RFA Report. The original RFA report, completed by A.T. Kearney in July 1993 has been revised by ECKENFELDER INC., on behalf of Hercules and DYNO Nobel, and at the request of NYSDEC, to correct various factual errors.

The RFA Report presents a detailed description of the site history and operation and identifies individual Solid Waste Management Units (SWMUs) and/or Areas of Concern (AOCs) which potentially resulted in a release to the environment. These areas were identified through a review of file materials and visual inspections and are evaluated as to their potential to release hazardous waste or constituents to the environment. Based on this evaluation, the RFA Report documents those SWMUs and/or AOCs which either a) require no further action; b) require confirmatory sampling (i.e., a RCRA Facility Assessment Sampling Visit (RFA-SV); c) require a RCRA Facility Investigation to collect information on a known or suspected release to the environment; or d) require that an interim corrective measure (ICM) be implemented on an expedited basis.

On the basis of the RFA, 17 SWMUs and/or AOCs were targeted for the implementation of Interim Corrective Measures (discussed below) and 19 SWMUs and/or AOCs were targeted for a RFA-SV as documented in the Sampling Visit Report (ECKENFELDER INC., February 1997). Of the 19 SWMUs and/or AOCs evaluated

under the RFA-SV, 10 were determined to require further investigation as part of the RFI and are thus included in this report. The total number of SWMUs and/or AOCs to be investigated as part of the RFI is thus 38 (see Table 1-1).

Additional work completed on the basis of the RFA included a site-wide groundwater investigation to provide a better understanding the site hydrogeology. This investigation was conducted in accordance with the Groundwater Investigation Work Plan, DYNO Nobel, Port Ewen, New York (ECKENFELDER INC., April 1995). The goals of this investigation included the following:

- To obtain a better understanding of the site hydrogeology including groundwater flow direction, hydraulic conductivity, and vertical and horizontal gradients;

- To estimate the horizontal extent of groundwater impacts in the vicinity of the Shell Plant;

- To recommend the location of monitoring wells associated with the Shell Plant based on data obtained from this investigation;

- To evaluate the potential for off-site migration of contaminants that may be associated with the detonation pond; and

- To determine groundwater use in the vicinity of the site, including the use and location of private wells, as well as the availability of public water supplies.

The results of this investigation are reported in the Groundwater Investigation Report, DYNO Nobel Inc. Site, Port Ewen, New York (ECKENFELDER INC., January 1996). The findings of the Groundwater Investigation as they relate to the site-wide

hydrogeology, supplemented by the additional data collected during the RFI, are summarized in Section 4.0. Data collected specific to the Shell Plant area are discussed in Section 6.0.

3.1 POTENTIAL RECEPTORS

As noted in subsequent sections, the soil and water quality data indicate that any exceedances of water or soil quality criteria are constrained within the site boundaries. However, in order to provide information regarding the potential impact to human population in the unlikely event of a release from the facility, an evaluation of groundwater and surface water use within a one mile radius of the site was conducted as part of the Groundwater Investigation. As reported in the Groundwater Investigation Report (ECKENFELDER INC., January , 1996), any potential receptors (i.e., those located downgradient of the facility) are located within the area served by the Port Ewen Water Supply. The area identified as not having access to the public water supply is located upgradient of the facility. Given that site specific data indicates that any exceedances of soil or groundwater quality criteria are constrained within the site boundaries, coupled with the hydrogeologic characteristics of the site as discussed in Section 4.0 and to a lesser degree the availability of public water, there is little if any possibility for groundwater related health concerns to neighboring residents.

3.2 INTERIM CORRECTIVE MEASURES

Interim corrective actions for explosives were undertaken during the period July 24, through October 7, 1996. This work was conducted to address health and safety concerns associated with areas of the facility which may contain explosives at reactive concentrations. A total of 17 SWMUs were screened by UXB International Inc. for primary and secondary explosives. Two locations (SWMU No. 41: Detonator Production Building Condensate Collection Sumps, and SWMU No. 48: Mercury Fulminate Area) were found to contain explosive quantities of both primary and secondary explosives. This material was removed until subsequent sampling indicated

that explosive quantities were no longer present. Three locations (SWMU No. 1: Former Detonation Pond, and SWMU Nos. 38S and 38N: Suspected Grenade Disposal Areas North and South) were found to contain numerous caps and related debris that was collected in five gallon pails for disposal. These activities are documented in "Documentation of Interim Corrective Measures (ICM) for Explosives, DYNO Nobel Facility, Port Ewen, New York" (ECKENFELDER INC., January 1997).

The objectives of the ICM for explosives were met and the screened areas were deemed safe for further investigation activities as described in Sections 5 and 6.

TABLE 3-1

SUMMARY OF PREVIOUS INVESTIGATIONS AND REPORTS

Name of Investigation	Investigation/Reports By	Final Report Date
New York State Superfund Program		
Phase I Investigation	EA Science and Technology	December 1983
Phase II Investigation	Gibbs and Hill Inc.	July 1990
USEPA Resource Conservation and Recovery Act		
RCRA Facility Assessment (RFA)[a]	A.T. Kearney Inc. ECKENFELDER INC.	August 1994[b]
Groundwater Investigation Report	ECKENFELDER INC.	January 1996[c]
RFI Task II Report	ECKENFELDER INC.	August 1996
Documentation of Interim Corrective Measures	UXB International ECKENFELDER INC.	January 1997
Sampling Visit Report	ECKENFELDER INC.	February 1997[c]

a Includes a Preliminary Review (PR) and Visual Site Inspection (VSI).
b The A.T. Kearney report was revised and finalized, at the request of NYSDEC, by ECKENFELDER INC., on behalf of Hercules and DYNO Nobel.
c Documents pending review by NYSDEC.

4.0 SITE HYDROGEOLOGY

The hydrogeology of the site has been previously described in the Groundwater Investigation Report, DYNO Nobel Inc. Site, Port Ewen, New York (ECKENFELDER INC., January 1996). The following presents a summary of these data with updated maps reflecting a recent round of water level data and the installation of three bedrock monitoring wells near the east-central portion of the facility associated with the Shell Plant area. For additional details such as individual hydraulic conductivity test results, monitoring well logs, etc., for wells completed prior to the RFI, the reader is referred to the Groundwater Investigation Report referenced above.

The location of monitoring wells installed across the site are illustrated on Sheet 001. The data collected from these locations, as well as the shallow RFI borings which reached bedrock along the north western edge of the property, indicate that bedrock across the site ranges from an elevation of approximately 224 feet NGVD near well MW-1, near which there are obvious outcrops, to 80 feet NGVD near the center of the site at MW-12D. Moving eastward, the bedrock then rises again beneath the wetlands to an elevation of approximately 130 feet near MW-17S. A Structural contour map of the top of the bedrock surface, presented in the Groundwater Investigation Report, indicates that the bedrock surface forms a buried valley oriented in a northeastward direction and located beneath the active portions of the site. The bedrock valley is offset to the western side of the topographic valley represented by the wetlands. The bedrock beneath the site consists of the Austin Glen Formation of the Normanskill Unit and is composed of graywacke that grades upward to a shale.

The overburden beneath the site consists of silt and clay deposits underlain by a sand and gravel layer. The upper 15 feet of the silt and clay deposits can generally be described as a moist, brown, Silty CLAY, trace f Sand. This then grades to a wet gray Silty CLAY to CLAY, trace to no f Sand. This gray Silty CLAY layer ranges in thickness from 3.5 feet in MW-17S to 66.8 feet thick in MW-12D.

Underlying the Silty CLAY is a Sand and Gravel layer identified in 22 borings across the site. The Sand and Gravel layer ranges from 3.5 feet below ground surface at MW-17S to 66.8 feet below ground surface in MW-12D. The Sand and Gravel layer is not present in the northwest portion of the site near MW-1 and, where its thickness could be determined, ranges in thickness from approximately 1.0 feet in HP-10 to greater than 23 feet at MW-11D.

The combined thickness of the overburden deposits ranges from 1.5 feet in MW-1 to 85.1 feet in MW-12D, and is depicted on the isopachous map presented with the Groundwater Investigation Report. The thickness contours are consistent with the contours presented on the structural contour map discussed above and exhibit a similar northeast orientation. The overburden deposits are thin along the western edge of the facility bordering Hussey Hill, thicken in the center of the bedrock valley (i.e., the central portion of the site), and thin in the eastern portion of the facility in the vicinity of the wetlands.

Groundwater flow within the deposits described above has been subdivided based upon the grain size of the underlying soils (i.e., Silty CLAY versus Sand and Gravel) and bedrock. Two groundwater contour maps (for the shallow overburden and deep overburden deposits) were generated using water level measurements collected on September 28, 1999. Potentiometric surface contours (i.e., the water table) for the shallow overburden deposits are depicted on Sheet 002. Sheet 003 illustrates the piezometric surface contours for the deep overburden deposits. The data used in the preparation of these maps are presented in Table 4-1.

The potentiometric surface map of the shallow overburden (Sheet 002) indicates, in general, that the groundwater in these deposits flows from Hussey Hill towards the wetlands in the eastern portion of the site. The groundwater flow direction then turns to the north-northeast, mimicking the surface water flow patterns. Groundwater flow in the deep overburden deposits (Sheet 003) follows a similar pattern with flow towards the northeast and the discharge area represented by the wetlands.

It should be noted that the groundwater flow maps for both the shallow and deep overburden deposits indicate a groundwater low (i.e., discharge point) associated with the wetlands northeast of the active facility. This results in converging groundwater flow lines and precludes the migration of potential contaminants from the facility east of the wetlands. As discussed further in the Groundwater Investigation Report (ECKENFELDER INC., January 1996), private wells potentially screened within the sand and gravel deposits east of the wetland area are located upgradient of any potential plume which may migrate from the facility, and are thus not considered potential receptors.

The lateral hydraulic conductivity of the shallow overburden deposits was estimated using the results of the slug tests. Slug tests were conducted on the thirteen wells screened within these deposits, and ranged from 8.1×10^{-4} cm/sec at MW-8 to 4.3×10^{-7} cm/sec in MW-13S. The geometric mean lateral hydraulic conductivity is 1.6×10^{-5} cm/sec. The values of hydraulic conductivity for the wells screened within the deep overburden deposits ranged from a high of 1.9×10^{-2} cm/sec in MW-13D, to a low of 2.3×10^{-4} cm/sec in MW-5. The geometric mean lateral hydraulic conductivity for this unit was thus calculated at 2.6×10^{-3} cm/sec. (Groundwater Investigation Report (ECKENFELDER INC., January 1996).

A comparison of the water level data collected at the various couplet locations installed across the site indicates that the hydraulic gradients are downward in the vicinity of the active portion of the site and, generally, upward at the perimeter of the site. On the basis of these gradients, and the relatively low hydraulic conductivity of the shallow overburden deposits, as compared with the higher hydraulic conductivity of the deep overburden deposits (see Groundwater Investigation Report), groundwater flow within the shallow overburden is anticipated to be predominately vertical, while flow in the deep overburden (Sand and Gravel deposits) is anticipated to be predominantly horizontal.

This assumption is supported by the Tangent Law for the refraction of groundwater flow lines between two units with different values of hydraulic conductivity (Freeze and Cherry, 1979).

Vertical seepage velocities within the Silty CLAY deposits were calculated in the Groundwater Investigation Report at approximately 1.7×10^{-3} ft/day or approximately 0.61 feet per year. Conversely, horizontal seepage velocities in the Sand and Gravel deposits are calculated at approximately 0.45 feet per day or 163 feet per year.

Groundwater flow within the bedrock has been evaluated based upon the data collected at three bedrock monitoring well locations installed during the RFI. These include MW-20R, MW-21R, and MW-22R. These data indicate that flow within the bedrock occurs within a highly fractured zone within the upper bedrock which likely, from a hydrogeologic standpoint, behaves as one hydrostratigraphic unit with the overlying Sand and Gravel deposits. The hydraulic conductivity of the upper fractured bedrock was estimated from slug tests conducted at wells MW-20R, MW-21R, and MW-22R. These results indicate the fractured rock is very permeable with values ranging from 2.8 cm/sec to 5.3×10^{-3} cm/sec and the plots are presented in Appendix A.

Groundwater flow within the bedrock, as determined from these three monitoring points, is to the northeast as illustrated in the potentiometric surface map presented in Figure 4-1. The bedrock groundwater flow direction in this area is consistent with that of the sand and gravel unit as would be anticipated.

Groundwater quality data were collected during the Groundwater Investigation from wells located throughout the site. These data indicate that with the exception of the Shell Plant Area discussed further in Section 6.0, and an estimated value of 8.5J µg/L for TCE at MW-13S, there were no exceedances of NYS Class GA water quality standards or MCLs for organic constituents (additional details are provided in the Groundwater Investigation Report).

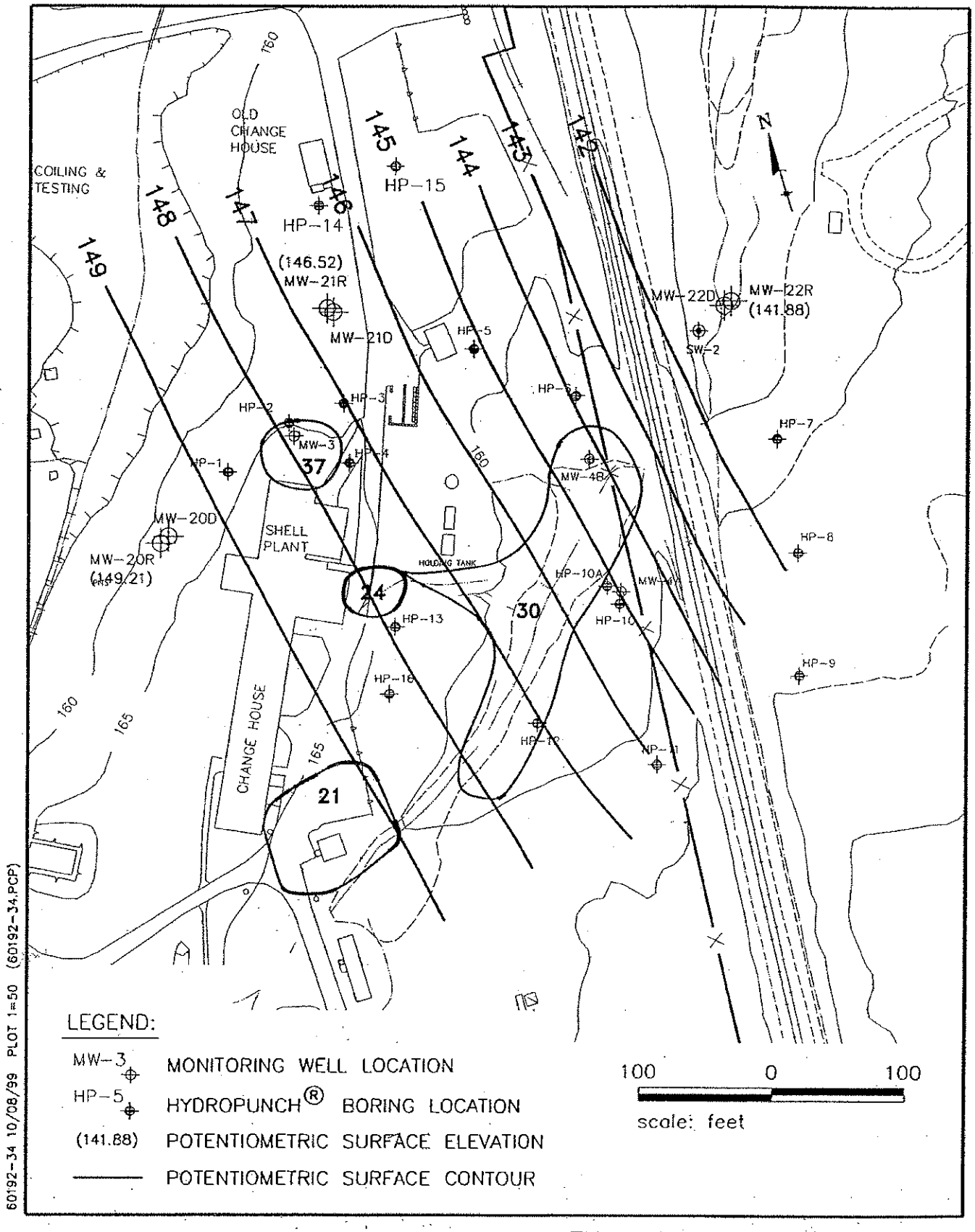
The soluble inorganic results indicated exceedances of NYS water quality standards for selenium at wells MW-15S and MW-15D and barium at MW-16S. The remaining analytes were either not detected or were below the water quality standard, where available. In comparison, the total metals analyses indicated an exceedance of water quality standards, with the exception of mercury and silver, in at least one location for all the analyzed metals. As discussed in the Groundwater Investigation Report, this is attributed to the high turbidity of the samples, which are obtained from wells screened in Silty CLAY deposits. Furthermore, although it is recognized that the NYSDEC generally requires the analysis of total metals for comparison to water quality standards, the disparity between total and soluble reported values cannot be ignored and must be taken into consideration when evaluating the collected data.

In summary, the water quality data collected during the Groundwater Investigation indicate that there are exceedances of water quality standards associated with one or two individual SWMUs. Specifically, those associated with the Shell Plant (SWMUs 24 and 30) and possibly AOC C comprising the open detonation pit. The data, however, does not support the presence of a site-wide groundwater impact as originally suggested by Gibbs and Hill (1990). Water quality data collected during the RFI further support this conclusion and are discussed in Section 6.0 with each SWMU, as applicable.

TABLE 4-1
GROUNDWATER ELEVATIONS
September 28, 1999

Well Name	Screen Intervals	Reference Elevation	9/28/99 Depht to Groundwater	Groundwater Elevation
MW-1	R	227.4	21.74	205.66
MW-2A	S	170.7	15.70	155.00
MW-2B	D	171.7	15.28	156.42
MW-3	S	167.2	7.79	159.41
MW-4A	S	158.9	6.45	152.45
MW-4B	S	158.3	6.97	151.33
MW-5	D	193.1	26.75	166.35
MW-6	D	180.9	27.03	153.87
MW-7	D	182.8	29.51	153.29
MW-8	S	153.9	9.82	144.08
MW-9	S	148.0	4.89	143.11
MW-10	S	149.0	6.90	142.10
MW-11S	S	164.4	7.95	156.45
MW-11D	D	163.9	7.35	156.55
MW-12S	S	168.9	7.34	161.56
MW-12D	D	168.4	15.47	152.93
MW-13S	S	162.5	8.06	154.44
MW-13D	D	162.4	17.09	145.31
MW-14S	S	175.6	5.45	170.15
MW-14D	D	176.1	9.43	166.67
MW-15S	S	162.0	7.56	154.44
MW-15D	D	162.0	7.39	154.61
MW-16S	S	159.3	19.28	140.02
MW-16D	D	143.9	16.78	127.12
MW-17S	S	146.8	4.00	142.80
MW-18S	S	147.5	4.67	142.83
MW-19S	S	156.3	2.83	153.47
MW-20D	D	161.4	11.07	150.33
MW-20R	R	161.0	11.79	149.21
MW-21D	D	164.1	17.29	146.81
MW-21R	R	163.8	17.28	146.52
MW-22D	D	151.9	9.68	142.22
MW-22R	R	151.6	9.72	141.88
MW-23S	S	165.2	4.93	160.27
SG-1	NA	147.5	1.12	146.38

R - Well screened in top of bedrock
D - Well screened in sand and gravel unit
S - Well screened in shallow water table (Silt and Clay)



BROWN AND CALDWELL

FIGURE 4-1
TOP OF ROCK POTENTIOMETRIC SURFACE MAP
SEPTEMBER 28, 1999

5.0 FIELD PROCEDURES

The field procedures used to collect the data for the RFI Investigation were consistent with the procedures presented in the approved work plans and are summarized below.

5.1 SOIL SAMPLING

Shallow soil samples, i.e., those collected at depths of less than one foot, were collected with a stainless steel core sampler in accordance with the following procedures:

A new pair of disposable latex gloves was donned prior to the collection of each sample. The shallow soil samples were collected by excavating to the desired depth with a pick and shovel or drilling with a stainless steel hand auger. The sample itself was then collected with a smaller diameter stainless steel core sampler. The hand tools and core sampler were decontaminated between each location and immediately prior to collection of the sample in accordance with the procedures presented in Appendix A, Section 7.0 of the Work Plan. The collected sample was extracted from the core sampler and immediately placed in the appropriate pre-labeled sample container. Samples collected from SWMUs suspected or documented to contain volatile organic compounds were screened with a photoionization detector and handled in accordance with standard chain of custody protocol. Excess portions of the samples were visually described for grain size classification in accordance with the Burmister System.

Soil samples collected at depths greater than 1.0 feet below ground surface were collected with an auger drilling rig and split-spoon sampler with the remaining aspects of the sampling as described above. Split spoons were also used for the collection of soil/sediment samples collected in the former detonation pond (SWMU No. 1) and surrounding wetland areas. However, the borings in these areas were advanced with a tripod and the cathead was manually carried to the location or mounted on a barge, as needed. In these instances, an open borehole was maintained by driving casing through the soft sediment and sampling ahead of the casing. The casing was then removed and

the hole immediately collapsed in on itself. At locations outside of the wetland areas, boreholes less than four feet in depth were backfilled with the excavated soil cuttings. Boreholes greater than four feet in depth were filled with cement/bentonite grout by the tremie method and the soil cuttings were spread around the borehole.

Records of the sampling were maintained in a dedicated field book in which the sampling location and identification number, physical description of the sample, sample depth and interval, and other pertinent notations were made. Each sample location was marked with a stake indicating the SWMU and sample number and was later surveyed by North Engineers and Surveyors of Kingston New York. Boring Logs for locations greater than 1.0 feet in depth are presented in Appendix B.

5.2 TEST PITS

Test pits were conducted for the purpose of defining the limits of waste at selected SWMUs. The areas of interest were investigated by excavating a shallow trench (6 inches to 1 foot in depth and 1 to 2 feet wide) at the perimeter of the suspected fill area. The perimeter of the waste was then staked and the procedure was repeated until the fill area was defined. The disturbed area was then backfilled with the excavated material. Record keeping consisted of a brief description of the waste material (where present) and surrounding soil in a dedicated field book. Each stake marking the perimeter of the waste was labeled with the SWMU number and a sequential test pit number (i.e., TP-1, TP-2, etc.) which was later surveyed by North Engineers and Surveyors.

5.3 MONITORING WELL INSTALLATION

Monitoring wells were installed during the RFI at locations associated with SWMUs 24, 30 and 37, SWMU 29 and SWMU 48. Bedrock wells, installed only at SWMUs 24, 30 and 37, were constructed of 4-inch diameter black steel grouted approximately three feet into bedrock. The well was then completed with an open borehole extending 15 to

20 feet below the casing. Overburden wells completed at these SWMUs were installed with 2-inch diameter stainless steel risers and ten foot stainless steel well screens in the sand and gravel unit overlying bedrock. Overburden wells completed at the remaining locations were constructed of 2-inch diameter PVC equipped with a ten foot long screen placed 10 to 25 feet below the ground surface. Split-spoon samples were collected continuously at each location or cluster and each well was developed to remove fine-grained materials from around the screened or open interval upon completion. Soil boring and well construction logs for these locations are presented in Appendix B.

5.4 IN-SITU HYDRAULIC CONDUCTIVITY TESTING (SLUG TESTING)

Following development, in-situ hydraulic conductivity tests (slug tests) were conducted at each of the newly installed wells. These tests consisted of rapidly lowering the water level in the well and measuring the change in the water level with respect to time as the well is allowed to recover to static conditions. The water levels were measured either manually or by means of a pressure transducer using an automatic data logger, depending on the rate of recovery. A detailed description of the procedures followed in conducting and evaluating these tests are presented in Appendix A of the Work Plan. Data plots for those wells tested as part of the RFI Investigation are presented in Appendix A. Previous plots of tests conducted during the groundwater investigation are presented in the appendices to the Groundwater Investigation Report.

5.5 GROUNDWATER QUALITY SAMPLING

Groundwater samples collected as part of this RFI were obtained using low-flow techniques and in-line measurement of field parameters. This method was employed to help limit the amount of turbidity in the collected samples.

Consistent with the previous groundwater sampling at this facility, both filtered and unfiltered groundwater samples were collected for metals analysis. This procedure was followed because previous investigations have indicated that the site monitoring wells

yield turbid samples even after development and the use of low flow sampling methods. Therefore, given the variability introduced into the metals analysis data by suspended sediment, and the desire to obtain consistent and comparable data at all locations, filtered samples were collected for the analysis of metals and will be used for comparison to groundwater standards. This approach is consistent with the recommendations presented in the article "Filtration of Groundwater Samples: A Review of Industry Practice" (Robert A. Saar, Groundwater Monitoring Review, Winter, 1997).

Quality assurance sampling and analytical procedures were conducted in accordance with the approved QAPjP.

6.0 RFI INVESTIGATION RESULTS

The RFI Investigation was undertaken to define the horizontal and vertical extent of soils, which exceed the screening criteria for inorganic constituents as listed in the tables following this section. This work was completed in a series of phases, consisting of Phase I through IV for horizontal delineation and Phase V for vertical delineation. The horizontal delineation work was completed in accordance with the approved Work Plan dated April 1997 while the vertical delineation work was completed in accordance with an approved supplemental work plan dated April 30, 1999 and revised in response to comments obtained from the NYSDEC in a meeting of June 2, 1999. At the completion of each phase, the accumulated analytical data were summarized and provided to the Department along with recommendations for additional sampling or no further action at that time, depending on the collected data. The next phase of work was then implemented following approval by the Department and implementing any requested changes. Deviations from the work plans, which were approved by the Department, included the elimination of selected borings at SWMUs 1 and 48 in response to health and safety concerns related to the potential presence of explosive devices.

In accordance with the work plan, the soil samples collected during the investigation are labeled with the SWMU number, the location number within that specific SWMU and the depth of the sample. In this manner, the sample collected at SWMU 39, sample location 9 and at a depth of 0 to 1 foot would be labeled 39-9-1.0. Deeper samples were expanded upon to indicate the actual depth interval of the sample. For example, 39-9 4-6 indicates that the sample was collected from the 4 to 6 foot interval below ground surface. Soil description logs for the vertical delineation borings are presented in Appendix B.

In addition to the soils work described above, the RFI work plan also called for the collection of shallow groundwater samples, and/or the installation and sampling of groundwater monitoring wells. Where applicable, groundwater results associated with a

given SWMU are also tabulated and discussed in the following sections. Site-wide groundwater trends and discussion, however, are discussed briefly in Section 4.0 and in greater detail within the Groundwater Investigation Report.

Each of the SWMUs and AOCs is discussed sequentially below. At each SWMU, AOC, or group thereof, the soils analytical data are presented in two tables. The first table summarizes the analytical results from the samples collected within that area. The second table summarizes only those locations where the concentrations of the analyzed constituents were above the respective screening criteria as presented on each of the exceedance summary tables. Inorganic data qualifiers for the soil samples are summarized at the back of the tables presented in this section. Additional tables summarizing the organic and inorganic constituents in groundwater are presented as applicable (i.e., if groundwater samples were collected associated with that SWMU or AOC). Laboratory analytical reports are provided in Appendix C, collated by SWMU number, soil results first, followed by groundwater results and QA/QC samples. The discussion associated with each area is also supplemented with a figure (included at the back of this section) illustrating the sample locations and the approximate area within which the analyzed constituents exceed the screening criteria. The location of the SWMUs and associated sampling locations in relation to the entire site is illustrated on Sheet 001 provided in the map pocket to this report. The figures referenced above are blowups of these respective areas and provide the greater detail necessary for the individual discussions.

SWMU Nos. 1, 22 and 35

The RFI Work Plan originally called for SWMU No. 1 to be investigated independently of SWMU Nos. 22 and 35. However, subsequent sampling indicated that impacts from these three areas encroached upon one another and a recommendation was made to, and approved by, NYSDEC to combine the efforts associated with these three areas.

The soil/sediment sampling associated with these three areas consisted of 58 locations, as illustrated in Figure 6-1, and 92 analytical samples for inorganics. The analytical results are summarized in Table 6-1 and those samples exceeding the established screening criteria are presented in Table 6-2. The data indicate that much of the wetland area surrounding these three SWMUs contains concentrations of metals in excess of the screening criteria. The analytes found most frequently above the screening criteria, and those recorded at the highest concentrations, include copper, lead, and selenium. The data further indicate that the impacts from these SWMUs are found downstream a distance of approximately 1000 feet from SWMU 22 (the last recorded exceedance of the screening criteria was at location 22-33).

Vertical exceedances of the screening criteria are found predominantly within the vicinity of SWMU No. 1 and are noted to depths in excess of 12 feet below the ground or water surface (locations 1-2 and 1-2B which was a re-sample of the 1-2 location). With the singular exception of location 22-14, which is located between SWMU 22 and 35, borings completed around the perimeter of SWMU 22 and further downstream did not indicate the presence of constituents above the screening criteria at depths greater than 1.0 feet. The exception at 22-14 indicated an exceedance of copper (2600 mg/kg) at a depth of 4-6 feet.

The analytical results from shallow groundwater samples, collected immediately adjacent to the perimeter of SWMUs 22 and 35 are summarized in Tables 6-3 and 6-4. The volatile organic results indicate the presence of sporadic constituents at estimated concentrations just over the detection limits. There is no apparent consistency in either the detected parameters or the sampling locations, which suggest the reported constituents are associated with the immediate area from which they were collected. The inorganic results indicate the exceedance of drinking water standards for many of the tested metals. These results are typically consistent with the soil/sediment results, which indicate elevated concentrations of copper, lead, and selenium. The data further indicate that the source of the elevated concentrations is primarily related to SWMU 22 as

opposed to 35. This is evident by the significantly reduced concentrations reported at locations 22-10, 22-11, and 22-13 which are all adjacent to SWMU 35 and up and/or cross gradient to SWMU 22.

SWMU No. 2 and AOC A

The soil samples associated with these two areas are illustrated in Figure 6-2 and consisted of 32 locations (four located around the former kerosene tank leak) and 40 analytical samples. Analytical parameters consisted of inorganics, TPH and at those locations exhibiting high TPH concentrations, Base Neutral compounds. The analytical results are summarized in Table 6-5 and those samples exceeding the established screening criteria are presented in Table 6-6. The analytes detected most frequently above their respective screening criteria were copper, lead and selenium. As illustrated in Figure 6-2, the data indicate elevated metals concentrations surrounding the former burning cage and kerosene tank (AOC A). Vertical delineation sampling indicates that elevated metals are present to depths of 6.0 feet in this area.

Base Neutral analyses were conducted on samples collected at locations 2-01, 2-02 and 2-07 as these locations represented a range of elevated TPH concentrations. The detected base neutral compounds are summarized in Table 6-7. As indicated, a variety of compounds were detected at location 2-01 while only a few compounds were detected at estimated concentrations at locations 2-02 and 2-07. In addition, base neutral analysis of samples collected at these three locations at deeper depths did not indicate the presence of any base neutral compounds. These data indicate that base neutral compounds are present in those areas containing elevated TPH concentrations and specifically at TPH concentrations in excess of 10,000. These impacts, however, are limited to the shallow surface soils.

SWMU Nos. 3 and 5

SWMU Nos. 3 and 5 are also former burning areas and the sample locations associated with these areas are illustrated in Figure 6-2. A total of 22 samples was analyzed from 17 locations as summarized in Table 6-8. Those samples containing concentrations of inorganics above their respective screening criteria are summarized in Table 6-9 with the most frequent constituents represented by copper, cadmium, selenium, and lead. Vertical delineation sampling indicates that elevated metals are present to depths of 6.0 feet in this area. The approximate extent of the area containing inorganic constituents above the applicable screening criteria is illustrated in Figure 6-2.

Base neutral analysis was also conducted on soils collected from location 3-08, which contained the highest TPH concentration (810) of the samples analyzed from this SWMU. Four base neutral compounds were detected at estimated concentrations from the sample collected at a depth of 1.0 feet as summarized in Table 6-10. These results are consistent with the findings at SWMU No. 2 and again indicate that TPH concentrations below 1,000 are not indicative of the presence of elevated base neutral compounds.

SWMU No. 4

SWMU No. 4 is also a former burning area located adjacent to SWMU No. 2 as illustrated in Figure 6-2. A total of 13 samples was analyzed from ten locations as summarized in Table 6-11. Those samples containing concentrations of inorganics above their respective screening criteria are summarized in Table 6-12 with the most frequent constituents represented by cadmium, copper, and selenium. Vertical delineation sampling at this SWMU indicates that the elevated metals concentrations are limited to the upper one to two feet of soil. Additionally, there were no elevated TPH concentrations detected within this SWMU. The approximate extent of the area containing inorganic constituents above the applicable screening criteria are illustrated in Figure 6-2, which abuts the area delineated for SWMU No. 2.

AOC B (SWMU Nos. 6, 7, 8) and SWMU No 32

SWMU No. 32 is discussed along with AOC B because it is located adjacent to SWMU No. 6. Furthermore, the limited number of soil samples exceeding the screening criteria around SWMU No. 32 are all adjacent to SWMU No. 6 and are represented solely by selenium, which is the most frequently detected compound associated with AOC B. The sampling locations associated with these SWMUs are illustrated in Figure 6-3. A total of 49 samples was analyzed from 39 locations associated with AOC B and is summarized in Table 6-13. Nine samples were analyzed from SWMU No. 32 and are presented in Table 6-14. Tables 6-15 and 6-16 present those locations and constituents that exceed the screening criteria at AOC B (designated by SWMU, No. 6) and SWMU No. 32 respectively. These data indicate that the only constituent exceeding the criteria at SWMU No. 32 was selenium and that selenium was also the most prevalent compound detected above the screening criteria at AOC B, followed by lead and barium to a much lesser extent. Selenium was also detected at concentrations above the screening criteria at depths of 8 feet at location 6-08, 6 feet at location 6-36 and 4 feet at locations 6-10 and 6-19. As illustrated in Figure 6-3, the data indicate a rather large area around AOC B that contains concentrations of metals above the screening criteria.

Three locations within AOC B (6-7, 6-9 and 6-10) also indicated elevated TPH concentrations and were thus also tested for base neutral compounds. These results are summarized in Table 6-17 and indicate that only two compounds, 2-methyl naphthalene and naphthalene, were detected at estimated concentrations. These data indicate that base neutral compounds are not of significant concern in these areas.

Six very shallow test pits completed in the vicinity of SWMU 32 confirmed that the waste in the area is scattered over the surface of shallow soils consisting of brown silt overlying bedrock. There was no distinct waste boundary located and rock was typically within 1.5 feet of the ground surface. Given the shallow depth to rock, test pit logs were not completed. The test pit locations are illustrated on Sheet 001.

Water quality sampling at well MW-1 generally confirmed the previous analytical results as summarized in Table 6-18. The only difference was an estimated value of 1.8J ppb for trichloroethene in the 1997 results. This value is just over the detection limit of 1 ppb and is inconsistent with the previous round of sampling. The actual presence of this compound is thus suspect.

SWMU No. 9

A total of 21 samples were analyzed from 19 locations around SWMU No. 9 as illustrated in Figure 6-4. The analytical results are summarized in Table 6-19. Table 6-20 indicates that the only parameter exceeding the screening criteria was mercury at five locations. Mercury was also detected above the screening criteria at a depth of 4 feet at location 9-7. The collected data indicate the presence of elevated levels of mercury immediately down slope of the tank house (Building 2037), as illustrated in Figure 6-4. The data further suggest that the mercury is attenuated in the soils such that the concentrations are reduced by approximately half within 4 feet of the ground surface.

SWMU No. 10

A total of 31 samples was analyzed from 25 locations around SWMU No. 10 as illustrated in Figure 6-5. The analytical results are summarized in Table 6-21. Table 6-22 indicates that with the exception of aluminum at location 10-2, the only parameter exceeding the screening criteria was mercury. As illustrated in Figure 6-5, however, the surficial distribution of mercury at concentrations above the screening criteria extends upward of 300 feet downgrade of the mix house (Building 2048). Elevated concentrations of mercury were also noted at a depth of 4 feet at location 10-19. However, samples collected at this depth at locations 10-4 and 10-6 did not indicate elevated mercury concentrations at this depth even though the sample at 1.0 feet at location 10-6 had the highest reported concentration of mercury (600 mg/kg) at this SWMU. These data again indicate that the soils significantly attenuate the mercury concentrations, as would be anticipated.

SWMU No. 11

A total of 16 samples were analyzed from 14 locations around SWMU No. 11 as illustrated in Figure 6-6. The analytical results are summarized in Table 6-23. Table 6-24 indicates that with the exception of potassium at location 11-6, the only parameter exceeding the screening criteria was mercury. Mercury was also detected between locations 11-3 and 11-4 at a concentration of 37 mg/kg at a depth of 2 to 4 feet, but was only 0.14 mg/kg in the 4- to 6-foot sample, again indicating that the soils are attenuating the concentrations. Of note is that this area had the highest reported surficial mercury concentration, by far, at 240 mg/kg. This would suggest that the impact to soils at depths of 2 to 4 feet is limited to a localized area around locations 11-3 and 11-4. The estimated extent of mercury impacted soils associated with the SWMU is illustrated in Figure 6-6.

SWMU No. 13

A total of 26 samples was analyzed from 23 locations around SWMU No. 13 as illustrated in Figure 6-7. The analytical parameters consisted of lead and mercury and are summarized in Table 6-25. Mercury was the only compound that exceeded the screening criteria as summarized in Table 6-26. The collected data indicates that the impacted soils are limited to the upper 1.0 foot of soils and are distributed downgrade of Building 3001 consistent with the surrounding drainage patterns as indicated in Figure 6-7.

SWMU No. 15

A total of 8 samples was collected and analyzed for mercury at eight locations as illustrated in Figure 6-8 and summarized in Table 6-27. None of the samples exceeded the screening criteria for mercury of 10 mg/kg with highest concentration recorded at 1.3 mg/kg.

SWMU No. 21

A total of 30 samples was analyzed from 24 locations around SWMU No. 21 as illustrated in Figure 6-9. After the first phase of sampling for which the full list of metals was analyzed, the sampling parameters were reduced to antimony, barium, lead, and selenium as summarized in Table 6-28. As indicated in Table 6-29, the most frequent parameter detected above the screening criteria was selenium and to a much lesser extent lead. All of the exceedances were limited to the upper 1.0 foot of soil and the estimated area of soils containing concentrations of metals above the screening criteria is illustrated in Figure 6-9.

SWMU No. 23

Eight shallow soils samples were collected downgrade of SWMU 23 as illustrated in Figure 6-10. The samples were analyzed for the full list of metals as summarized in Table 6-30. Three of the locations exceeded the screening criteria for aluminum and one location for potassium as presented in Table 6-31. These exceedances, however, are likely related to natural variation in the metals concentration of the clayey soils found throughout the facility and an estimated area of impacted soils has not been delineated.

In addition to the soil sampling, 14 shallow test pits were excavated to assist in identifying the edge of waste. The test pits confirmed that the edge of waste was consistent with the break in slope as visible in the field. The encountered waste consisted primarily of metal in various forms (parts of drums, sheet metal, etc.). The location of the edge of waste was staked in the field and logs were not completed.

As noted in the work plan, this area was investigated previously as part of the NYSDEC Phase II investigation, during which three monitoring wells were installed (MW-5, MW-6, and MW-7). Groundwater samples collected from these wells during the Groundwater Investigation did not indicate the presence of organic or inorganic (soluble fraction) constituents above drinking water standards. These wells were sampled again

as part of the RFI and the results, with the exception of upgradient well MW-5 which, has been damaged and was not able to be sampled, are summarized in Tables 6-32 and 6-33 along with the 1995 data. As indicated, there were no detected volatile organics during either sampling event. The unfiltered, (i.e., total) inorganic data collected in 1997 indicates an exceedance of barium in wells MW-6 and MW-7 and an exceedance for chromium, copper and lead in MW-6. The soluble fraction, however, indicates an exceedance for barium only, with all of the constituent concentrations significantly reduced as compared to the unfiltered samples. This is consistent with previous analytical data and is again reflective of the turbidity of the samples collected from these fine grained deposits.

SWMU Nos. 24, 30, and 37

The RFI work at these SWMUs consisted of the installation of three well couplets at the locations illustrated in Figure 6-11. These wells were installed and sampled for volatile organics to determine if the volatile organic compounds, most notably trichloroethene confirmed in the Silt and Clay deposits underlying these SWMUs, had migrated to the underlying sand and gravel deposits and bedrock. As illustrated in Figure 4-1 and Sheets 002 and 003, the MW-22 cluster is downgradient of the source area whose downgradient extent is near wells MW-4A and MW-4B. In addition, the MW-22 cluster is also located between the source area and the site production well. The analytical data collected during the RFI, however, and summarized in Table 6-34, indicate that there were no volatile organic constituents detected in the samples. These data indicate that further migration of the TCE has been attenuated by the low permeability silt and clay deposits. In addition, HydroPunch sampling completed during the groundwater investigation indicates that the TCE has not migrated east of the railroad tracks. Given that activities in this area ceased around 1980, there is no longer a continuing source of volatile organics. The non-detectable levels of volatile organics in the surrounding area thus suggest that the degradation rate of TCE is, at a minimum, equal to the rate of groundwater movement in the silt and clay deposits, thereby limiting the further migration of TCE.

SWMU No. 26D

Satellite Accumulation Area 26D is located in a congested area near Building 2075. As illustrated in Figure 6-12, 13 sample locations were investigated throughout this area. The analytical results are summarized in Table 6-35 and those locations and parameters exceeding the screening criteria are presented in Table 6-36. These data indicate that selenium is the most frequently detected compound at concentrations in excess of the screening criteria and that these impacts are limited to the upper 1.0-foot of soil. Much of this area is covered by paved walkways or landscaping gravel. The estimated area of impacted soils is illustrated in Figure 6-12 and is typically bounded by adjacent buildings.

SWMU No. 26E

Six samples were collected and analyzed at the locations as illustrated in Figure 6-13 and summarized in Table 6-37. There were two locations at which the screening criteria for mercury and selenium were slightly exceeded, as presented in Table 6-38. These low concentrations suggest that the limited impacts are within the upper 1.0 foot of soil in the estimated area illustrated in Figure 6-13.

SWMU No. 26F

A total of four samples were collected and analyzed for the full list of metals at four locations as illustrated in Figure 6-14 and summarized in Table 6-39. None of the samples exceeded the established screening criteria.

AOC C and D (SWMU No. 26G)

SWMU No. 26G was initially investigated on its own but was subsequently consolidated within AOC C and D as soils exceeding the screening criteria for mercury and selenium were found throughout the area. A total of 16 samples was analyzed from 16 locations

associated with SWMU 26G and is summarized in Table 6-40. Twenty-four samples were analyzed from AOC C and D from 20 locations as presented in Table 6-41. Tables 6-42 and 6-43 present those locations and constituents that exceed the screening criteria at SWMU 26G and AOC C and D (identified as AOC C) respectively. The data indicate that selenium and mercury, and occasionally lead and copper, were the constituents identified at concentrations in excess of the screening criteria. The data further indicate that with the exception of location 26G-16, at which selenium slightly exceeded the screening criteria at a depth of 4.0 feet (6.3 mg/kg vs. 5 mg/kg), the impacted soils are limited to the upper 1.0 foot of soil. The approximate area of these impacts is illustrated in Figure 6-15.

SWMU No. 27

Four samples were collected and analyzed for the full list of metals at the locations illustrated in Figure 6-16. The analytical results are summarized in Tables 6-44 and 6-45 and indicate that the only constituent exceeding the screening criteria is aluminum at location 27-01. This is likely due to natural variations in the aluminum content of the clayey soils found throughout the site and an area of impacted soils has not been defined.

SWMU No. 29

A total of seven samples was collected and analyzed from seven locations as illustrated in Figure 6-17. The analytical results are summarized in Tables 6-46 and 6-47 and indicate that there was one exceedance for mercury at location 29-01. The estimated area containing elevated mercury concentrations is illustrated in Figure 6-17.

In addition to the soil sampling, a shallow overburden groundwater monitoring well, MW-23S, was installed downgradient of the suspected area. This well was sampled and analyzed for TCL volatile organics and metals and the analytical results are presented in Tables 6-48 and 6-49 respectively. The data indicated that there were no detected volatile organics. Consistent with the other groundwater monitoring results from across

the site, there were exceedances of water quality standards associated with the total metals results for barium, chromium, cobalt, and selenium. However, the soluble results indicate exceedances only for barium and, marginally, selenium. As discussed previously, this difference between the soluble and total results is due to the high turbidity of the sample which was collected from a silt and clay water-bearing zone.

SWMU No. 33

A total of 27 samples was collected and analyzed for lead, mercury, and silver from 18 locations as illustrated in Figure 6-18. The analytical results are summarized in Tables 6-50 and 6-51 and indicate that there was an exceedance of the screening criteria for mercury at nine locations. At location 33-13, which had the highest concentration of mercury within this SWMU (7400 mg/kg), a concentration of 18 mg/kg was detected at a depth of 4 to 6 feet below the ground surface. This further decreased to a concentration of 5.3 mg/kg at a depth of 6 to 8 feet. A vertical delineation boring to be completed in the vicinity of location 33-4 hit refusal within two feet of the ground surface and was not completed. In addition, a boring to be completed at location 33-8 was not completed due to a field error. Vertical delineation within this SWMU is thus incomplete. However, the data collected here and at other locations across the site indicate that the clayey soils attenuate the metals concentrations with depth. Accordingly, the depth of mercury concentrations in excess of the screening criteria is not anticipated to exceed 2 to 4 feet throughout the remainder of the area. The estimated area of impacted soils is illustrated in Figure 6-18.

SWMU No. 34 and 38N

A total of 15 samples was collected and analyzed for the full list of metals from 15 locations as illustrated in Figure 6-19. The analytical results are summarized in Tables 6-52 and 6-53 and indicate that the only constituent exceeding the screening

criteria was aluminum. Given the relatively consistent concentrations, the exceedances are considered to be natural variations of aluminum in the clayey soils and an area of impacted soils has not been identified.

SWMU No. 38S

A total of 12 samples was collected and analyzed for the full list of metals from 12 locations as illustrated in Figure 6-20. The analytical results are summarized in Tables 6-54 and 6-55 and indicate that the only constituent exceeding the screening criteria was aluminum. Given the relatively consistent concentrations, the exceedances are considered to be natural variations of aluminum in the clayey soils and an area of impacted soils has not been identified.

SWMU No. 39

A total of 20 samples was analyzed from 15 locations as illustrated in Figure 6-21. The analytical data are summarized in Tables 6-56 and 6-57 and indicate sporadic exceedances of selenium and one exceedance of cobalt. The data also indicate that these exceedances are limited to the upper 1.0 foot of soil. The estimated area of soils containing the slightly elevated levels of selenium and/or cobalt is illustrated in Figure 6-21.

SWMU No. 40

A total of 11 samples were analyzed from nine locations as illustrated in Figure 6-22. The analytical data are summarized in Tables 6-58 and 6-59 and indicate that there was one exceedance of the screening criteria for lead, 1.0 foot below the ground surface, at location 40-2. Deeper samples collected at this location, however, were well below the screening criteria suggesting that the elevated lead concentrations are limited to an isolated pocket of soils as illustrated in Figure 6-22.

SWMU No. 41

Three samples were collected from the area of the three former condensate collection sumps as illustrated in Figure 6-23. The samples were analyzed for lead and the reported concentrations were 62, 23, and 38 mg/kg at locations 41-1, 41-2, and 41-3 respectively. These concentrations are well below the screening criteria of 400 mg/kg so there are no exceedances at this SWMU. Of note is that the work plan had called for the collection of five samples at five collection sumps. However, subsequent site visits indicated that there were only three sumps and that the text of the work plan was in error.

SWMU No. 42

A total of 14 samples was analyzed from nine locations as illustrated in Figure 6-24. The analytical data are summarized in Tables 6-60 and 6-61 and indicate that there were two locations at which selenium exceeded the screening criteria and one location at which chromium exceeded the criteria. The exceedances were limited to the upper 1.0 foot of soil and the estimated area of impacted soils is illustrated in Figure 6-24. Of note is that location 42-1 falls within the area of impacted soils associated with SWMU 26G.

SWMU No. 46

Three samples were collected from the former condensate collection sump locations as illustrated in Figure 6-25. The analytical results are summarized in Table 6-62 and indicate that there were no exceedances of the screening criteria at this SWMU.

SWMU No. 47

A total of 12 samples was collected for analysis from ten locations as illustrated in Figure 6-26. The analytical results are summarized in Tables 6-63 and 6-64 and indicate that selenium exceeded the screening criteria at five locations. The selenium concentrations were also above the screening criteria in samples collected at 4 to 6 and 6

to 8 feet below the ground surface. These depths are inconsistent with data collected from other areas of the site, which have indicated that the elevated concentrations are typically attenuated within the shallow soils. The estimated area of soils containing concentrations above the screening criteria is illustrated in Figure 6-26.

SWMU No. 48

A total of 11 samples was collected for analysis from 11 locations as illustrated in Figure 6-27. The analytical results are summarized in Tables 6-65 and 6-66 and indicate that the copper was the constituent that exceeded the screening criteria most frequently and by the greatest concentration. Vertical delineation borings at this SWMU were not completed due to health and safety concerns and with concurrence from the Department. The estimated area of soils containing concentrations above the screening criteria is illustrated in Figure 6-27.

TABLE 6-1
INORGANIC SAMPLING RESULTS
SWMU No. 1 and 22
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum	Antimony	Arsenic	Barium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Potassium	Selenium	Silver	Zinc
01-01- 4.0	6/11/98		9.2 N	10	750 *	3.3	130 *		4400	8300	2.3		1400	5.1	580
01-01- 6.0	6/11/98		14 N	9.5	830 *	4.5	160 *		5400	8300	1.2		1200	4.2	750
01-01- 8.5	6/11/98		23 N				240 *		6200 *	12000 *			1800 *		
01-01-10.0	6/11/98		27 N				230 *		9200	11000			1600		
01-02- 4.0	6/10/98		6.4 N	11	260 *	0.88	71 *		2800	1900	0.52		340	1.1	350
01-02- 6.0	6/10/98		3.8 N	9.6	190 *	0.78	71 *		6700	1100	0.32		190	1.2	670
01-02- 8.0	6/11/98						35 *		2200 *	1100 *			140 *		
01-02-12.0	6/11/98						35 *		2200 *	1100 *			140 *		
01-02B- 4.0	6/11/98		3.2 N	10	260 *	1.2	61 *		1200	1900	1.2		340	1.4	190
01-02B- 6.0	6/11/98		5.3 N	11	270 *	0.82	61 *		1700	2300	0.56		370	0.95	190
01-02B- 8.0	6/11/98		3.3 N				72 *		3800 *	3400 *			550 *		
01-02B-10.0	6/11/98		2 N				28 *		400 *	470 *			78 *		
01-02B-12.0	6/11/98		1.6 U				21 *		3800 *	3400 *			59 *		
01-03- 4.0	6/10/98		57 N	13	740 *	1.4	250 *		14000	5800	0.54		760	1.7	
01-03- 6.0	6/10/98		1.6 U	9.9	110 *	0.32 U	28 *		130	130	0.063 U		21	0.32 U	88
01-04- 4.0	6/11/98		4.2 N	13	260 *	0.92	72 *		1800	1300	0.17		200	0.78	250
01-04- 6.0	6/11/98		1.6 U	11	83 *	0.32 U	25 *		45	28	0.063 U		1.6	0.32 U	86
01-05-1.1	2/17/98		13 N	5.6	4000	1.7	38		1300 N	8100	5.3		990	2.4	300 N N
01-05 2-4	7/26/99		3.2 U		180	1			580	21 N	0.16		1.7 U		
01-05-3.5	5/7/98	39000	28 N	23	1900	1.9 U	83 N*	17 E	8600	7100	150 N	2100		1.9 U	420
01-05 4-6	7/26/99		3.1 U		85	0.3 U			26	20	0.064 U		1.6 U		
01-05-5.0	10/23/98		2.1 U		250	0.42 U			990 N	250	3.4		45		
01-06-1.1	2/17/98		4.8 N	6.3	1300	1.6	36		4200 N	5300	24		1000	1.1	430 N
01-06-3.5	5/7/98	22000	14 N	11	2000	2.6 NE	36 N*	12 E	5600	6800	76 N	1500		1.4	490
01-07-1.0	2/17/98		4 N	13	240	1.6	13		2000 N	1000	160		150	0.29	140 N
01-07 2-4	7/27/99		3 U		170	0.37			17	20 N	0.41		1.6 U		
01-07-3.5	5/7/98	23000	2.4 U	6.8	360	0.59 NE	26 N*	12 E	970	550	26 N	1100		0.48 U	170
01-07 4-6	7/27/99		3.1 U		99	0.3 U			31 EN	27 N	0.86		1.6		
01-08-1.0	2/17/98		0.36 U	3.9	190	0.44	29		33 N	24	0.74		3.5	0.071 U	90 N
01-09-1.0	2/17/98		1.1 N	5.9	200	0.47	23		500 N	250	3.6		46	0.092	130 N
01-09-3.5	5/7/98	18000	1.7 U	4.5	94	0.35 U	21 N*	15 E	28	24	0.58 N	1900		0.35 U	80
01-10-1.0	2/17/98		0.56 N	8.3	77	0.31	21		38 N	40	0.22		4.2	0.068 U	89 N
01-11-1.0	2/17/98		0.35 N	10	64	0.36	23		38 N	41	0.16		2.4	0.071 U	91 N
01-12-1.0	2/17/98		0.32 U	6.3	80	0.44	18		29 N	34	0.41		0.89	0.065 U	110 N
01-13-1.0	2/17/98		0.3 U	13	130	0.6	27		100 N	52	0.12 U		2.3	0.068	93 N
01-14-1.0	5/7/98	13000	20 N	13 U	700	2.1 NE	65 N*	6.1 E	1800	5400	2.5 N	2000 U		2.5	1300
01-15-1.0	5/7/98	18000	14 N	11 U	360	2.1 NE	69 N*	9.7 E	1000	5400	1.6 N	1600		1.6	320
01-16-1.0	5/7/98	17000	8.9 N	8.8 U	300	1.5 NE	76 N*	8.7 E	930	3900	2.1 N	1800		2	300

TABLE 6-1
INORGANIC SAMPLING RESULTS
SWMU No. 1 and 22
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum	Antimony	Arsenic	Barium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Potassium	Selenium	Silver	Zinc
01-17-1.0	5/7/98	11000	4.8 U	6.7 U	120	1 U	16 N*	7.4 E	420	370	9.1 N	1000		1 U	130
01-18-1.0	5/7/98	6700	1.4 U	9.8	65	0.28 U	12 N*	6.3 E	36	67	0.12 N	1000		0.28 U	62
01-19-1.0	10/23/98		2.1 U		220	0.42 U			30 N	19	0.39		2.1 U		
01-20-1.0	10/23/98		1.8 U		210	0.36 U			17 N	24	0.093		1.8 U		
01-21-1.0	10/23/98		2 U		79	0.4 U			26 N	29	1.2		2 U		
01-22-1.0	10/23/98		2.6 U		130	0.81			310 N	180	0.57		28		
01-23-1.0	10/23/98		2.2 U		410	0.45 U			34 N	30	10		2.2 U		
22-01-1.0	9/8/97	28000	0.73 N	19 *	370 N*	4.4	29	18	21000	440 *	58	2400 E*	18	0.48 *	4000
22-02-1.0	9/8/97	12000	0.47 U	5.5 *	210 N*	1.4	16	8.3	2400	72 *	89	1200 E*	8.1	0.12 *	630
22-03-1.0	9/8/97	21000	0.31 U	10 *	59 N*	1.6	20	22	5000	28 *	5.2	960 E*	0.63 U	0.063 U	530
22-04-1.0	9/8/97	36000	0.86 U	22 *	250 N*	3.6	46	16	33000	590 *	240	2300 E*	31	0.5 *	960
22-05-1.0	9/8/97	11000	0.33 U	8.1 *	66 N*	0.52	14	7.7	36	46 *	14	560 E*	4.8	0.067 *	69
22-06-1.0	9/8/97	4100	1.1 N	9.7 *	190 N*	27	7.8	2.8	1400	290 *	2.6	490 E*	37	0.6 *	910
22-07-1.0	9/8/97	16000	8.4 N	8.8 *	1500 N*	8.7	75	9.3	4800	2000 *	1.1	780 E*	280	3.2 *	500
22-08-1.0	9/8/97	22000	11 N	29 *	370 N*	38	80	5	100000	4000 *	0.077 U	4600 E*	64	65 *	780
22-09-1.0	9/8/97	11000	0.3 U	9.4	97 N	0.28	21	5.5 E	590	27 E	0.076	940	0.93 E*	0.06 U	41 E
22-10-1.0	9/8/97	23000 N*	0.69 U	8.2	270	1.1	27 N	12 E	550	490 E	1.9	2200 *	61	0.3	170 NE*
22-11-1.0	9/8/97	18000 N*	0.46 U	3.1	200	0.83	21 N	9.6 E	240	81 E	0.52	1400 *	14	0.16	120 NE*
22-12-1.0	9/8/97	15000 N*	0.32 U	5.5	110	0.27	20 N	13 E	38	16 E	0.063 U	1200 *	0.65	0.063 U	62 NE*
22-13-1.0	5/5/98		3.4 N			5.9	280 N		11000 *	3500 *	2.4		490 N*	12	
22-14-1.0	5/5/98		18 N			36	98 N		8000 *	3700 *	4.8		2200 N*	7.4	
22-14 4-6	7/23/99		4.3 U		220	0.59			2600	57	1.2		2.2 U		
22-14 10-12	7/23/99		3.2 U		84	0.55			33	16 N	0.09		1.7 U		
22-15-1.0	5/5/98		14 N			55	37 N		3700 *	3600 *	1.6		530 N*	3.2	
22-16-1.0	5/5/98		35 N			10	31 N		2600 *	4700 *	4.6		740 N*	1.7 U	
22-18-1.0	5/5/98		2 U			6.2	42 N*		1200 *	400 *	0.72		78 N*	0.82	
22-18 2-4	7/20/99		3.1 U		420	0.37			23	16 N	0.063 U		2.2 U		
22-18 4-6	7/15/99		3.1 U		49	0.31 U			18	9.3	0.07 U		1.6 U		
22-19-1.0	5/5/98		1.5 U			0.3 U	22 N		37 *	21 *	0.14		5.6 N*	0.3 U	
22-20-1.0	5/5/98		5.7 U			5.7	17 N*		18000 *	310 *	0.23 U		26 N*	1.1 U	
22-21-1.0	5/5/98		1.6 U			0.31 U	44 N*		41 *	200 *	0.063 U		3.1 U	0.31 U	
22-21 2-4	7/20/99		3.1 U		57	0.31 U			24	10 N	0.058 U		1.6 U		
22-21 4-6	7/15/99		3 U		39	0.3 U			20	11	0.057 U		1.6 U		
22-22-1.0	10/23/98		4.8 U		570	2.5			5400 N	550	22		18		
22-23-1.0	10/23/98		5.7 U		240	1.2			4300 N	290	10		13		
22-24-1.0	10/23/98		5.4 U		500	2			2300 N	440	12		33		
22-25-1.0	10/23/98		3.1 U		380	0.63 U			3460 N	210	12		12		

TABLE 6-1
INORGANIC SAMPLING RESULTS
SWMU No. 1 and 22
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum	Antimony	Arsenic	Barium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Potassium	Selenium	Silver	Zinc
22-26-1.0	10/23/98		3.57 U		220	2.3			6600 N	210	35		16		
22-26 2-4	7/20/99		3.1 U		85	0.31 U			25	12 N	0.067 U		1.6 U		
22-26 4-6	7/15/99		3.1 U		170	0.3 U			23 EN	16 N	0.063 U		1.6 U		
22-27-1.0	10/23/98		5.4 U		320	4.2			16000 N	930	67		85		
22-28-1.0	10/23/98		6 U		480	6.4			4700 N	600	3.5		49		
22-28 2-4	7/22/99		3.1 U		140	0.3 U			18	18 N	0.061 U		1.6 U		
22-28 4-6	7/22/99		3.1 U		62	0.3 U			15	7.3	0.066 U		1.6 U		
22-29-1.0	10/23/98		8.9 U		680	12			3900 N	620	5.3		120		
22-30-1.0	10/23/98		2.1 U		190	0.73			7200 N	98	1.9		5		
22-30 2-4	7/23/99		3.1 U		290	0.41			11	13 N	0.058 U		1.6 U		
22-30 4-6	7/23/99		3.6 U		210	0.4 U			15 EN	17 N	0.07 U		1.9 U		
22-31-1.0	4/29/99		4.7 U		320	7.2			7000	400	48		43		
22-32-1.0	4/29/99		4.1 U		230	0.41 U			1000	23	0.31		2 U		
22-32 2-4	7/23/99		3.1 U		230	0.5			11	15 N	0.063 U		1.6 U		
22-33-1.0	4/29/99		3.6 U		170	0.54			520	23	16		1.7 U		
22-34-1.0	4/29/99		3.8 U		230	0.38 U			170	47	0.96		1.8 U		
22-35-1.0	4/29/99		3.3 U		190	0.33 U			25	16	0.81		1.6 U		

TABLE 6-2
INORGANIC PARAMETERS EXCEEDING SCREENING CRITERIA
SWMU No. 1 and 22
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum	Antimony		Barium	Cadmium	Chromium		Copper		Lead		Mercury		Potassium	Selenium		Silver
Screening Conc.		19265	5		1600	8	38		600		400		10		1900	5		34
01-01-4.0	6/11/98		9.2	N			130	*	4400		8300					1400		
01-01-6.0	6/11/98		14	N			160	*	5400		8300					1200		
01-01-8.5	6/11/98		23	N			240	*	6200	*	12000	*				1800	*	
01-01-10.0	6/11/98		27	N			230	*	9200		11000					1600		
01-02-4.0	6/10/98		6.4	N			71	*	2800		1900					340		
01-02-6.0	6/10/98						71	*	6700		1100					190		
01-02-8.0	6/11/98								2200	*	1100	*				140	*	
01-02-12.0	6/11/98								2200	*	1100	*				140	*	
01-02B-4.0	6/11/98						61	*	1200		1900					340		
01-02B-6.0	6/11/98		5.3	N			61	*	1700		2300					370		
01-02B-8.0	6/11/98						72	*	3800	*	3400	*				550	*	
01-02B-10.0	6/11/98										470	*				78	*	
01-02B-12.0	6/11/98								3800	*	3400	*				59	*	
01-03-4.0	6/10/98		57	N			250	*	14000		5800					760		
01-03-6.0	6/10/98															21		
01-04-4.0	6/11/98						72	*	1800		1300					200		
01-05-1.1	2/17/98		13	N	4000				1300	N	8100					990		
01-05-3.5	5/7/98	39000	28	N	1900		83	N*	8600		7100		150	N	2100			
01-05-5.0	10/23/98								990	N						45		
01-06-1.1	2/17/98								4200	N	5300		24			1000		
01-06-3.5	5/7/98	22000	14	N	2000				5600		6800		76	N				
01-07-1.0	2/17/98								2000	N	1000		160			150		
01-07-3.5	5/7/98	23000							970		550		26	N				
01-09-1.0	2/17/98															46		
01-14-1.0	5/7/98		20	N			65	N*	1800		5400							
01-15-1.0	5/7/98		14	N			69	N*	1000		5400							
01-16-1.0	5/7/98		8.9	N			76	N*	930		3900							
01-22-1.0	10/23/98															28		

TABLE 6-2
INORGANIC PARAMETERS EXCEEDING SCREENING CRITERIA
SWMU No. 1 and 22
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum	Antimony	Barium	Cadmium	Chromium	Copper	Lead	Mercury	Potassium	Selenium	Silver
22-01-1.0	9/8/97	28000					21000	440 *	58	2400 E*	18	
22-02-1.0	9/8/97						2400		89		8.1	
22-03-1.0	9/8/97	21000					5000					
22-04-1.0	9/8/97	36000				46	33000	590 *	240	2300 E*	31	
22-05-1.0	9/8/97								14			
22-06-1.0	9/8/97				27		1400				37	
22-07-1.0	9/8/97		8.4 N		8.7	75	4800	2000 *			280	
22-08-1.0	9/8/97	22000	11 N		38	80	100000	4000 *		4600 E*	64	65 *
22-10-1.0	9/8/97	23000 N*						490 E		2200 *	61	
22-11-1.0	9/8/97										14	
22-13-1.0	5/5/98					280 N	11000 *	3500 *			490 N*	
22-14-1.0	5/5/98		18 N		36	98 N	8000 *	3700 *			2200 N*	
22-14 4-6	7/23/99						2600					
22-15-1.0	5/5/98		14 N		55		3700 *	3600 *			530 N*	
22-16-1.0	5/5/98		35 N		10		2600 *	4700 *			740 N*	
22-18-1.0	5/5/98					42 N*	1200 *				78 N*	
22-19-1.0	5/5/98										5.6 N*	
22-20-1.0	5/5/98						18000 *				26 N*	
22-21-1.0	5/5/98					44 N*						
22-22-1.0	10/23/98						5400 N	550	22		18	
22-23-1.0	10/23/98						4300 N				13	
22-24-1.0	10/23/98						2300 N	440	12		33	
22-25-1.0	10/23/98						3460 N		12		12	
22-26-1.0	10/23/98						6600 N		35		16	
22-27-1.0	10/23/98						16000 N	930	67		85	
22-28-1.0	10/23/98						4700 N	600			49	
22-29-1.0	10/23/98				12		3900 N	620			120	
22-30-1.0	10/23/98						7200 N					
22-31-1.0	4/29/99						7000		48		43	
22-32-1.0	4/29/99						1000					
22-33-1.0	4/29/99								16			

TABLE 6-3
SHALLOW GROUNDWATER
INORGANIC ANALYTICAL RESULTS
SWMU NO. 22

SAMPLE NAME		GW-22-01	GW-22-02		GW-22-03		GW-22-04		GW-22-05		GW-22-06	GW-22-07		GW-22-10		GW-22-11		GW-22-12	
SAMPLE DATE		10/13/97	10/13/97		10/13/97		10/13/97		10/13/97		10/13/97	10/13/97		10/13/97		10/13/97		10/13/97	
Aluminum (Total)		120000	50000		41000		2200		8500		49000	55000		920		160		98	
Antimony (Total)		5.1	5	U	5	U	5	U	22		31	99		5	U	5	U	5	U
Arsenic (Total)	10	130	52		44		7	U	7.5		28	44		7	U	7	U	7	U
Barium (Total)	20	2400	950		450		74		280		680	910		130		54		53	
Cadmium (Total)	5	18	6.3		5		7.1		13		12	3		1	U	1	U	1	U
Chromium (Total)	10	150	64		42		5	U	19		55	120		5	U	5	U	5	U
Cobalt (Total)	50	130	86		63		2.7		7.9		22	8.3		1.8		1	U	1	U
Copper (Total)	20	70000	12000		9800		2700		1100		8200	4200		46		9		4	U
Lead (Total)	5	1400	510		340		120		1200		6400	5000		78		20		5	U
Mercury (Total)	0.5	9.1	8.4		5.9		2.8		0.99		9.6	8.1		0.2	U	0.2	U	0.2	U
Potassium (Total)		13	7.9		4.2		13		3		4.2	2.8		1	U	1.3		1.6	
Selenium (Total)	5	86	20		18		36		220		560	1000		23		5	U	5	U
Silver (Total)	10	1.3	1	U	1	U	1	U	1	U	1	1	U	1	U	1	U	1	U
Zinc (Total)		15000	5500		3200		370		970		1600	400		44		20	U	20	U

TABLE 6-4
SHALLOW GROUNDWATER
TCL VOLATILE ANALYTICAL RESULTS
SWMU NO. 22

SAMPLE NAME	GW-22-01		GW-22-02		GW-22-03		GW-22-04		GW-22-05		GW-22-06		GW-22-07		GW-22-10		GW-22-11		GW-22-12	
SAMPLE DATE	10/13/97		10/13/97		10/13/97		10/13/97		10/13/97		10/13/97		10/13/97		10/13/97		10/13/97		10/13/97	
1,1,1-Trichloroethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1		1	U
1,1,2,2-Tetrachloroethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1,2-Trichloroethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1-Dichloroethane	1	U	1	U	1	U	5.1	J	1	U	1	U	1	U	1	U	1	U	1	U
1,1-Dichloroethene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-Dichloroethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-Dichloroethene(total)	1	U	1	U	1	U	9.1	J	1.4	J	1	U	1	U	1	U	1	U	1	U
1,2-Dichloropropane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
2-Butanone	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
2-Hexanone	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
4-Methyl-2-pentanone	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Acetone	5	U	5	U	16	J	5	U	5	U	5	U	5	U	5	U	5	U	5	U
Benzene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Bromodichloromethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Bromoform	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Bromomethane	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Carbon disulfide	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Carbon tetrachloride	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Chlorobenzene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Chloroethane	2	U	2	U	17	J	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Chloroform	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Chloromethane	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
cis-1,3-Dichloropropene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Dibromochloromethane	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Ethylbenzene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Methylene chloride	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Styrene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Tetrachloroethene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Toluene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
trans-1,3-Dichloropropene	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Trichloroethene	1	U	1	U	1	U	1.1	J	1	U	1	U	1	U	1	U	1	U	1	U
Vinyl chloride	2	U	2	U	2	U	2.4	J	2	U	2	U	2	U	2	U	2	U	2	U
Xylene(total)	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	2.2	J

TABLE 6-5
INORGANIC SAMPLING RESULTS
SWMU No. 2 and AOC A
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum	Antimony	Arsenic	Barium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Potassium	Selenium	Silver	TPH	Zinc
02-01-1.0	9/5/97	4800 E*	0.54 N	8.3 *	59	0.58 NE	7.1 E	5 E	120 *	2600 E*	0.052 U	1100	2.7 E*	0.28	10000	42 E
02-01-1.0	4/29/98		1.3 U			0.85	11		210	4800 *	0.65		6			
02-01 4-6	7/13/99		2.8 U			2.5	20		270	110			14 N			
02-01 10-12	7/13/99		2.8 U			0.29	14		25	11			1.4 U			
02-02-1.0	9/5/97	7600 E*	1.5 N	17 *	200	5.8 NE	48 E	6.4 E	440 *	460 E*	1.5	1100	24 E*	0.89	1100	220 E
02-02-1.0	4/29/98		1.4 U			1.3	17		64	60 *	0.81		2.8 U			
02-03-1.0	9/5/97	12000 E	0.31 N	7.2	92	7.8	18	12	170 N	29	0.24	1500	1.1	0.24	74 U	140
02-04-1.0	9/5/97	15000 E	0.29 U	9.4	110	9.8	20	12	280 N	46	0.19	1400	3.9	0.058 U	78 U	84
02-05-1.0	9/5/97	13000 E	0.28 U	11	80	0.31	18	10	35 N	24	0.072	1500	0.28 U	0.056 U	75 U	83
02-06-1.0	9/5/97	12000 E	0.62 N	9.1	150	1.9	20	8.9	1200 N	210	0.51	2000	12	0.36	190	270
02-07 4-6	7/14/99		3 U			6.5	15		16000	1100			160 N			
02-07-1.0	9/5/97	14000 E	6.1 N	10	320	6.6	18	11	54000 N	1900	1.6	1200	190	1.2	580	1400
02-07-1.0	4/29/98		4.3 N			8.1 *	18		70000	2300 *	1.9		340			
02-08-1.0	9/5/97	16000 E*	0.31 U	4.6 *	140	0.34 NE	14 E	9 E	370 *	24 E*	0.063 U	670	10 E*	0.063 U	84 U	70 E
02-09-1.0	9/5/97	17000 E*	0.42 N	9.6 *	110	3.5 NE	24 E	16 E	330 *	120 E*	1.1	2200	8.8 E*	0.76	70 U	120 E
02-10-1.0	9/5/97	11000 E*	0.46 N	7.3 *	100	3 NE	15 E	8.3 E	16000 *	270 E*	0.42	1200	25 E*	0.7	170	400 E
02-11-1.0	9/5/97	8800 E*	1.8 N	7.6 *	150	2.8 NE	14 E	8.4 E	9100 *	620 E*	1.1	1000	35 E*	0.7	71 U	220 E
02-12-1.0	9/5/97	23000 E*	0.31 U	6.3 *	120	0.31 NE	24 E	15 E	740 *	27 E*	0.065	1300	4.2 E*	0.062 U	83 U	98 E
02-13-1.0	4/29/98		1.4 U			4.1 *	14		200	76 *	0.16		3.4			
02-14-1.0	4/29/98		1.5 U			3.5 *	15		27000	560 *	2.5		43			
02-15-1.0	4/29/98		1.6 U			0.44 *	20		110	20 *	0.068		4.4			
02-16-1.0	4/29/98		1.5 U			1.8	28		310	44 *	0.062		4.2			
02-17-1.0	4/29/98		1.5 U			0.3 U	24 N		260	20	0.3		3 U			
02-18-1.0	4/29/98		1.6 U			0.33 U	20 N		770	30	0.12		3.3 U			
02-18 2-4	7/13/99		3.1 U			0.31 U	26		250	23			1.6 U			
02-18 4-6	7/13/99		3.1 U			0.31 U	28		33	21			1.6 U			
02-19-1.0	4/29/98		1.6 U			0.46 N	28 N		65	68	0.25		3.1 U			
02-20-1.0	10/20/98		1.6 U			0.31 U	23 N*		2200	68			1.7			
02-21-1.0	10/20/98		1.4 U			0.53	17 N*		230	790			1.5			
02-22-1.0	4/28/99		3 U			0.3 U	28		48	27			1.4 U			
02-23-1.0	4/28/99		3 U			0.3 U	24		110	23			1.5 U			
02-24-1.0	4/28/99		3.4			0.31 U	28		360	200			3.4			
02-25-1.0	4/28/99		3.3 U			0.33 U	21		88	32			1.6 U			
02-26-1.0	4/28/99		3.1 U			0.31 U	21		37	20			1.5 U			
02-27-1.0	4/28/99		3 U			12	26		900	73			2.4			
02-28-1.0	4/28/99		2.9 U			0.29 U	26		91	29			1.4 U			
AOC-A-01-1.0	9/5/97	18000	0.4 U	3.9	130	3.2	14	8.8 E	24	15 E	0.12	540	0.81 U	0.081 U		69 E
AOC-A-02-1.0	9/5/97														85 U	
AOC-A-03-1.0	9/5/97													81 U		
AOC-A-04-1.0	9/9/97												18000			

TABLE 6-6
INORGANIC PARAMETERS EXCEEDING SCREENING CRITERIA
SWMU No. 2 and AOC A
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum	Antimony	Cadmium	Chromium	Copper	Lead	Potassium	Selenium	TPH
Screening Conc.		19265	5	8	38	600	400	1900	5	100
02-01 4-6	7/13/99								14 N	
02-01-1.0	9/5/97						2600 E*			10000
02-01-1.0	4/29/98						4800 *		6	
02-02-1.0	9/5/97				48 E		460 E*		24 E*	1100
02-04-1.0	9/5/97			9.8						
02-06-1.0	9/5/97					1200 N		2000	12	190
02-07-1.0	9/5/97		6.1 N			54000 N	1900		190	580
02-07-1.0	4/29/98			8.1 *		70000	2300 *		340	
02-07 4-6	7/14/99					16000	1100		160 N	
02-08-1.0	9/5/97								10 E*	
02-09-1.0	9/5/97							2200	8.8 E*	
02-10-1.0	9/5/97					16000 *			25 E*	170
02-11-1.0	9/5/97					9100 *	620 E*		35 E*	
02-12-1.0	9/5/97	23000 E*				740 *				
02-14-1.0	4/29/98					27000	560 *		43	
02-18-1.0	4/29/98					770				
02-20-1.0	10/20/98					2200				
02-21-1.0	10/20/98						790			
02-27-1.0	4/28/99			12		900				
AOC-A-04-1.0	9/9/97								18000	

TABLE 6-7
DETECTED BASE NEUTRAL COMPOUNDS
SWMU NO. 2

SAMP_ID	SAMP_DA	2-Methyl naphthalene		Acena-phthene		Anthra-cene		Benzo(a) anthracene	Benzo(a) pyrene	Benzo(b) fluoranthene		Benzo(g,h,i) perylene		Benzo(k) fluoranthene	bis(2-Chloroethyl) ether
02-01-1.0	10/20/98	87	J	130	J	480	J	1500	1600	2200		710	J	1000	810
02-02-1.0	10/20/98	200	J							85	J				
02-07-1.0	10/20/98	120	J.							84	J				

TABLE 6-7
DETECTED BASE NEUTRAL COMPOUNDS
SWMU NO. 2

SAMP_ID	SAMP_DA	Bis(2-ethylhexyl) phthalate		Carbazole		Chrysene		Dibenz(a,h) anthracene		Fluor-anthene		Fluorene		Indeno(1,2,3-cd) pyrene	Naph-thalene		Phen-anthrene
02-01-1.0	10/20/98	350	J	440	J	1900		300	J	2700		160	J	880	120	J	1900
02-02-1.0	10/20/98					99	J			130	J				150	J	
02-07-1.0	10/20/98					100	J								100	J	

TABLE 6-7
DETECTED BASE NEUTRAL COMPOUNDS
SWMU NO. 2

SAMP_ID	SAMP_DA	Pyrene	
02-01-1.0	10/20/98	2100	
02-02-1.0	10/20/98	94	J
02-07-1.0	10/20/98	100	J

TABLE 6-8
INORGANIC SAMPLING RESULTS
SWMU No. 3 & 5
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum	Antimony		Arsenic		Barium	Cadmium		Chromium	Cobalt	Copper		Lead		Mercury		Potassium	Selenium		Silver		TPH		Zinc	
03-01-1.0	9/4/97	13000	0.54	N	7.8	N*	110	4.9		18	13	380	N	24	E	0.2	N*	1200	1	E	0.054	U	73	U	65	NE
03-02-1.0	9/4/97	9400	1.2	N	49	N*	310	860		29	6	78000	N	380	E	2.3	N*	840	23	E	1.5		84	U	260	NE
03-02 2-4	7/14/99				10			2.2				190		25					1.4	U						
03-02 4-6	7/14/99				6.1			9.5				180		20					1.5	U						
03-03-1.0	9/4/97	20000	0.58	N	7.8	N*	96	2.4		21	9.3	1000	N	41	E	0.36	N*	1400	1.4	E	0.059	U	79	U	95	NE
03-04-1.0	9/4/97	18000	0.34	N	4.2	N*	120	1.9		14	7.7	80	N	17	E	0.44	N*	630	1.1	E	0.065	U	87	U	65	NE
03-05-1.0	9/4/97	14000	1.2	N	12	N*	160	730		21	14	30000	N	290	E	5.9	N*	1600	16	E	0.56		140		150	NE
03-06-1.0	9/4/97	18000	0.47	N	11	N*	130	2.1		21	14	580	N	22	E	0.13	N*	1600	1	E	0.063	U	85	U	84	NE
03-07-1.0	9/4/97	19000	0.36	N	4.3	N*	110	0.38		15	9.1	24	N	11	E	0.18	N*	620	0.74	E	0.065	U	87	U	64	NE
03-08-1.0	9/4/97	11000	3.3	N	54	N*	220	690		15	7.6	100000	N	680	E	5.9	N*	960	38	E	8.7		810		270	NE
03-08-1.0	5/4/98				3.4			7.2				160	*	20	*				3.1	U						
03-08 4-6	7/14/99				2.1			43				3300		5200					500	N						
03-08 8-10	7/14/99				15	E		0.43				190		30	N				4.9	N						
03-09-1.0	9/4/97	13000	0.3	U	10	N*	64	4.2		17	11	210	N	16	E	0.092	N*	1000	0.3	U	0.06	U	80	U	78	NE
03-10-1.0	5/4/98				13			710				48000	*	2300	*				380	*						
03-11-1.0	5/4/98				14			6.9				290	*	79	*				4.5	*						
03-12-1.0	5/4/98				7.5			1.8				52	*	14	*				3.1	U						
03-13-1.0	10/20/98				4.9			2.9				1100		15					1.5	U						
03-14-1.0	4/28/99				4.6			1.6				37	N	16	E				1.8	U						
03-15-1.0	4/28/99				4.1			16				95		11					1.4	U						
03-16-1.0	4/28/99				5.9			0.29	U			18		11					1.4	U						
03-17-1.0	4/28/99				7.1			2.2				29		13					1.3	U						

TABLE 6-9
INORGANIC PARAMETERS EXCEEDING SCREENING CRITERIA
SWMU No. 3 & 5
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum	Arsenic		Cadmium	Copper		Lead		Selenium		TPH
Screening Conc.		19265	29		8	600		400		5		100
03-02-1.0	9/4/97		49	N*	860	78000	N			23	E	
03-02 4-6	7/14/99				9.5							
03-03-1.0	9/4/97	20000				1000	N					
03-05-1.0	9/4/97				730	30000	N			16	E	140
03-08-1.0	9/4/97		54	N*	690	100000	N	680	E	38	E	810
03-08 4-6	7/14/99				43	3300		5200		500	N	
03-10-1.0	5/4/98				710	48000	*	2300	*	380	*	
03-13-1.0	10/20/98					1100						
03-15-1.0	4/28/99				16							

TABLE 6-10
DETECTED BASE NEUTRAL COMPOUNDS
SWMU NO. 3 and 5

SAMP_ID	SAMP_DATE	2-Methylnaphthalene		Chrysene		Naphthalene		Phenanthrene	
03-08-1.0	10/20/98	260	J	91	J	170	J	160	J

TABLE 6-11
INORGANIC SAMPLING RESULTS
SWMU NO. 4
(all vlaues in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum		Antimony		Arsenic		Barium	Cadmium		Chromium		Cobalt		Copper		Lead		Mercury		Potassium	Selenium		Silver		TPH		Zinc	
04-01-1.0	9/5/97	15000	E*	0.28	U	9.1	*	81	3.1	NE	15	E	10	E	160	*	14	E*	0.094		1000	0.34	E*	0.057	U	76	U	62	E
04-02-1.0	9/5/97	12000	E*	0.33	N	7.4	*	49	2.9	NE	16	E	8.5	E	94	*	14	E*	0.19		1200	0.57	E*	0.055	U	74	U	59	E
04-03-1.0	9/5/97	17000	E*	0.45	N	8.7	*	64	2.6	NE	20	E	14	E	92	*	19	E*	0.057	U	1600	3.3	E*	0.057	U	83		71	E
04-04-1.0	9/5/97	22000	E*	0.52	N	12	*	130	0.37	NE	26	E	17	E	39	*	32	E*	0.11		1400	0.72	E*	0.063	U	84	U	80	E
04-05-1.0	9/5/97	1400	E*	0.54	N	32	*	220	4	NE	19	E	9.8	E	1600	*	170	E*	1.4		1200	14	E*	0.38		74	U	110	E
04-05 2-4	7/13/99					8.4	E		0.27	U					24							1.4	U						
04-06-1.0	9/5/97	18000	E*	0.26	U	11	*	130	8.5	NE	23	E	16	E	1100	*	70	E*	0.25		2000	12	E*	0.2		70	U	88	E
04-07-1.0	4/30/98					10				N					340							7.3							
04-08-1.0	4/30/98					9.8			16	N					810							6.2							
04-08 2-4	7/13/99					5.5			6.1						470							4.2							
04-08 4-6	7/13/99					12			0.66						38							1.6	U						
04-09-1.0	10/20/98					9.4			8.8						480							2.3							
04-10-1.0	10/20/98					20			4.6						200							2.5							

TABLE 6-12
INORGANIC PARAMETERS EXCEEDING SCREENING CRITERIA
SWMU No. 4
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum		Arsenic		Cadmium		Copper		Potassium	Selenium	
Screening Conc.		19265		29		8		600		1900	5	
04-04-1.0	9/5/97	22000	E*									
04-05-1.0	9/5/97			32	*			1600	*		14	E*
04-06-1.0	9/5/97					8.5	NE	1100	*	2000	12	E*
04-07-1.0	4/30/98					12	N				7.3	
04-08-1.0	4/30/98					16	N	810			6.2	
04-09-1.0	10/20/98					8.8						

TABLE 6-13
INORGANIC SAMPLING RESULTS
AOC B (SWMU's 6,7 & 8)
(all values in MG/KG)

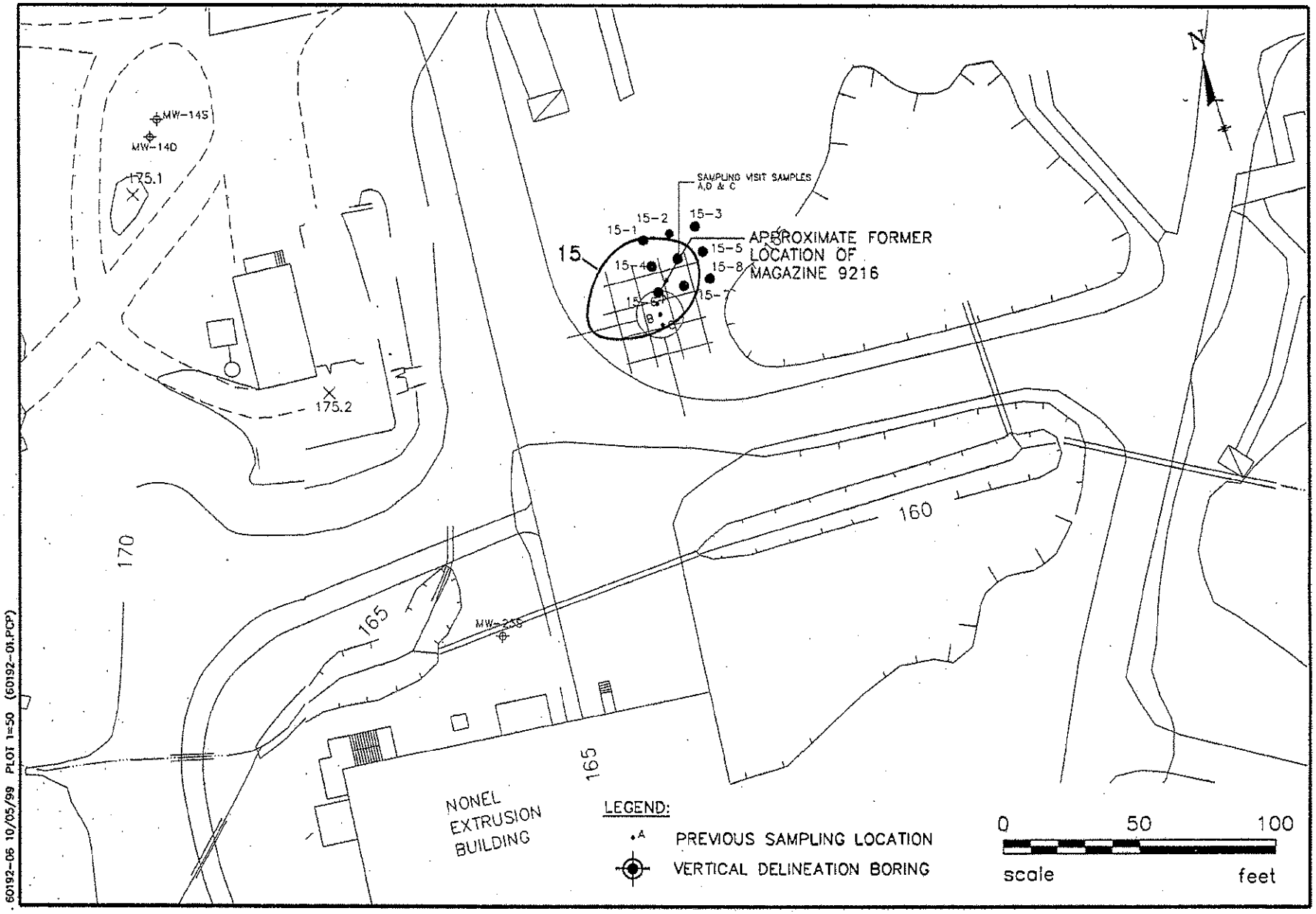
SAMPLE LOCATION	SAMPLE DATE	Aluminum	Antimony	Arsenic	Barium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Potassium	Selenium	Silver	TPH	Zinc
06-01-1.0	9/4/97	12000 E	0.28 U	9.6	41	0.11	13	9.9	26 N	11	0.057 U	1200	0.28 U	0.11 U	76 U	68
06-02-1.0	9/4/97	12000	0.54 N	8.8 N*	360	0.88	18	12	40 N	260 E	0.38 N*	870	88 E	1.2 U	78 U	63 NE
06-03-1.0	9/4/97	14000	0.48 N	6.1 N*	250	0.84	14	10	72 N	110 E	2.8 N*	730	26 E	0.066 U	88 U	76 NE
06-04-1.0	9/4/97	22000	0.038 N	8.5 N*	140	0.27	18	22	30 N	100 E	18 N*	1200	46 E	0.13 U	86 U	88 NE
06-05-1.0	9/4/97	15000	0.39 N	4.1 N*	120	0.063 U U	12	7.5	12 N	12 E	0.1 N*	470	7.1 E	0.063 U	85 U	65 NE
06-06-1.0	9/4/97	16000	0.6 N	11 N*	360	0.6	27	18	63 N	140 E	0.16 N*	1400	63 E	0.092	76 U	110 NE
06-07-1.0	9/4/97	17000	0.55 N	13 N*	3900	0.2	23	22	45 N	250 E	0.07 N*	2300	120 E	0.056 U	680	88 NE
06-07-1.0	5/1/98		1.4 U		2700 N		31 N			1700	0.094 N*		640			
06-08-1.0	9/4/97	19000	0.72 N	7 N*	210	0.062	18	14	21 N	36 E	0.086 N*	1100	16 E	0.12 U	82 U	140 NE
06-08 4-6	7/15/99		3 U		42		13 N			18 N	0.057 U		34			
06-08 6-8	7/15/99		2.9 U		73		13 N			24 N	0.081		17 N			
06-09-1.0	9/4/97	12000	3.7 N	8.2 N*	4400	0.94	34	11	200 N	7100 E	0.51 N*	1000	3000 E	0.49	670	69 NE
06-09-1.0	5/1/98		8.5 N		2900 N		18 N			14000	0.37 N		1900			
06-10-1.0	9/4/97	12000	9 N	9.8 N*	17000	0.99	56	8.3	51 N	14000 E	0.16 N*	900	7900 E	0.91	1200	97 NE
06-10-1.0	5/1/98		1.5 U		330 N		18 N			21	0.058 U		6.9			
06-10 2-4	7/14/99		2.9 U		770		37 N			440 N	0.33		260 N			
06-11-1.0	9/4/97	16000	0.38 N	12 N*	140	0.1	20	17	47 N	56 E	0.6 N*	2200	19 E	0.055 U	74 U	86 NE
06-12-1.0	9/3/97	13000	0.34 U	6.1	1800	1	12	7.8 E	40	820 E	0.48	640	260 E*			310 E
06-13-1.0	5/1/98		1.6 U		89 N		16 N			15	0.065 U		3.2 U			
06-14-1.0	5/1/98		1.5 U		100 N		22 N			23	1.3		3 U			
06-15-1.0	5/1/98		1.5 U		200 N		15 N			110	0.31		45			
06-16-1.0	5/1/98		1.6 U		120 N		17 N			31	0.2		5.1			
06-17-1.0	5/1/98		1.5 U		220 N		15 N			320	1.2		50			
06-18-1.0	5/4/98		1.6 U		460		14 N*			270 *	0.98		55 *			
06-19-1.0	5/4/98		1.5 U		620		12 N*			780 *	1.4		240 *			
06-19 2-4	7/15/99		11 N		1200		14 N			8000 N	1.1		1700			
06-20-1.0	5/4/98		2.1 N		690		14 N*			4600 *	1.8		1000 *			
06-21-1.0	5/4/98		3.6 N		1600		14 N*			4100 *	2.2		950 *			
06-22-1.0	5/4/98		1.5 U		110		11 N*			15 *	0.072		3.3 *			
06-23-1.0	5/4/98		7.9 N		7000		18 N*			6300 *	0.39		3600 *			
06-24-1.0	5/4/98		1.5 U		130		18 N*			29	0.065		23 *			
06-25-1.0	5/4/98		1.4 U		360		23 N*			240 *	0.085		110 *			
06-26-1.0	10/20/98		1.4 U		90		23 N*			31	0.18		2.9			
06-27-1.0	10/20/98		1.5 U		120		18 N*			49	0.51		7.9			
06-28-1.0	10/20/98		1.5 U		110		18 N*			64	0.66		11			
06-29-1.0	10/20/98		1.5 U		160		20 N*			80	0.21		25			
06-30-1.0	10/20/98		1.5 U		110		15 N*			17	0.058 U		3.3			
06-31-1.0	10/20/98		1.6 U		150		14 N*			130	0.7		230			
06-32-1.0	10/20/98		1.5 U		130		16 N*			19	0.15		1.5 U			
06-32 2-4	7/16/99		2.9 U		42		21 N			15 N	0.096		1.5 U			
06-32 4-6	7/15/99		2.9 U		49		22 N			18 N	0.067 U		1.5 U			
06-33-1.0	10/20/98		1.5 U		140		17 N*			18	0.062 U		1.5 U			
06-34-1.0	10/21/98		1.7 U		650 N		19 N			79	0.35		1.7 U			
06-35-1.0	10/21/98		1.6 U		330 N		20 N			22	0.063 U		35			
06-36-1.0	10/21/98		1.6 U		1300 N		22 N			1000	0.51		1.6 U			
06-36 4-6	7/15/99		3 U		55		18 N			19	0.061 U		6.1			
06-37-1.0	10/21/98		1.6 U		87 N		26 N			28	0.34		13			
06-38-1.0	10/21/98		1.5 U		100 N		16 N			14	0.06 U		1.5 U			
06-39-1.0	10/21/98		1.5 U		97 N		16 N			13	1.3		1.5 U			

TABLE 6-14
INORGANIC SAMPLING RESULTS
SWMU No. 32
(All values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum		Antimony		Arsenic		Barium	Cadmium		Chromium		Cobalt		Copper		Lead		Mercury		Potassium	Selenium		Silver		TPH		Zinc	
32-01-1.0	9/4/97	14000		0.29	U	7.7	N*	190	0.48		17		11		35	N	280	E	0.25	N*	1000	32	E	0.057	U	77	U	66	NE
32-02-1.0	9/4/97	14000	E*	0.34	N	7.5	*	53	0.057	U	15	E	11	E	16	*	12	E*	0.057	U	800	0.54	E*	0.057	U	76	U	64	E
32-03-1.0	9/4/97	16000	E*	0.33	N	4.5	*	72	0.092	NE	14	E	10	E	14	*	12	E*	0.062	U	660	0.31	U	0.062	U	83	U	68	E
32-04-1.0	9/4/97	11000	E*	0.8	N	7.4	*	360	0.53	NE	17	E	10	E	33	*	370	E*	0.31		900	160	E*	0.058		72	U	46	E
32-04-1.0	4/28/98																					28							
32-05-1.0	9/4/97	18000	E*	0.39	N	6.3	*	63	0.23	NE	18	E	13	E	20	*	14	E*	0.062	U	950	0.57	E*	0.062	U	83	U	74	E
32-06-1.0	9/4/97	15000	E*	0.63	N	5.4	*	88	1.8	NE	14	N	9.8	E	100	*	42	E*	0.33		600	2.5	E*	0.094		89	U	170	E
32-07-1.0	9/4/97	1800	E*	0.5	N	3.6	*	200	0.6	NE	11	E	6	E	25	*	20	E*	0.21		500	3.3	E*	0.13	U	86	U	78	E
32-08-1.0	9/4/97	2800	E*	0.64	N	5	*	290	0.54	NE	13	E	7.9	E	18	*	24	E*	0.38		500	2.3	U	0.45	U	130	U	98	E

TABLE 6-15
INORGANIC PARAMETERS EXCEEDING SCREENING CRITERIA
AOC B (SWMU 6, 7 & 8)
(all values in MG/KG)

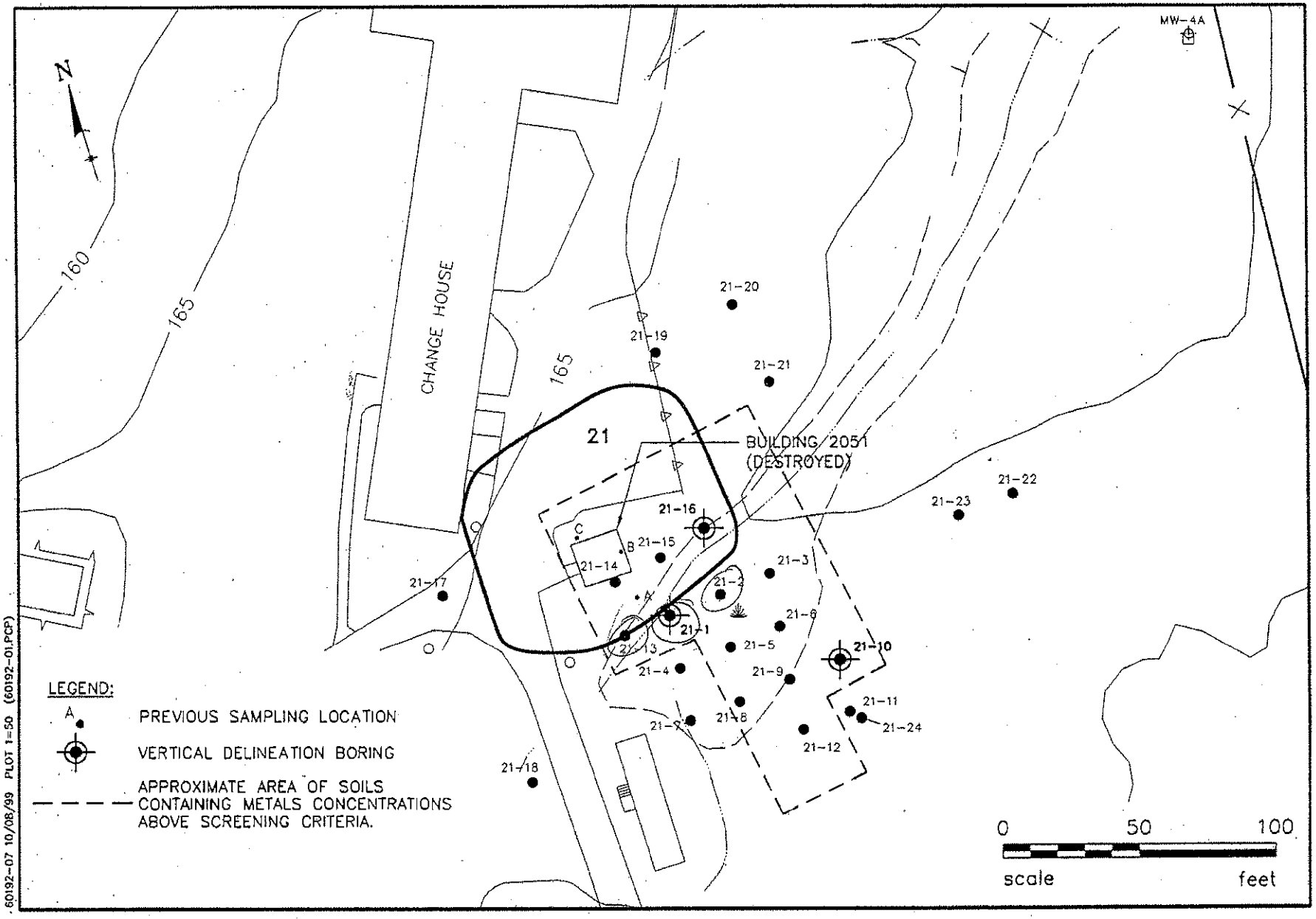
SAMPLE LOCATION	SAMPLE DATE	Aluminum	Antimony		Barium		Chromium	Lead		Mercury		Potassium	Selenium		TPH
Screening Conc.		19265	5		1600		38	400		10		1900	5		100
06-02-1.0	9/4/97												88	E	
06-03-1.0	9/4/97												26	E	
06-04-1.0	9/4/97	22000								18	*N		46	E	
06-05-1.0	9/4/97												7.1	E	
06-06-1.0	9/4/97												63	E	
06-07-1.0	9/4/97				3900							2300	120	E	680
06-07-1.0	5/1/98				2700	N		1700					640		
06-08-1.0	9/4/97												16	E	
06-08 4-6	7/15/99												34		
06-08 6-8	7/15/99												17		
06-09-1.0	9/4/97				4400			7100	E				3000	E	670
06-09-1.0	5/1/98		8.5	N	2900	N		14000					1900		
06-10-1.0	9/4/97		9	N	17000		56	14000	E				7900	E	1200
06-10-1.0	5/1/98												6.9		
06-10 2-4	7/14/99							440	N				260	N	
06-11-1.0	9/4/97											2200	19	E	
06-12-1.0	9/3/97				1800			820	E				260	E*	
06-15-1.0	5/1/98												45		
06-16-1.0	5/1/98												5.1		
06-17-1.0	5/1/98												50		
06-18-1.0	5/4/98												55	*	
06-19-1.0	5/4/98							780	*				240	*	
06-19 2-4	7/15/99		11	N				8000	N				1700		
06-20-1.0	5/4/98							4600	*				1000	*	
06-21-1.0	5/4/98							4100	*				950	*	
06-23-1.0	5/4/98		7.9	N	7000			6300	*				3600	*	
06-24-1.0	5/4/98												23	*	



60192-06 10/05/99 PLOT 1=50 (60192-01.PCP)

BROWN AND CALDWELL

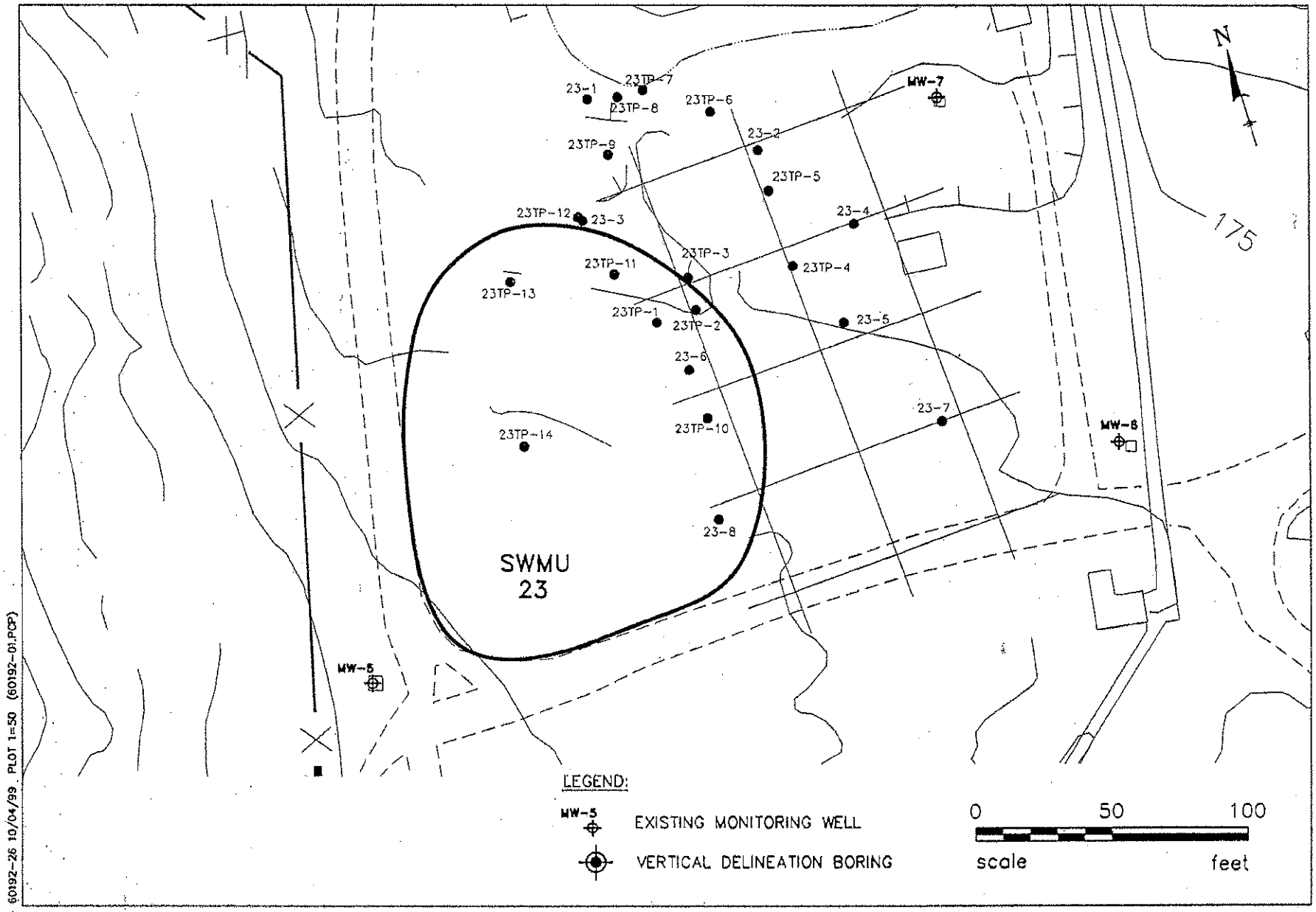
FIGURE 6-8
SWMU NO. 15



60192-07 10/08/99 PLOT 1=50 (60192-01.PCP)

BROWN AND CALDWELL

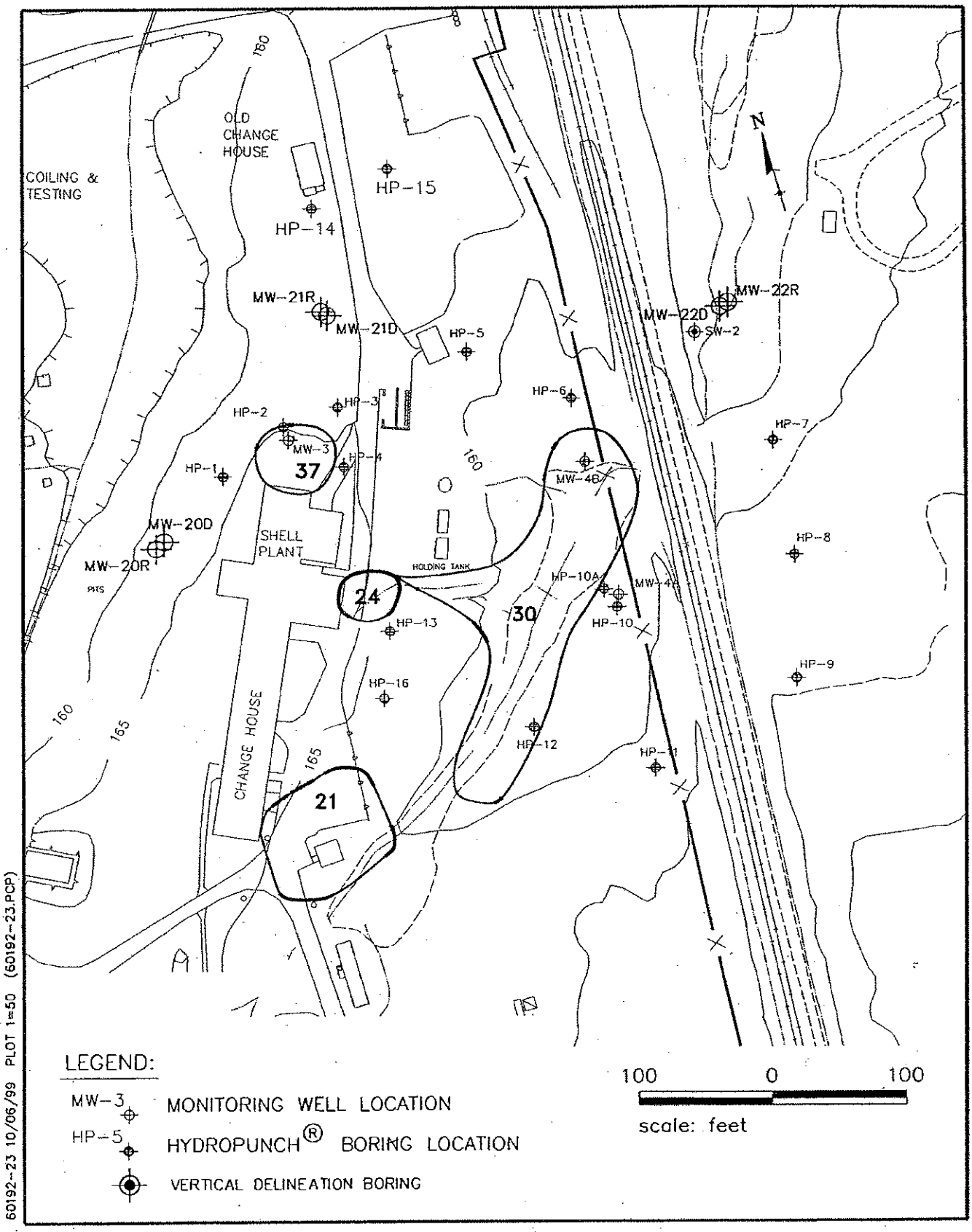
FIGURE 6-9
SWMU NO. 21



60192-26 10/04/99 PLOT 1=50 (60192-01.PCP)

BROWN AND CALDWELL

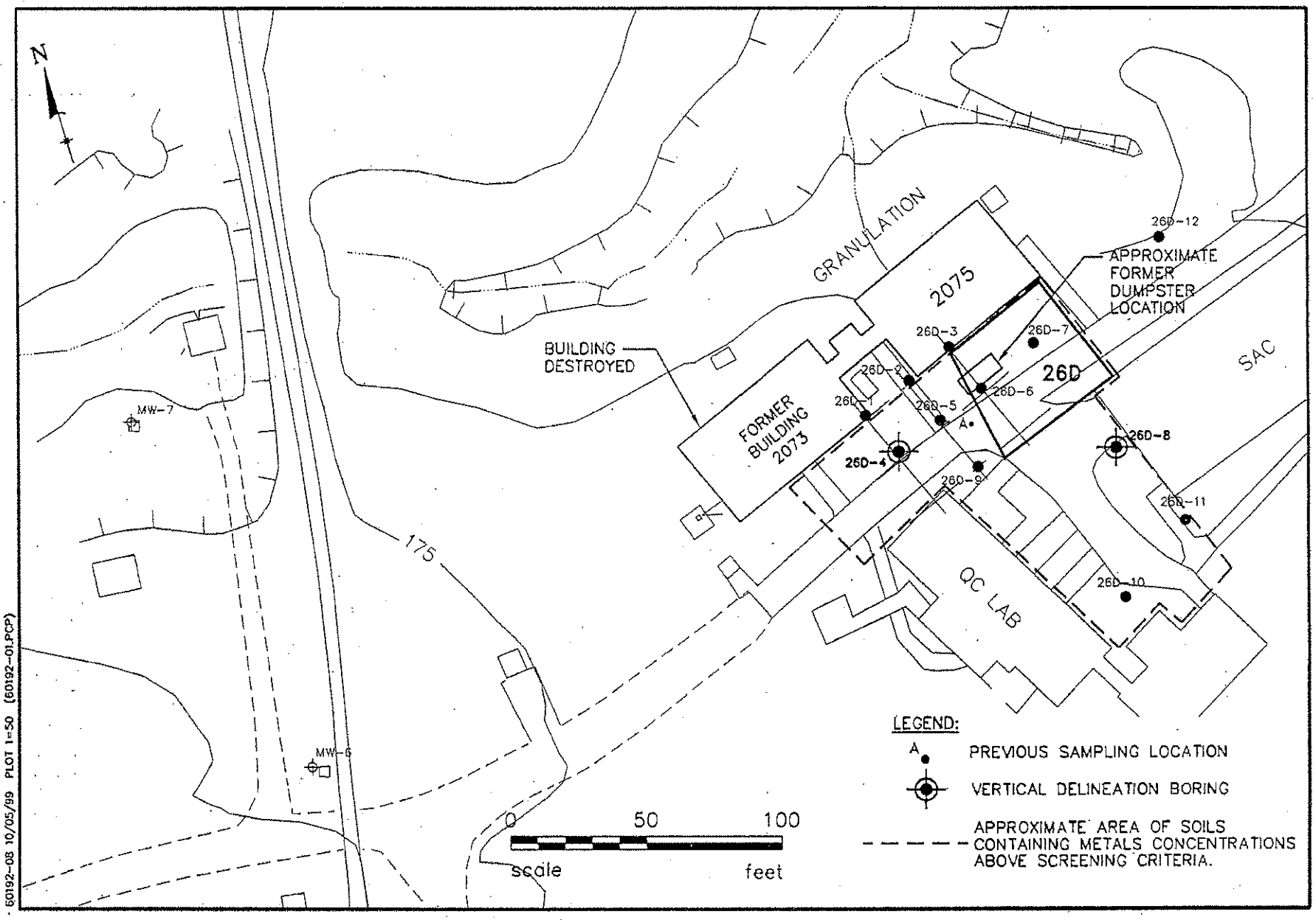
FIGURE 6-10
SWMU NO. 23



60192-23 10/06/99 PLOT 1=50 (60192-23.PCP)

BROWN AND CALDWELL

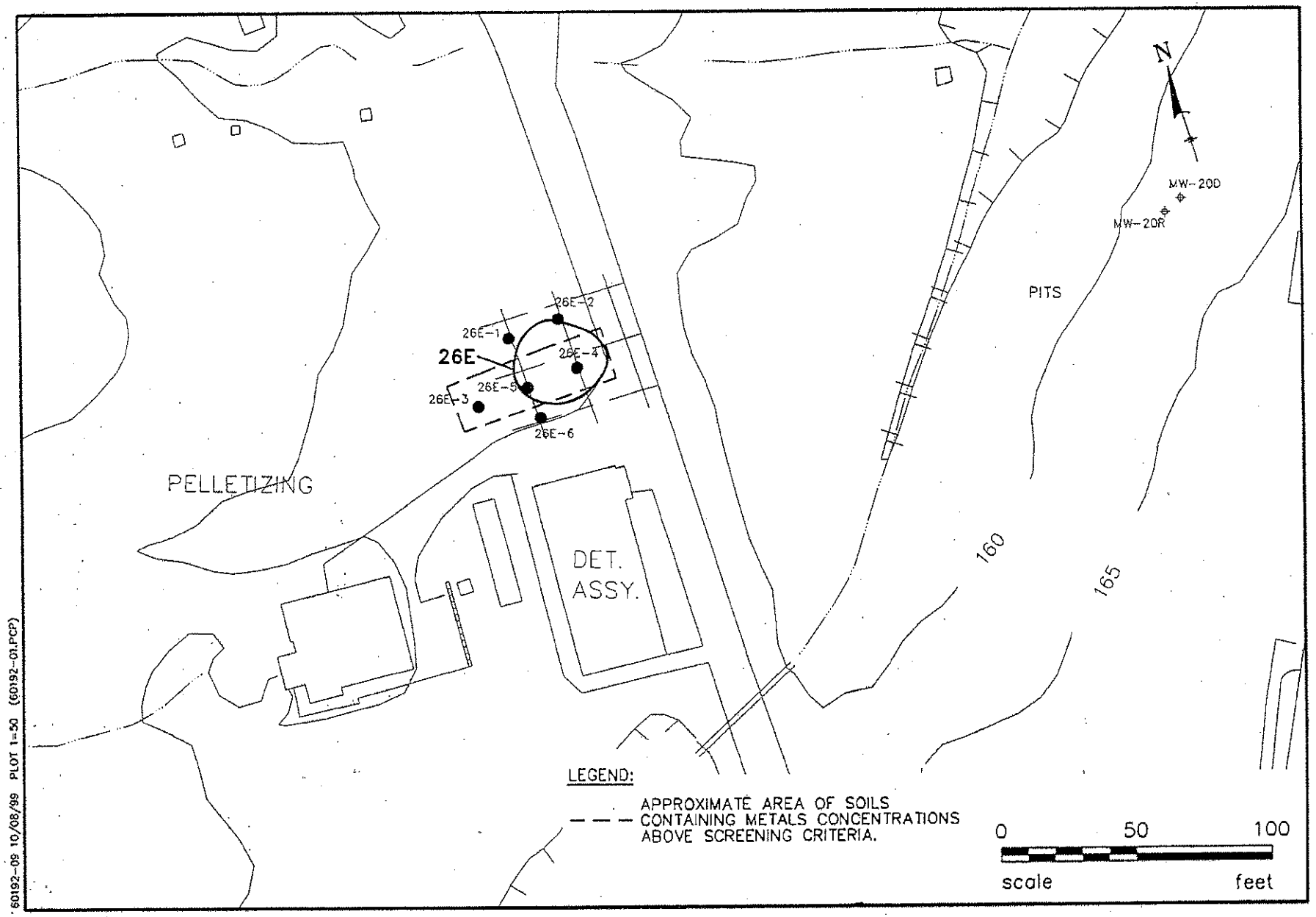
FIGURE 6-11
SWMU NOS. 24, 30 & 37



60192-08 10/05/99 PLOT 1=50 (60192-01.PCP)

BROWN AND CALDWELL

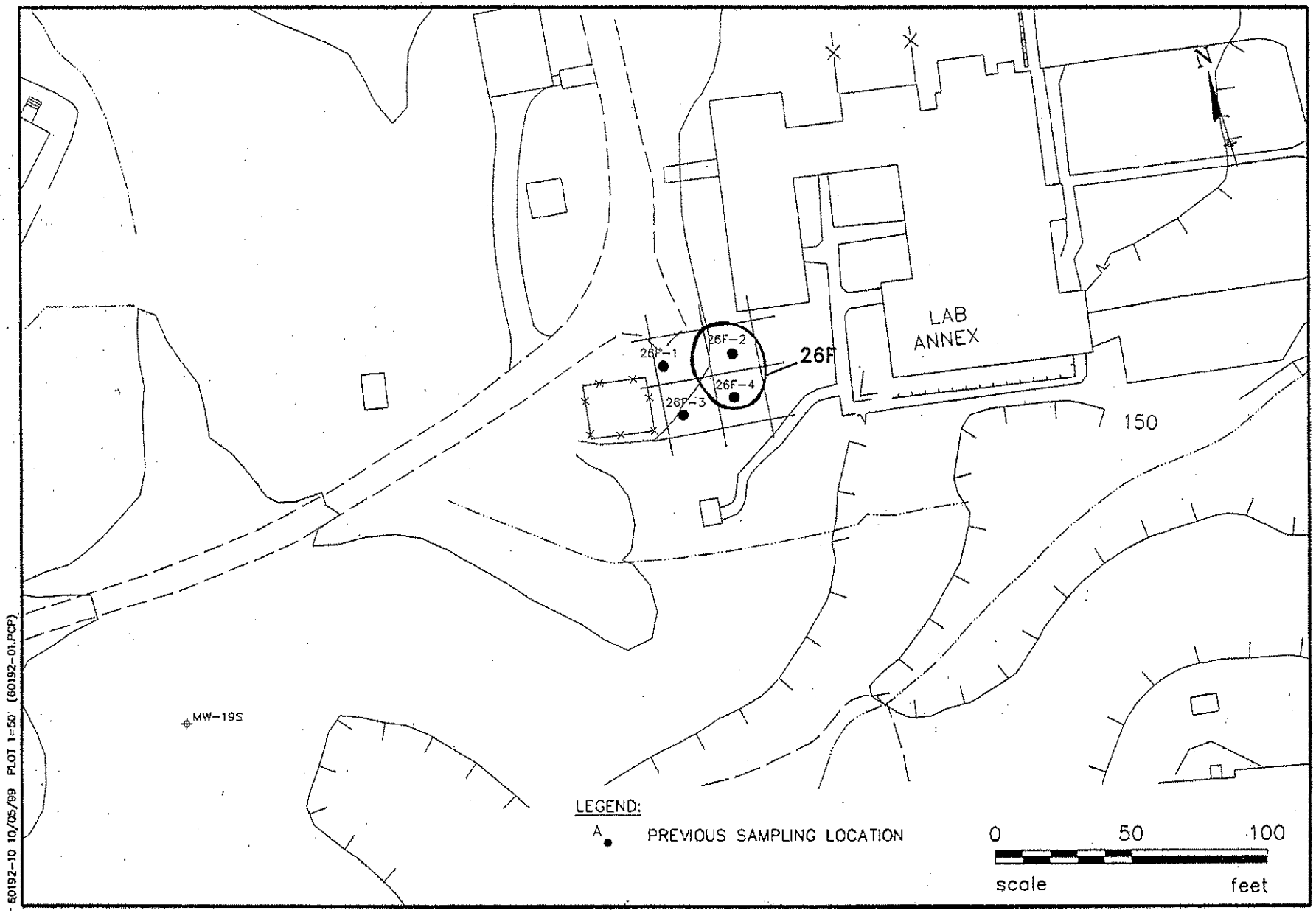
FIGURE 6-12
SWMU NO. 26D



60192-09 10/08/99 PLOT 1=50 (60192-01.PCP)

BROWN AND CALDWELL

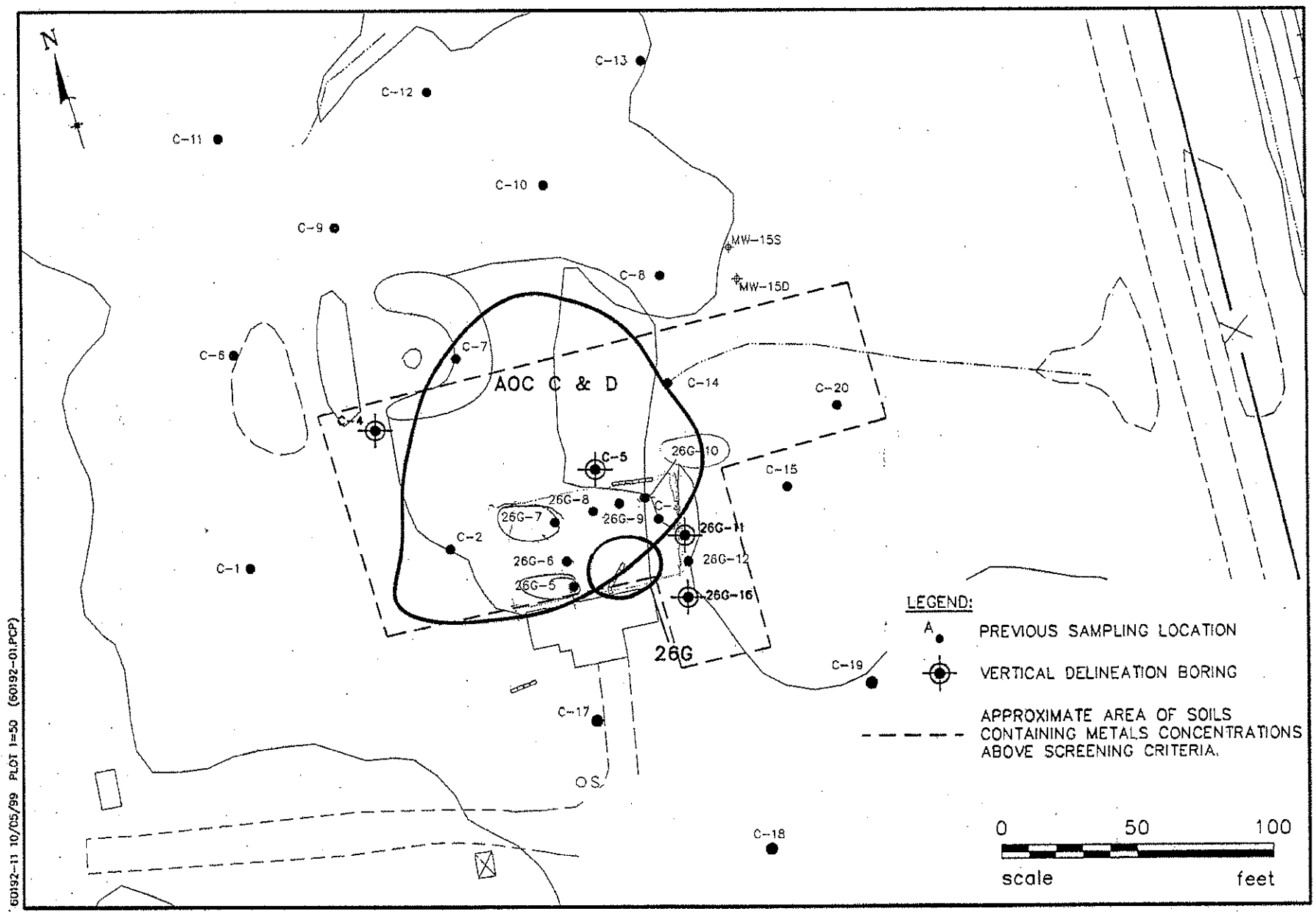
FIGURE 6-13
SWMU NO. 26E



60192-10 10/05/99 PLOT 1=50' (60192-01.PCP)

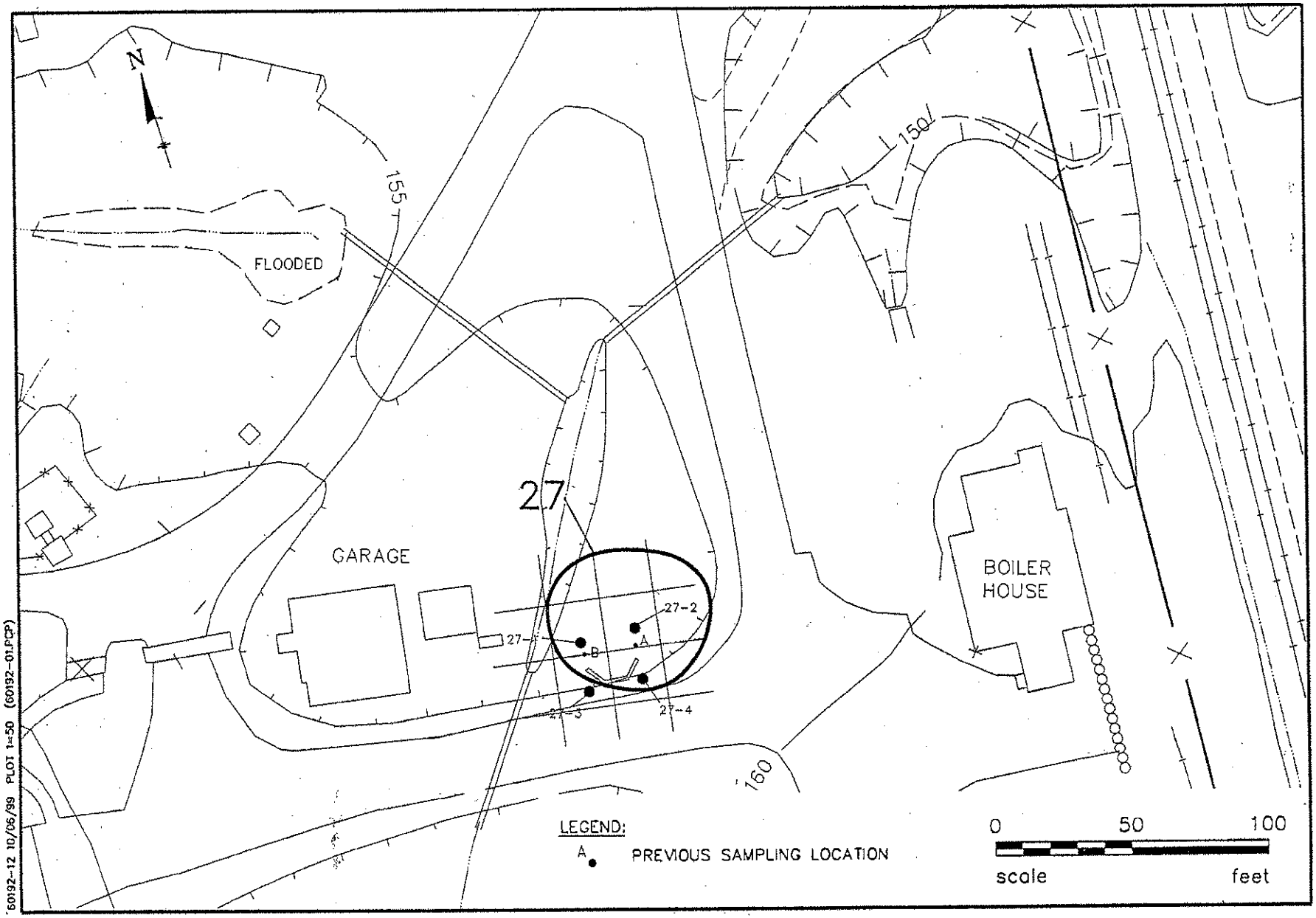
BROWN AND CALDWELL

FIGURE 6-14
SWMU NO. 26F



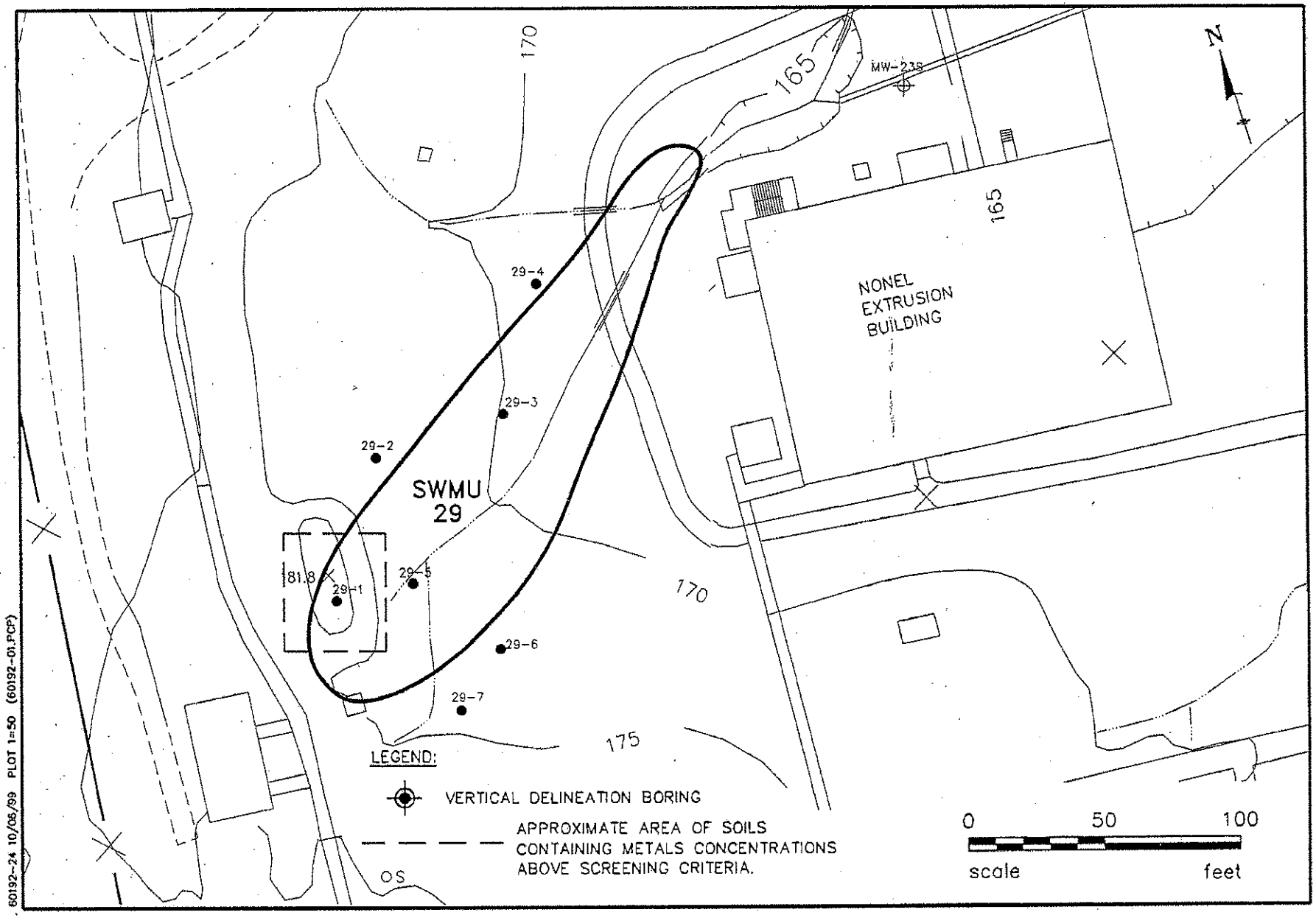
BROWN AND CALDWELL

FIGURE 6-15
AOC C&D, SWMU 26G



BROWN AND CALDWELL

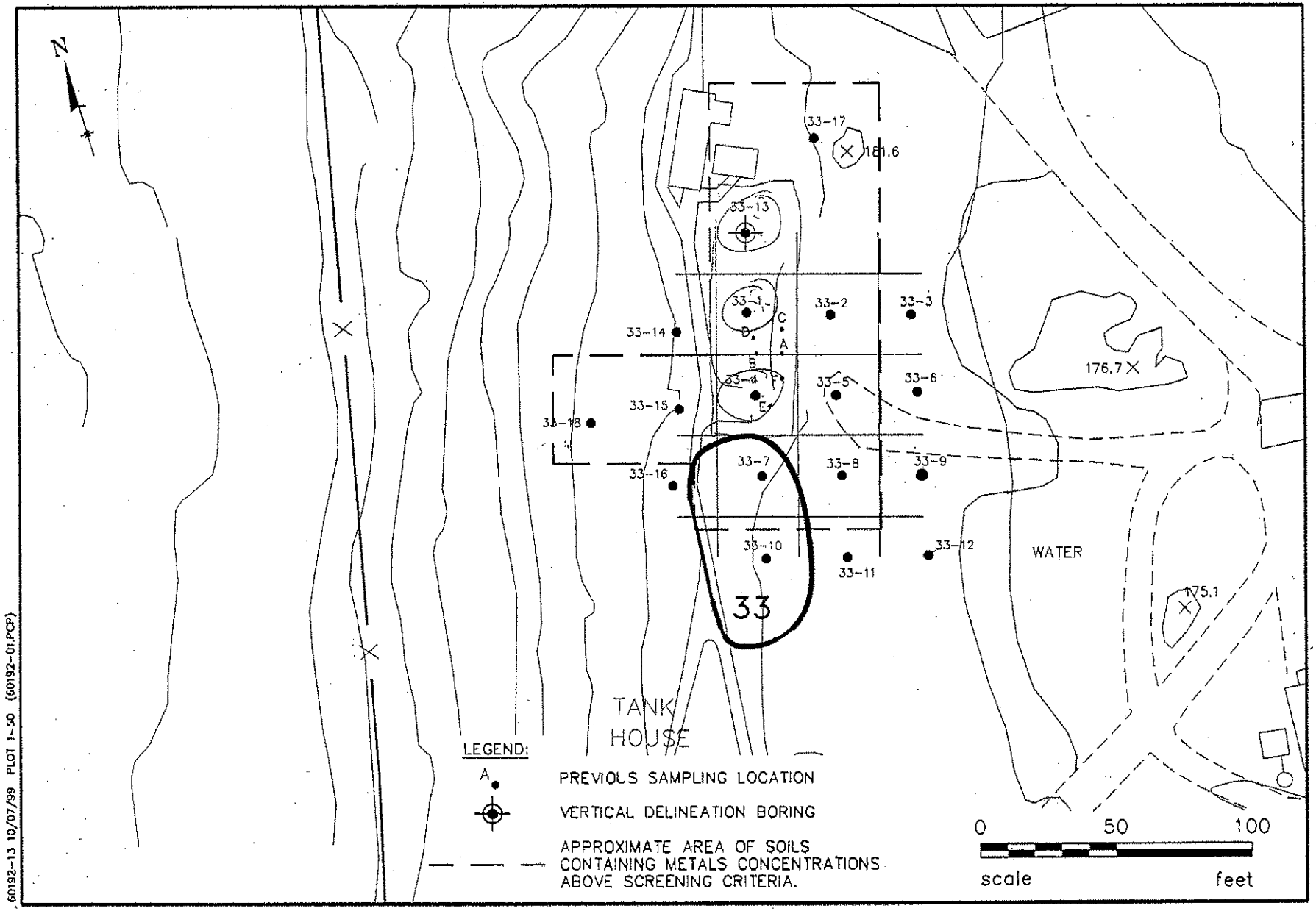
FIGURE 6-16
SWMU NO. 27



60192-24 10/06/99 PLOT 1=50 (60192-01.PCP)

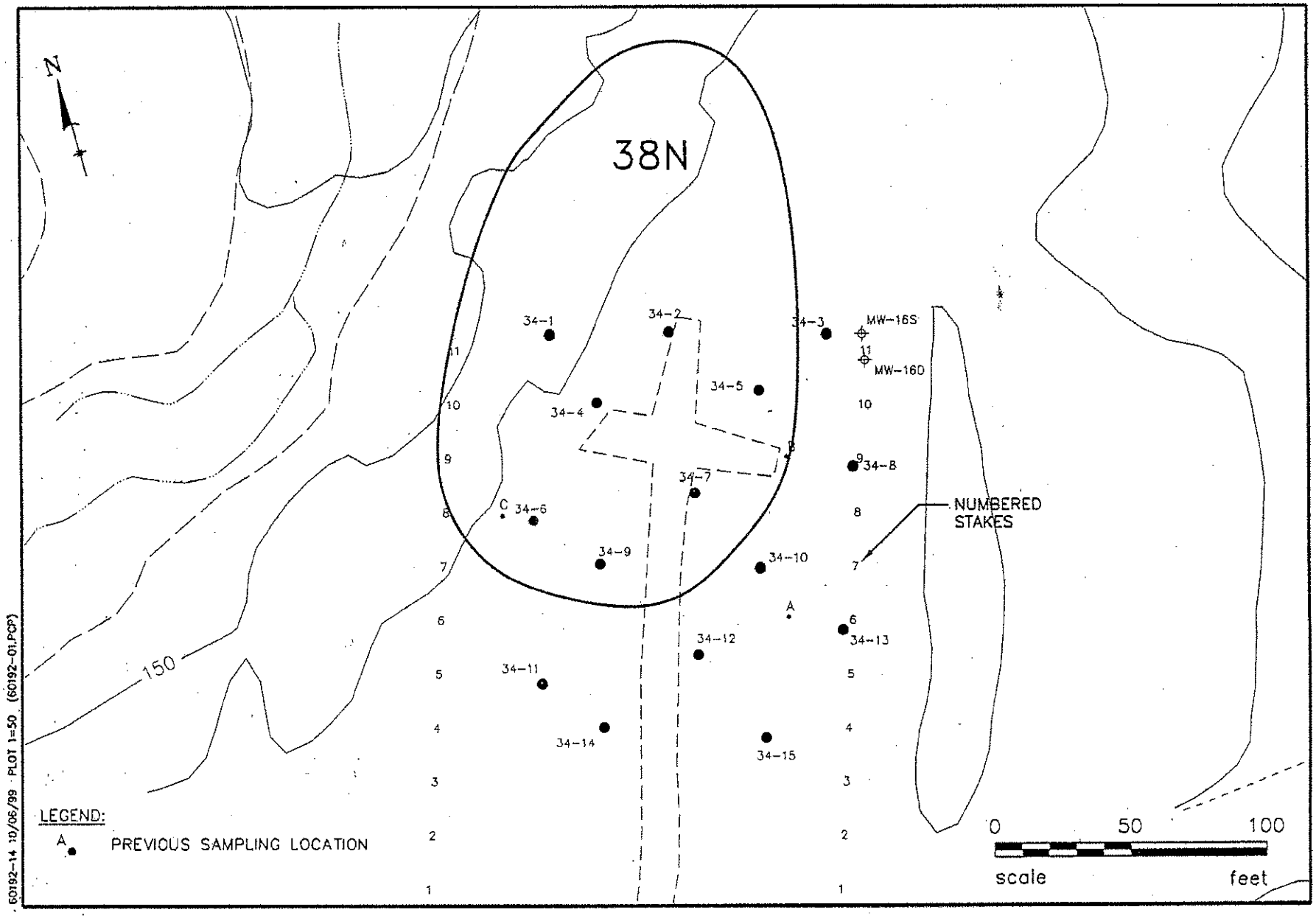
BROWN AND CALDWELL

FIGURE 6-17
SWMU NO. 29



BROWN AND CALDWELL

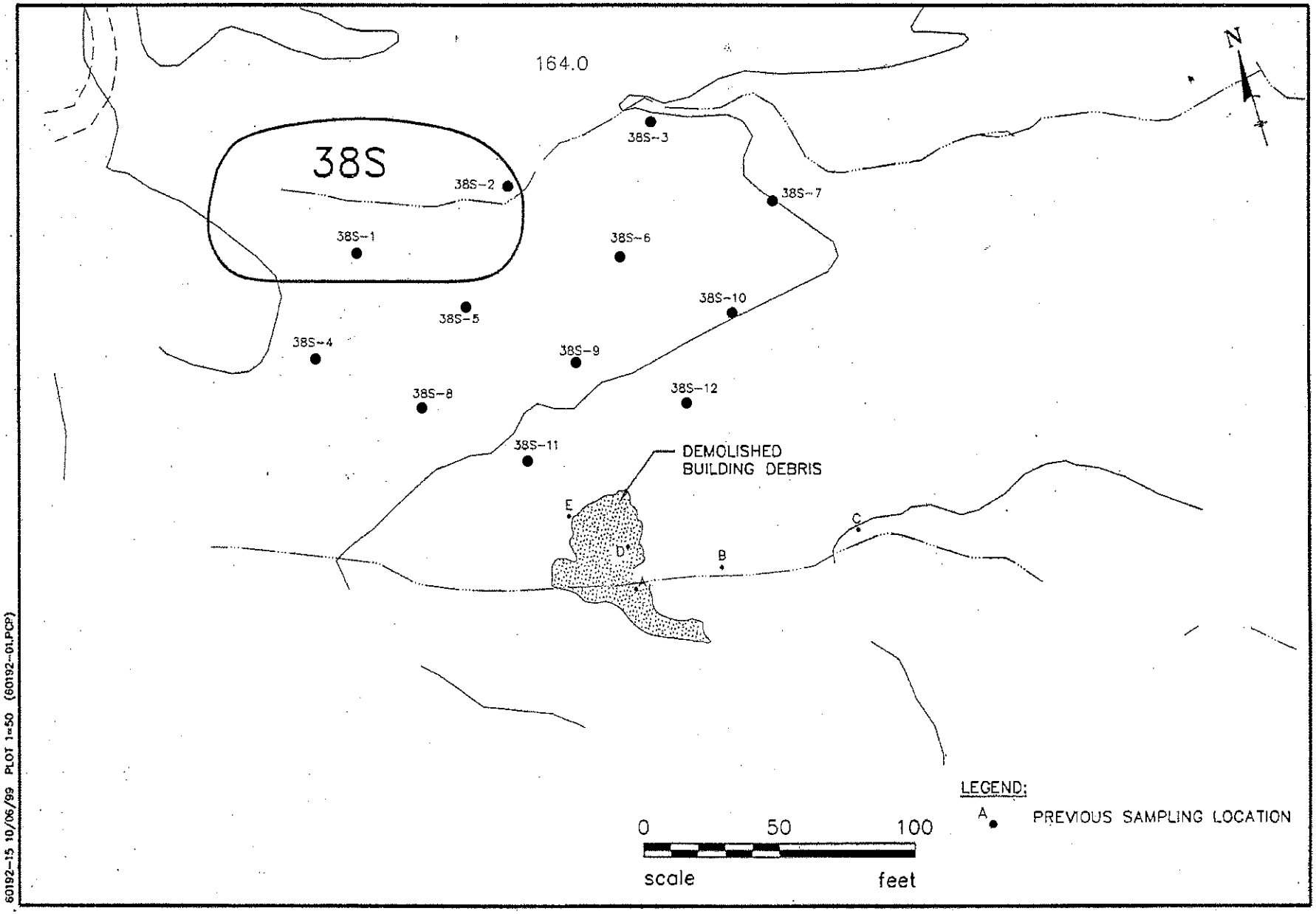
FIGURE 6-18
SWMU NO. 33



60192-14 10/06/99 PLOT 1=50 (60192-01.PCP)

BROWN AND CALDWELL

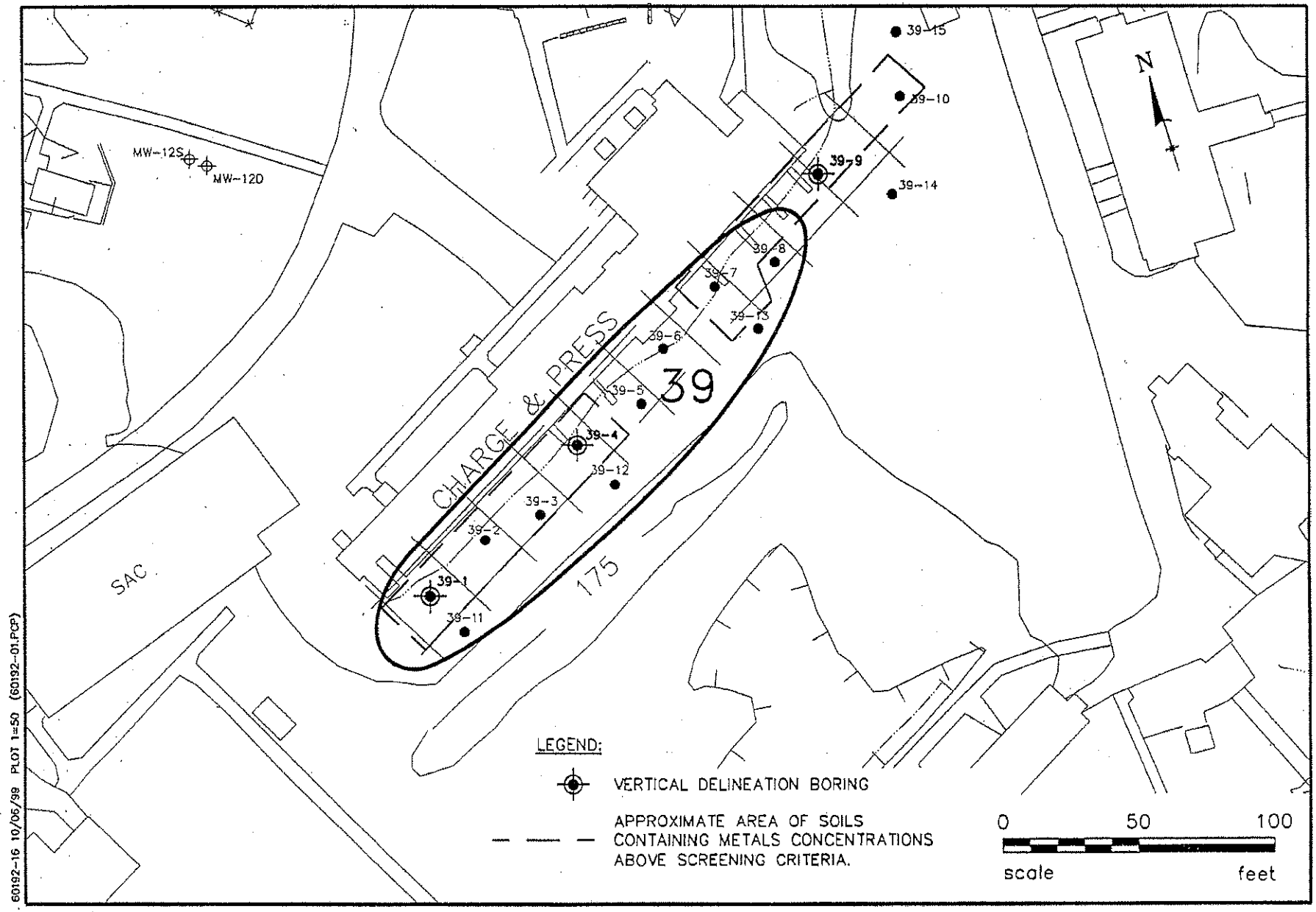
FIGURE 6-19
SWMU 34 & 38N



60192-15 10/06/99 PLOT 1=50 (60192-01.PCP)

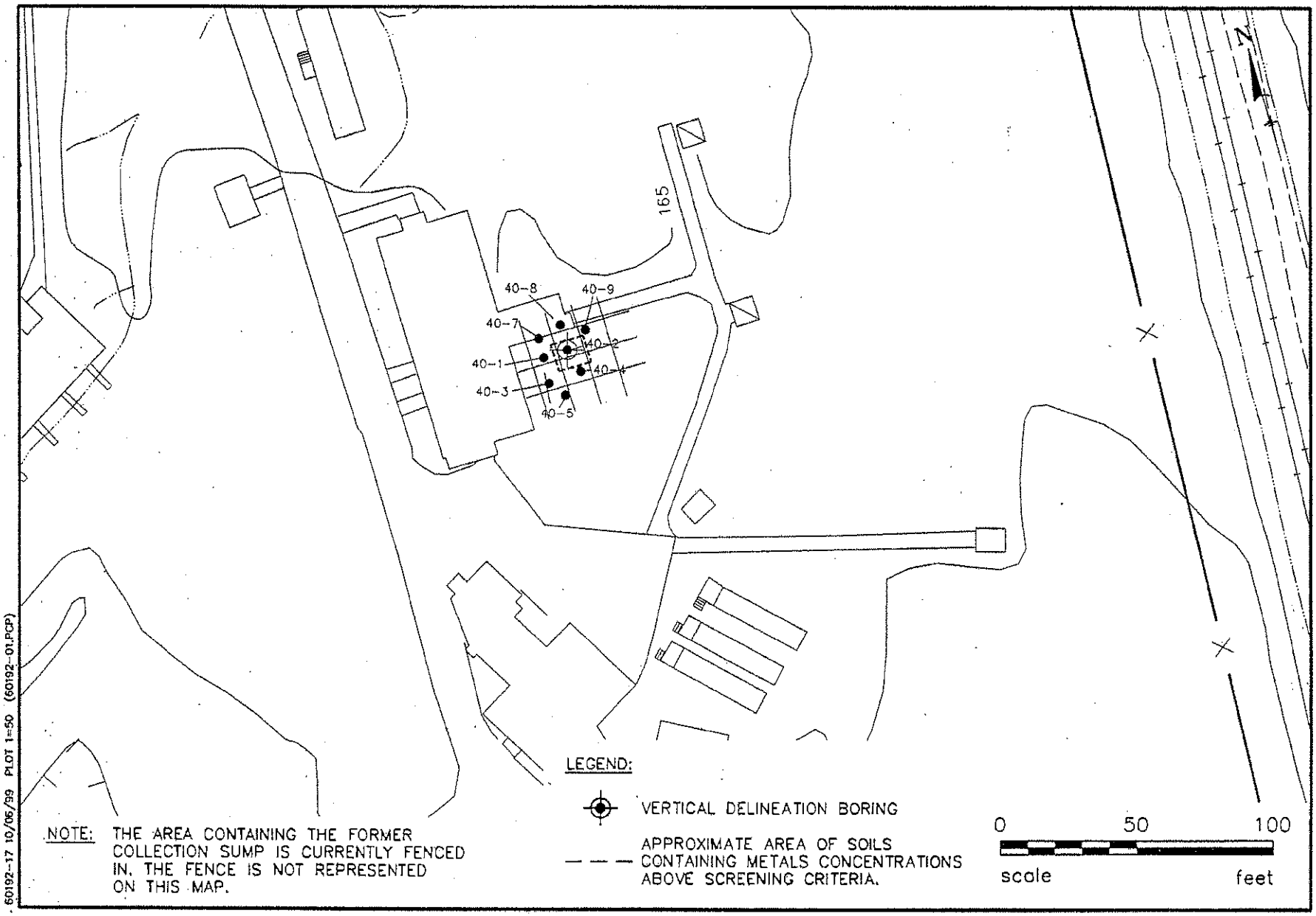
BROWN AND CALDWELL

FIGURE 6-20
SWMU NO. 38S



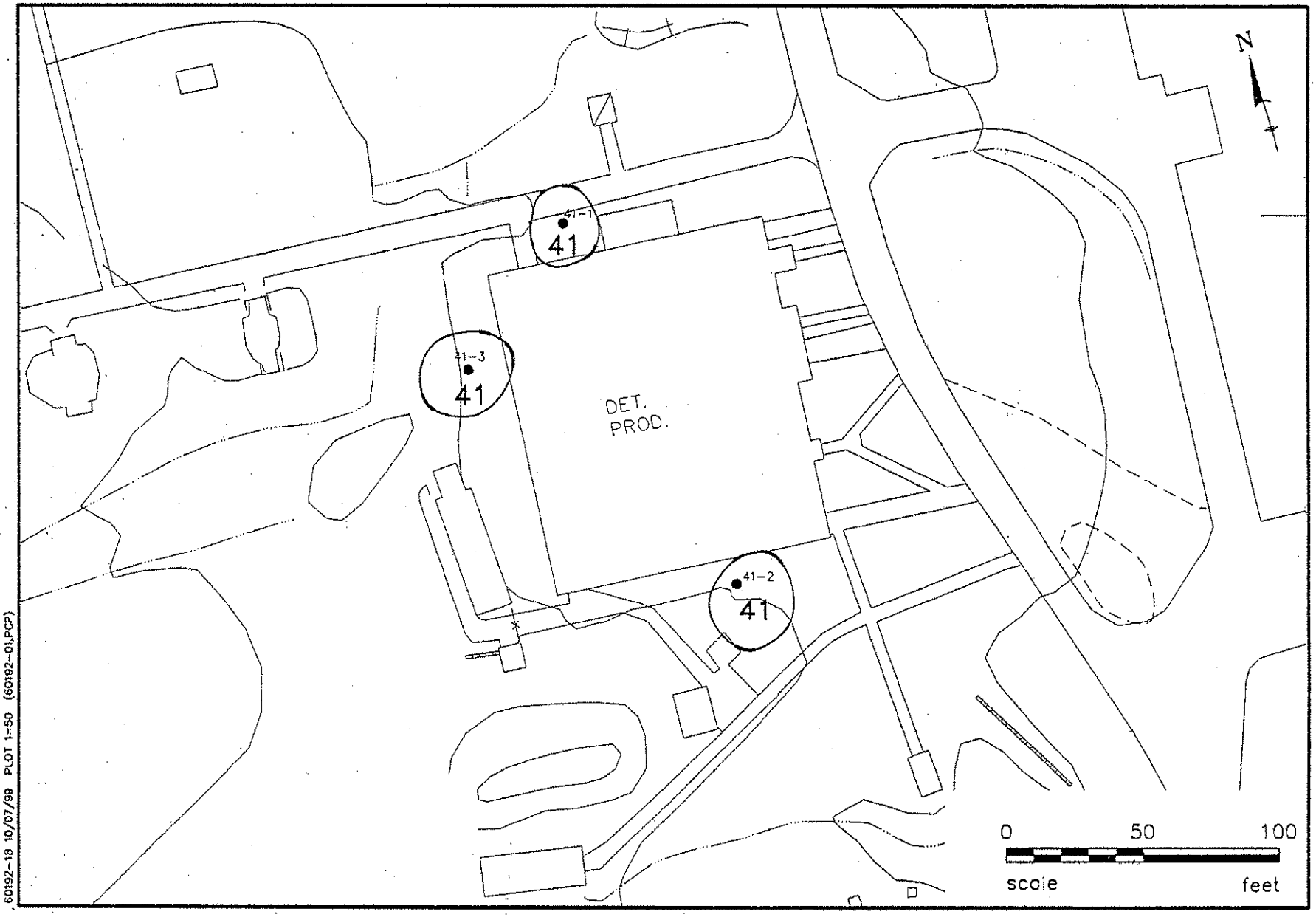
BROWN AND CALDWELL

FIGURE 6-21
SWMU NO. 39



BROWN AND CALDWELL

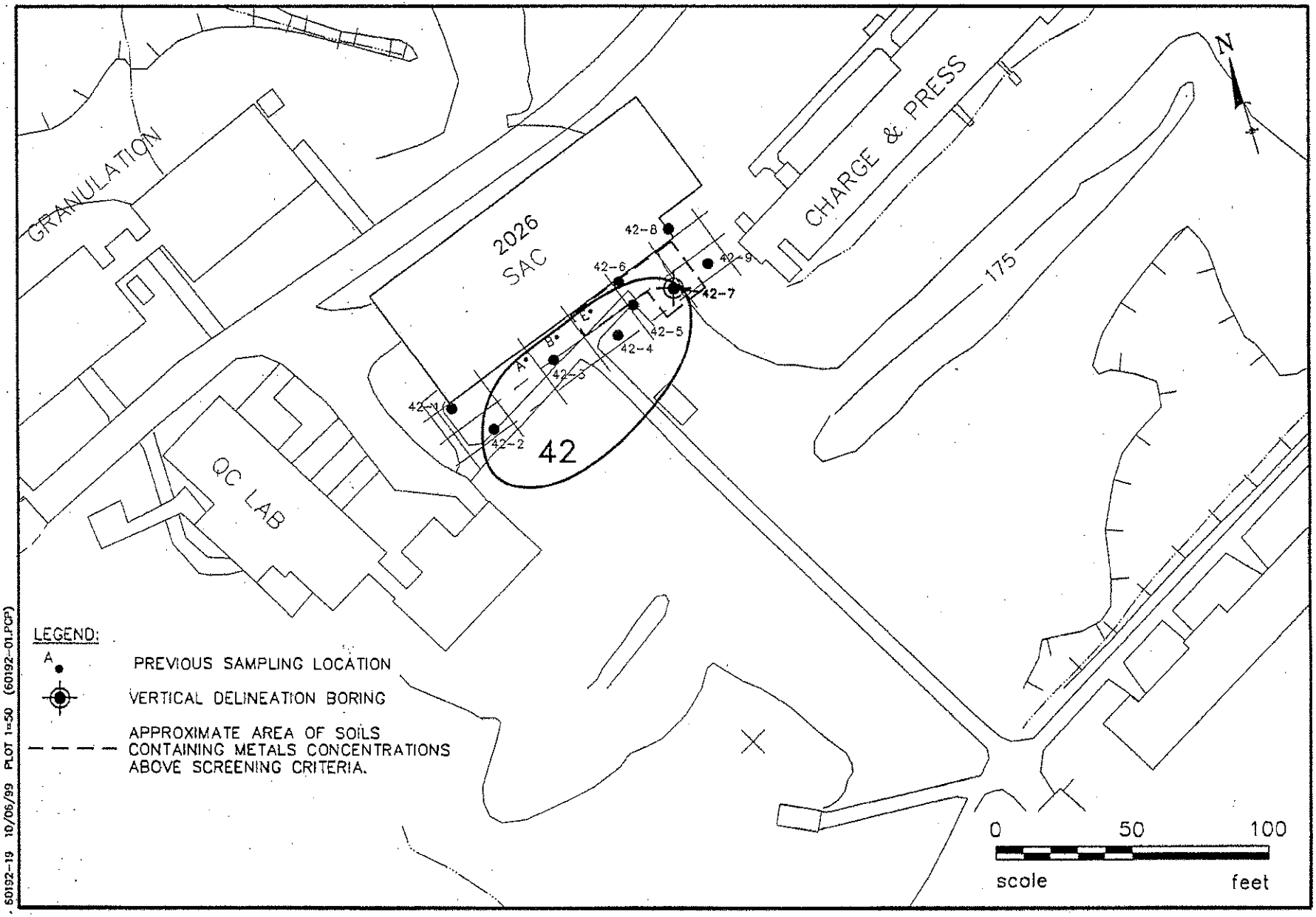
FIGURE 6-22
SWMU NO. 40



60192-18 10/07/99 PLOT 1=50 (60192-01.PCP)

BROWN AND CALDWELL

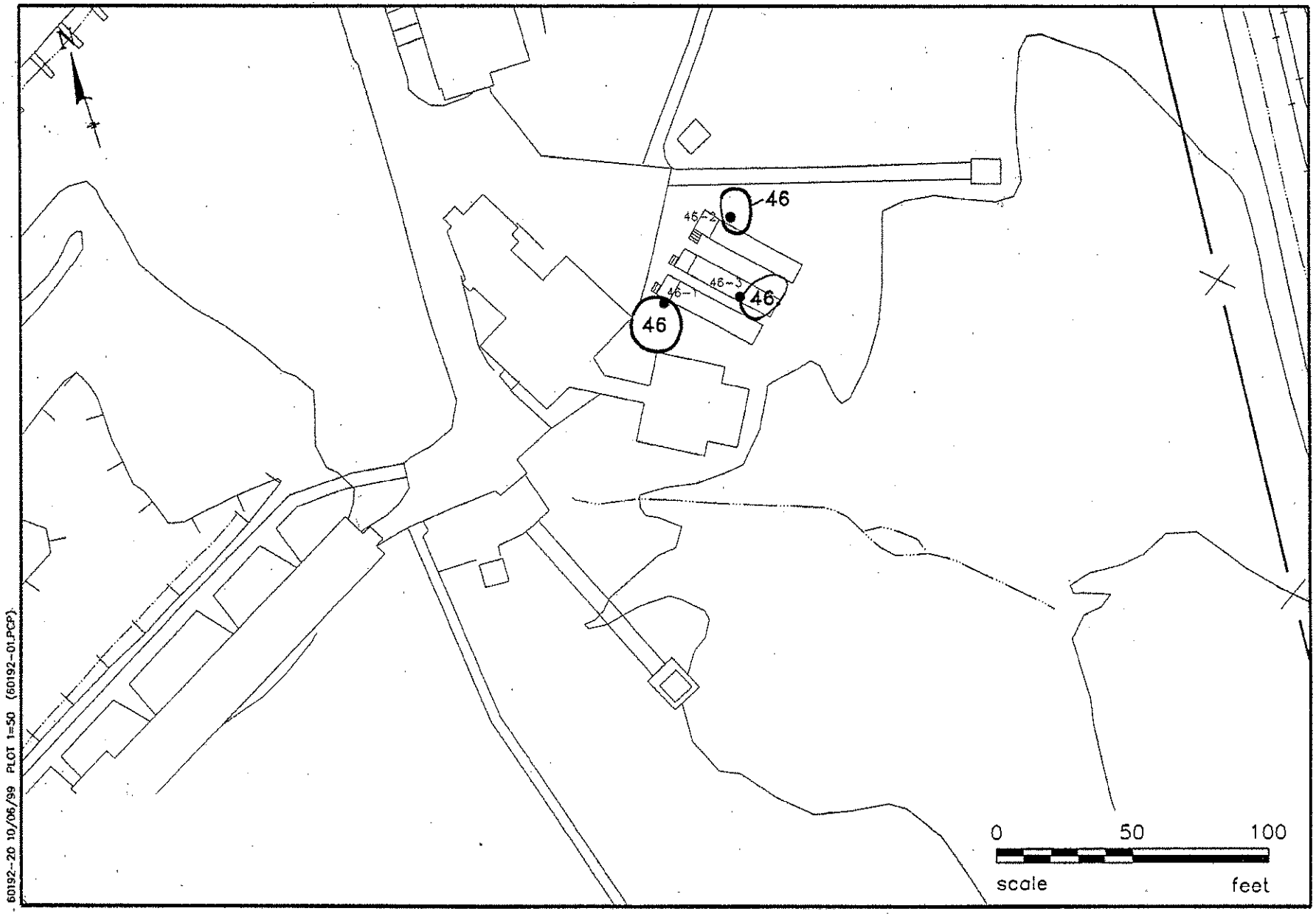
FIGURE 6-23
SWMU NO. 41



60192-19 10/06/99 PLOT 1=50 (60192-01.PCP)

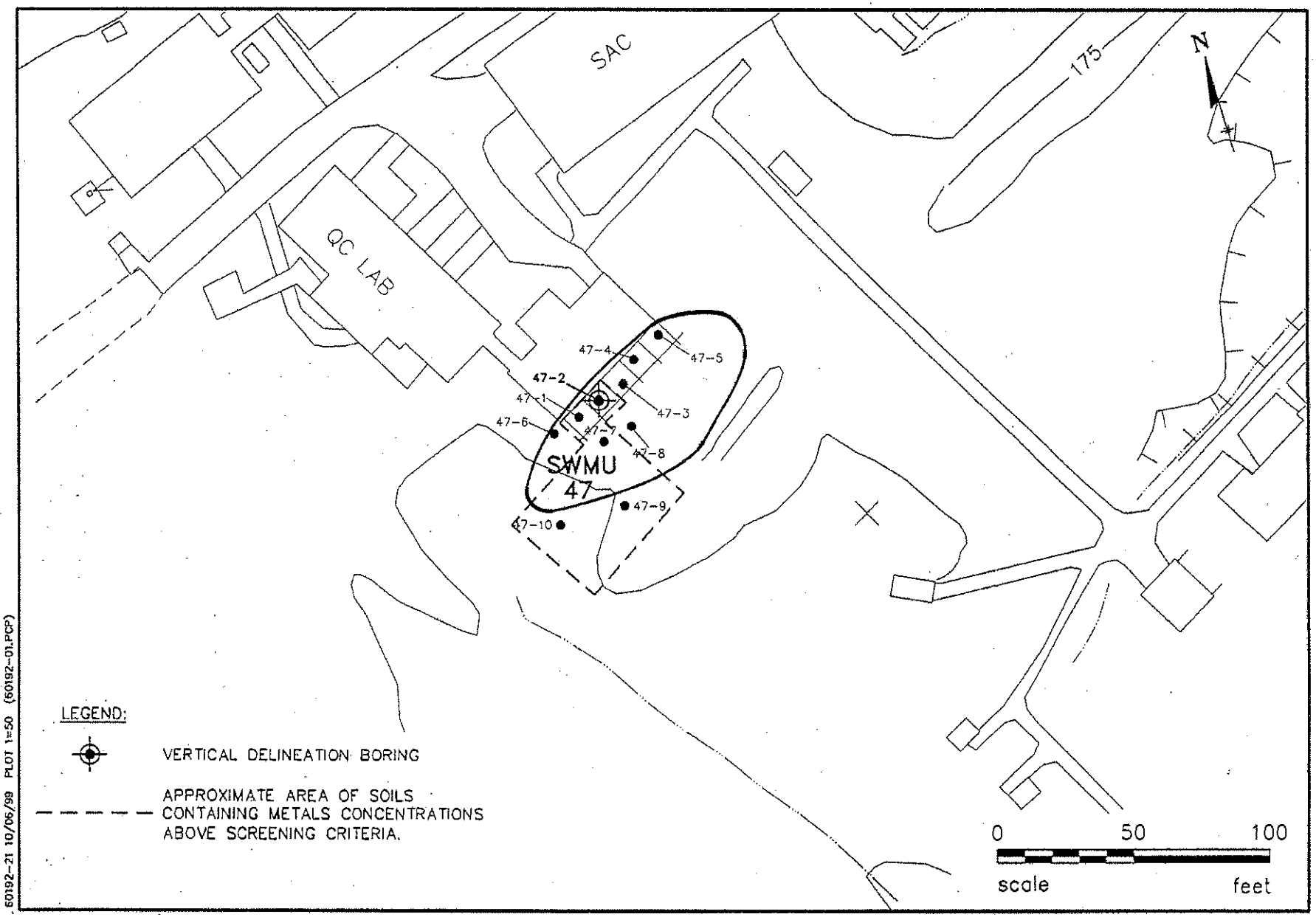
BROWN AND CALDWELL

FIGURE 6-24
SWMU NO. 42



BROWN AND CALDWELL

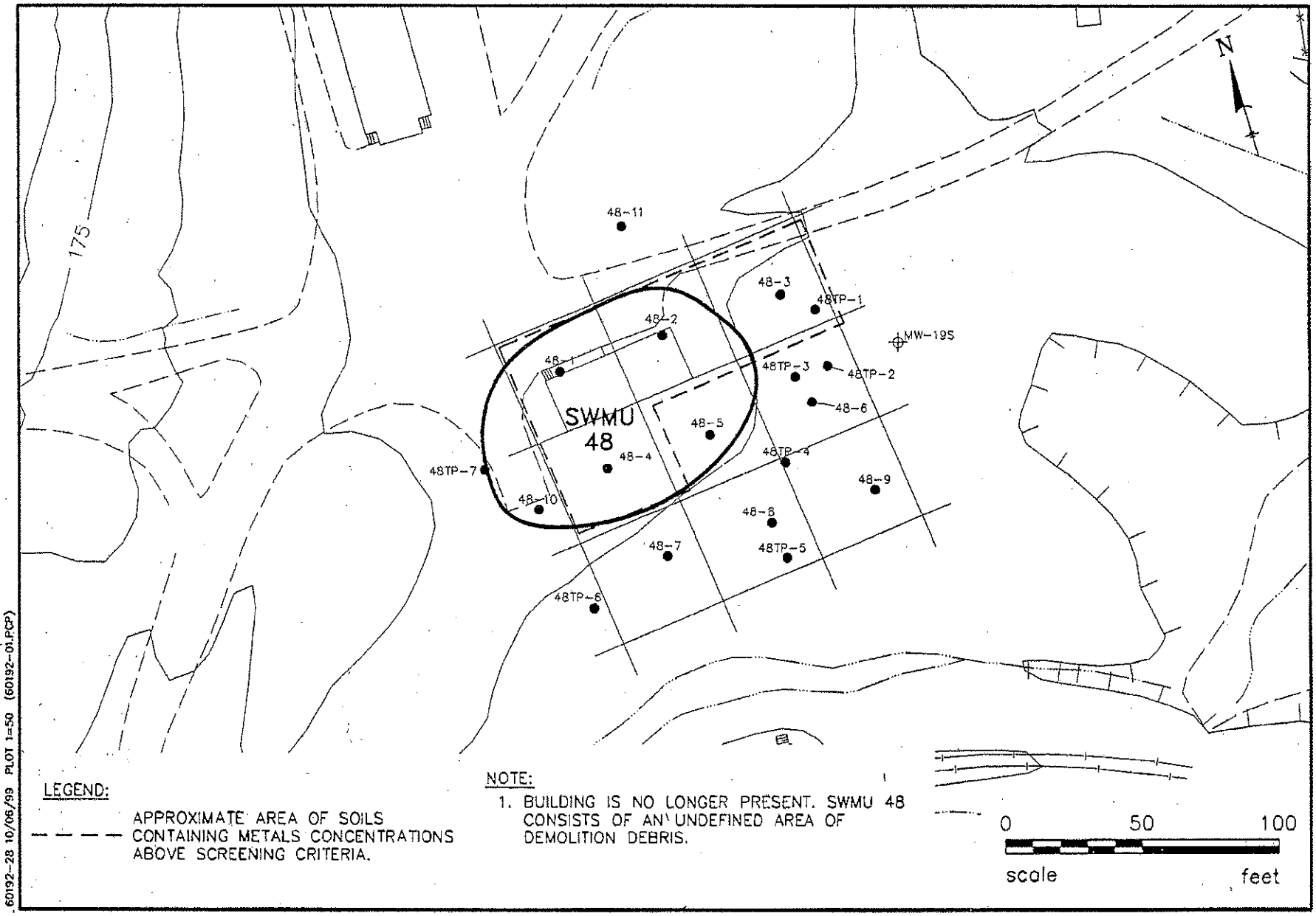
FIGURE 6-25
SWMU NO. 46



60192-21 10/06/99 PLOT 1=50 (60192-01.PCP)

BROWN AND CALDWELL

FIGURE 6-26
SWMU NO. 47



60192-28 10/06/99 PLOT 1=50 (60192-01.PCP)

BROWN AND CALDWELL

FIGURE 6-27
SWMU NO.48

7.0 SAMPLING AND ANALYTICAL QA/QC

In accordance with the work plan, sampling and analytical QA/QC included the collection of blind field duplicates and equipment/field blanks. These data are summarized in Table 7-1 and present the blind duplicate and its corresponding sample. As illustrated, the reported concentrations for the duplicate and its corresponding sample are generally in good agreement with variations accounted for by the inherent inhomogeneity of the collected soils and analytical variability. The field/equipment blanks indicate non-detectable levels of the analyzed constituents, which indicate that the sampling equipment decontamination procedures employed between samples were effective.

QA/QC measures in the laboratory during the first phase of soils sampling indicated matrix interference do to naturally occurring levels of yitrium, which is used as an internal standard. To avoid further matrix interference, many of the samples were analyzed at a 5X sample dilution. This reduced the yitrium levels to an insignificant level but maintained sufficiently low detection levels for the compounds of interest. This approach was approved by the department prior to the second phase of work.

TABLE 7-1
QA/QC ANALYTICAL RESULTS

SAMPLE LOCATION	SAMPLE DATE	Aluminum	Antimony	Arsenic	Barium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Potassium	Selenium	Silver	TPH	Zinc
DUP 091197	9/11/97									19 E	1.4			0.063 U		
33-11-1.0	9/11/97									20 E	0.11			0.062 U		
DUP 091297	9/12/97									55						
41-01-1.0	9/12/97									62						
DUP 091597	9/15/97	9800 E	0.37 U	6.5 E*	69	0.43	14 NE*	7.8 E	75	190 E	29	570 *	0.75 U	0.075 U		100 NE*
26E-03-1.0	9/15/97	12000 E	0.37 N	8.7 E*	77	0.27	16 NE*	10 E	57	140 E	17	780 *	2.1 N	0.068 U		84 NE*
DUP 091697	9/16/97	18000	0.31 U	10 N	64	0.12 U	24	10	31	18	0.12 U	1000	0.62 U	0.062 U		
46-02-1.0	9/16/97	19000	0.33 N	9.4 N	60	0.19 U	25	9	29	15	0.13 U	1400	0.63 U	0.063 U		61
DUP-011097	9/10/97	18000	0.3 U	8.2	100	0.34	24	17	27	18	0.066	1300	0.61 U	0.061 U		
48-09-1.0	9/10/97	19000	0.3 U	11	140	0.56	26	21	34	22	0.061 U	1300	0.61 U	0.061 U		83
DUP-021701	2/17/98		0.33 U	10	56	0.38	25		31 N	23	0.13 U		0.84	0.066 U		
01-12-1.0	2/17/98		0.32 U	6.3	80	0.44	18		29 N	34	0.41		0.89	0.065 U		110 N
DUP-042898	4/28/98												69			
32-04-1.0	4/28/98											28				
DUP-042998	4/29/98									8.4						
40-09-1.0	4/29/98								12 *							
DUP-042999	4/29/99										31					
10-23-1.0	4/29/99										160					
DUP-043098	4/30/98			9.6 N		9.6 *			350				5.4			
04-07-1.0	4/30/98			10		N			340				7.3			
DUP-050498	5/4/98								240 *							
48-11-1.0	5/4/98								120 *							
DUP-050698	5/6/98						27 N*						7.1			
42-07-1.0	9/13/97	16000	0.32 U	9 N	95	0.41	20	14 E	36	95 E	0.36	1500 *	12	0.065 U		74 E
DUP-050898	5/8/98												3.1	U		
39-15-1.0	5/8/98												3.1	U		
DUP-061198	6/11/98		28 N	9	960 *	6.1	210 *		9600	11000	2.4		1600	5.7		
01-01- 8.5	6/11/98		23 N				240 *		6200 *	12000 *			1800 *			
DUP-061198A	6/11/98		1.6 U	9.7	85 *	0.32 U	22 *		51	69	0.063 U		12	0.32 U		
01-04- 6.0	6/11/98		1.6 U	11	83 *	0.32 U	25 *		45	28	0.063 U		1.6	0.32 U		86
DUP-090897	9/8/97	20000	0.55 N	14	270	3	26	15 E	14000	380 E	52	1600	10	E* 0.32		
22-01-1.0	9/8/97	28000	0.73 N	19 *	370 N*	4.4	29	18	21000	440 *	58	2400 E*	18	0.48 *		4000
DUP-091097	9/10/97	15000	0.3 U	7	76	0.23	20	12 E	150	91 E	1.8	710	24	E* 0.061 U		
26E-01-1.0	9/15/97	17000 E	0.31 U	7.6 E*	68	0.098	21 NE*	16 E	18	23 E	1	1100 *	0.63	U 0.063 U		58 NE*
DUP-091697	9/16/97	23000	0.41 N	10 N	100	0.13 U	29	12	35	19	0.17	2300	0.73	N 0.063 U		
21-03-1.0	9/16/97	20000 E	0.32 U	10 E*	87	0.19	27 NE*	9.8 E	32	16 E	0.064 U	1400 *	0.84	N 0.064 U		66 NE*
DUP-091697	9/17/97	19000	0.32 U	21 N	170	1.8	25	11	22	32 E	44	1300 *	1.6	N 0.065 U		
29-01-1.0 -	9/17/97	14000	0.36 N	14 N	140	1.5	19	11	26	61	140	730	3.2	N 0.065 U		660
DUP-091897	9/18/97	15000	0.3 U	10 N	120	0.06 U	22	13	120	22 E	1.4 N	1300 *	2.8	N 0.06 U		
26D-03-1.0	9/18/97	14000	0.39	8.5 N	88 0		18	13	200	40 E	1.2	1700 *	4.4	N 0.057 U		67 E
DUP-102098-1	10/20/98		1.4 U	6.6	130	0.29 U	18 N*		30	24	0.13		5.5			
06-30-1.0	10/20/98		1.5 U		110		15 N*			17	0.058 U	3				
DUP-102198	10/21/98		1.6 U	9.3	94 N	0.32 U	25 N		32	220	140		1.6	U		
13-21-1.0	10/21/98										150					
DUP-102298	10/22/98		1.4 U	8.2	43	0.27 U	15 N		15 N	14	30		1.4	U		
33-17-1.0	10/22/98										63					

TABLE 7-1
QA/QC ANALYTICAL RESULTS

SAMPLE LOCATION	SAMPLE DATE	Aluminum		Antimony		Arsenic		Barium		Cadmium		Chromium		Cobalt		Copper		Lead		Mercury		Potassium		Selenium		Silver		TPH		Zinc	
Dup-102398	10/23/98			4.2	U			330		0.87						3300	N	260		12				14							
22-22-1.0	10/23/98			4.8	U			570		2.5						5400	N	550		22				18							
DUP090597	9/5/97	17000	E	0.29	U	10		81		7		21		16		170	N	31		0.095		1700		4.8		0.057	U				
02-04-1.0	9/5/97	15000	E	0.29	U	9.4		110		9.8		20		12		280	N	46		0.19		1400		3.9		0.058	U	78	U	84	
DUP090997	9/9/97	18000	N*	0.31	U	4.7		110		0.19		20	N	11	E	14		17	E	0.13		1300	*	0.63	U	0.063	U				
23-08-1.0	9/9/97	20000	N*	0.32	U	5		140		0.27		22	N	12	E	18		23	E	0.082		1100	*	0.63	U	0.063	U			74	NE*
DUP091397	9/13/97	20000		0.31	U	10		140		0.49		29		15		32		19	E	0.062	U	1900		0.62	U	0.062	U				
39-10-1.0	9/13/97	20000		0.31	U	9.7		140	0	28	15		35	19	E	0.083		1600		0.63	U	0.099		90							
EB 090897	9/8/97	50	U	5	U	7.	U	3	U	1	U	5	U	1	U	4	U	5	U	0.2	U	1	U	5	U	1	U			28	
EB 090997	9/9/97	50	U	5	U	7	U	3	U	1	U	5	U	1	U	4	U	5	U	0.2	U	1	U	5	U	1	U			20	U
EB 091197	9/11/97	50	U	5	U	7	U	3	U	1	U	5	U	1	U	4	U	5	U	0.2	U	1	U	5	U	1	U			20	U
EB 091297	9/12/97			5	U	7	U	3	U	1	U	5	U	1	U	4	U	5	U	0.2	U	1	U	5	U	1	U			20	U
EB 091597	9/15/97	50	U	5	U	7	U	3	U	1	U	5	U	1	U	4	U	5	U	0.2	U	1	U	5	U	1	U			20	U
EB-021798	2/17/98			5	U	7	U	3	U	1	U	5	U			4	U	5	U	0.2	U			10	U	1	U				
EB-042898	4/28/98																			0.2	U			10	U						
EB-042998	4/29/98			5	U			3	U	1	U	5	U			4	U	5	U	0.2	U			10	U						
EB-042999	4/29/99			10	U			5	U	1	U	5	U			5	U	5	U	0.2	U			5	U	1	U				
EB-043098	4/30/98					7	U			1	U					4	U	5	U	0.2	U			10	U						
EB-050198	5/1/98			5	U			3	U			5	U					5	U	0.2	U			10	U						
EB-050498	5/4/98			5	U	7	U	3	U			5	U			4	U	5	U	0.2	U			10	U						
EB-050698	5/6/98			5	U					1	U	5	U			4	U	5	U	0.2	U			10	U	1	U			20	U
EB-090597	9/5/97	50	U	5	U	7	U	3	U	1	U	5	U	1	U	4	U	5	U	0.2	U	1	U	5	U	1	U			20	U
EB-091097	9/10/97	50	U	5	U	7	U	3	U	1	U	5	U	1	U	4	U	5	U	0.2	U	1	U	5	U	1	U			20	U
EB-091697	9/16/97	50	U	5	U	7	U	3	U	1	U	5	U	1	U	4	U	5	U	0.2	U	1	U	5	U	1	U			20	U
EB-091797	9/17/97	50	U	5	U	7	U	3	U	1	U	5	U	1	U	4	U	5	U	0.2	U	1	U	5	U	1	U			23	
EB-091897	9/18/97	50	U	5	U	7	U	3	U	1	U	20		1	U	4	U	5	U	0.2	U	1	U	5	U	1	U				
EQ Blank 71299	7/13/99			10	U	5	U	5	U	1	U	5	U			5	U	5	U	0.2	U			5	U						
EQ Blank 7199	7/1/99			10	U	5	U	5	U	1	U	5	U			5	U	5	U	0.2	U			5	U						
EQ Blank 7699	7/6/99			10	U	5	U	5	U	1	U	5	U			5	U	5	U	0.2	U			5	U						
EQ-102398	10/23/98			5	U			3	U	1	U					4	U	5	U	0.2	U			5	U					20	U
FB 091197	9/11/97	50	U	5	U	7	U	3	U	1	U	5	U	1	U	4	U	5	U	0.2	U	1	U	5	U	1	U			20	U
FB 091297	9/12/97	50	U	5	U	7	U	3	U	1	U	5	U	1	U	4	U	5	U	0.2	U	1	U	5	U	1	U				

Notes: See following page for definition of Qualifiers.
Duplicate analysis referenced on following page refers to internal laboratory duplicates not the field duplicates tabulated above.

ANALYTICAL REPORT NOTES, TERMS AND QUALIFIERS (INORGANIC)

Notes:

The metals and cyanide reporting limits (RLs) have been statistically determined to be no less than three standard deviations as defined in 40 CFR 136, Appendix B, Revision 1.11. All other reporting limits are referenced from the specific analytical method.

Terms:

NA	Not Applicable
NR	Not Requested
U	Below Reporting Limits

Qualifiers:

B	The reported value is less than the practical quantitation limit (PQL, project defined) but greater than or equal to the RL.
E	The reported value is estimated due to the presence of matrix interference.
N	Predigested spike recovery not within control limits.
W	Post digestion spike recovery not within control limits.
*	RPD or absolute difference for Duplicate analysis not within control limits.
**	Reference Standard Methods 19th edition.
(1)	pH analyzed outside USEPA specified holding time. pH must be measured immediately after sample collection.
(2)	The sample pH did not meet the preservation guidelines. Therefore the pH was adjusted upon receipt.
(3)	The sample had to be diluted because of matrix interferences.
(4)	Reference Standard Methods 17th edition for the distillation method.
(5)	The sample was analyzed out of the USEPA holding time.
(6)	The sample was received in the laboratory out of the USEPA holding time.
(7)	The shipping cooler temperature exceeded 6°C upon receipt to Eckenfelder Laboratory, LLC.
(8)	When the concentration of the analyte is below the detection limit, the detection limit must be divided by the %Solids (in decimal form) in order to obtain the sample's true detection limit on a dry weight basis.
(9)	Analysis was subcontracted

8.0 SUMMARY AND CONCLUSIONS

The work completed to date, related to the RCRA program, consists of the Groundwater Investigation which addressed the site wide groundwater flow, groundwater quality, and hydrogeology, the Interim Corrective Measures for Explosives, which addressed potential explosive concerns at selected SWMUs, and most recently the RFI, reported herein. In addition, one aspect of the Groundwater Investigation Report was to identify groundwater and surface water use within a one-mile radius of the site. This information was used to identify potential impacts to human health associated with a release from the facility.

The Groundwater Investigation indicates that the active portions of the facility are underlain by a thick sequence of low permeability silt and clay. The only portions of the site where these silt and clay deposits are not present is in the undeveloped area on the western side of the property associated with step side slopes of Hussey Hill. Groundwater flow at the site is controlled by the large wetlands area, which represents a groundwater discharge point in the center of the topographic valley east of the facility. Therefore, groundwater beneath the site flows generally to the east before discharging to the wetlands, which represent the headwaters to an unnamed tributary of Plantasie Creek.

Water quality data collected from wells located throughout the facility indicate that there is a wide range in metals concentrations as determined from either filtered or unfiltered samples. This is a result of the collection of water samples from the low permeability silt and clay deposits and the resulting turbidity of the samples. As discussed in the Groundwater Investigation Report, the unfiltered samples were turbid even though low flow purging techniques were used to collect the samples. This turbidity resulted in metals concentrations that are not representative of surrounding groundwater. As a result, with the exception of mercury and silver, the total metals concentrations exceed groundwater standards throughout the facility. The filtered samples, however, indicate exceedances only for barium and selenium at a few selected locations immediately downgradient of individual SWMUs.

The organic analytical data confirm the presence of TCE and its related compounds in the vicinity of the Shell Plant (SWMUs 24, 30, and 37) at concentrations above MCLs. However, wells and HydroPunch sampling downgradient of these SWMUs did not detect the presence of volatile organics. Scattered volatile organic compounds were also noted at other wells located at a few locations across the facility. However, the reported values were estimates below both their respective PQLs and MCLs.

The cumulative data thus indicate that with the exception of SWMUs 24, 30, and 37 (i.e., the Shell Plant area) there are only minor exceedances of water quality standards for barium and selenium at a few selected SWMUs. These exceedances, however, are found in wells immediately downgradient of the specific SWMU and do not represent a site wide impact. The data also indicate that even where MCLs are exceeded adjacent to the Shell Plant, there are no detectable levels of organics downgradient of the SWMU or east of the Conrail tracks.

These data clearly indicate that the low permeability silt and clay deposits have attenuated potential releases throughout the facility such that there are no documented groundwater impacts any appreciable distance from the SWMUs or AOCs. This also indicates that any exceedances of water quality standards are within the facility property boundaries. Furthermore, the potential receptors evaluation presented in the Groundwater Investigation Report indicates that groundwater use around the site is upgradient of the facility. Given the above, there is little possibility and no evidence for groundwater related health concerns to neighboring residents.

The soils data indicate that there are exceedances of the inorganic screening criteria for soils associated with 28 individual SWMU or AOC locations, three SWMUs within one area with volatile organics in both soils and groundwater, eight areas at which there were no exceedances detected and three areas where no exceedances were detected but the areas contain former waste piles that will be evaluated further as part of the CMS. Those locations to be evaluated under the CMS are summarized in Table 8-1. The collected data further indicate that with some exceptions, metals concentrations exceeding the

screening criteria are limited to the upper one foot of soil. Metals concentrations below this depth are shown to typically decrease significantly as the metals are attenuated by the silt and clay soils. Concentrations above the screening criteria are however, noted at several locations. Most notably, these include SWMU 1, as well as the former burning areas (SWMUs 2 through 8, AOCs A and B). Concentrations in the center of the former detonation pond (SWMU No. 1) are documented above screening levels as deep as 12 feet below the water surface while concentrations above screening levels in the former burning areas is recorded to depths of 6 feet below the ground surface.

As noted in Section 1.0, exceedance of the screening criteria, which are based upon conservative assumptions, indicates that these areas warrant further evaluation as part of the CMS, not that corrective action is necessarily required. This is particularly true in that all of the SWMUs and AOCs located within the active portion of the facility are in areas that require employees, for safety reasons, to traverse the site only on designated walkways which are paved or consist of concrete sidewalks. Furthermore, the site has 24-hour security, is completely fenced, and any visitors must be accompanied by an employee. Given the above, and that potential explosive concerns were addressed by the Interim Corrective Measures, there is little if any risk of human exposure associated with these locations.

The site conditions would also suggest that a site specific risk analysis would be appropriate for SWMUs 1 and 22. These locations are located outside the active area of the facility. However, these areas consist of dense reeds and wetlands through which access is very difficult and is surrounded by undeveloped property. Given the above, and that the screening criteria are developed using conservative assumptions, a site specific risk analysis may also indicate that these areas do not pose a significant human health risk.

In summary, the work completed to date indicates the presence of SWMUs and/or AOCs that contain concentrations of inorganic or organic constituents above the established screening criteria. However, the collected data indicate that the exceedances of the

screening criteria are typically limited to the proximity of the individual locations and there is no evidence to suggest the presence of site wide impacts. Furthermore, the low permeability silt and clay deposits underlying the site, coupled with the discharge area represented by the wetlands in the center of the topographic valley, significantly limit the potential for contaminant migration beyond the facility boundaries. As also noted, the screening criteria represent values determined on the basis of very conservative assumptions. Therefore, the risk associated with these locations and the need for corrective actions is yet to be determined and will be addressed as part of the CMS.

8.1 RECOMMENDATIONS

As noted above, the collected data indicates that exceedance of water and soil quality criteria are limited to the vicinity of the individual SWMUs and there are no exceedances beyond the property limits. In addition, the activities associated with the releases at the SWMUs have been discontinued, and the low permeability soils are acting to attenuate any further migration. Furthermore, those areas documented to contain soil or groundwater concentrations above applicable criteria will be evaluated as part of the CMS (Table 8-1). Never the less, it is recommended that an annual monitoring plan be implemented to document that conditions have stabilized and that there are no unexpected migration of contaminants occurring. To this end, we recommend the collection of semi-annual groundwater samples from the following locations:

Location	Analytes	Location	Analytes
MW-21D	TCL Volatile Organics	MW-2B	TCL Metals (Total and Filtered)
MW-21R	TCL Volatile Organics	MW-15S	TCL Metals (Total and Filtered)
MW-22D	TCL Volatile Organics	MW-15D	TCL Metals (Total and Filtered)
MW-22R	TCL Volatile Organics	MW-16S	TCL Metals (Total and Filtered)
Surface water sampling point at property boundary			TCL Metals (Total and Filtered)

The wells listed above are located at the downgradient boundary of SWMUs known to have at least a limited impact upon groundwater quality while the surface water sampling

point will represent the water quality of surface water leaving the site. The selected analytical parameters are based upon the analytical results obtained at the individual SWMUs while the recommendation for semi-annual sampling is based upon the slow groundwater travel times related to the low permeability soils. Purging and sampling of the wells will be conducted using Low Flow sampling techniques previously approved for this site and samples collected for metals analysis will be both field filtered and total in order to obtain a representative sample. Upon approval by the Agency, the recommended semi-annual monitoring program will continue until changes are recommended as part of corrective measures.

TABLE 8-1

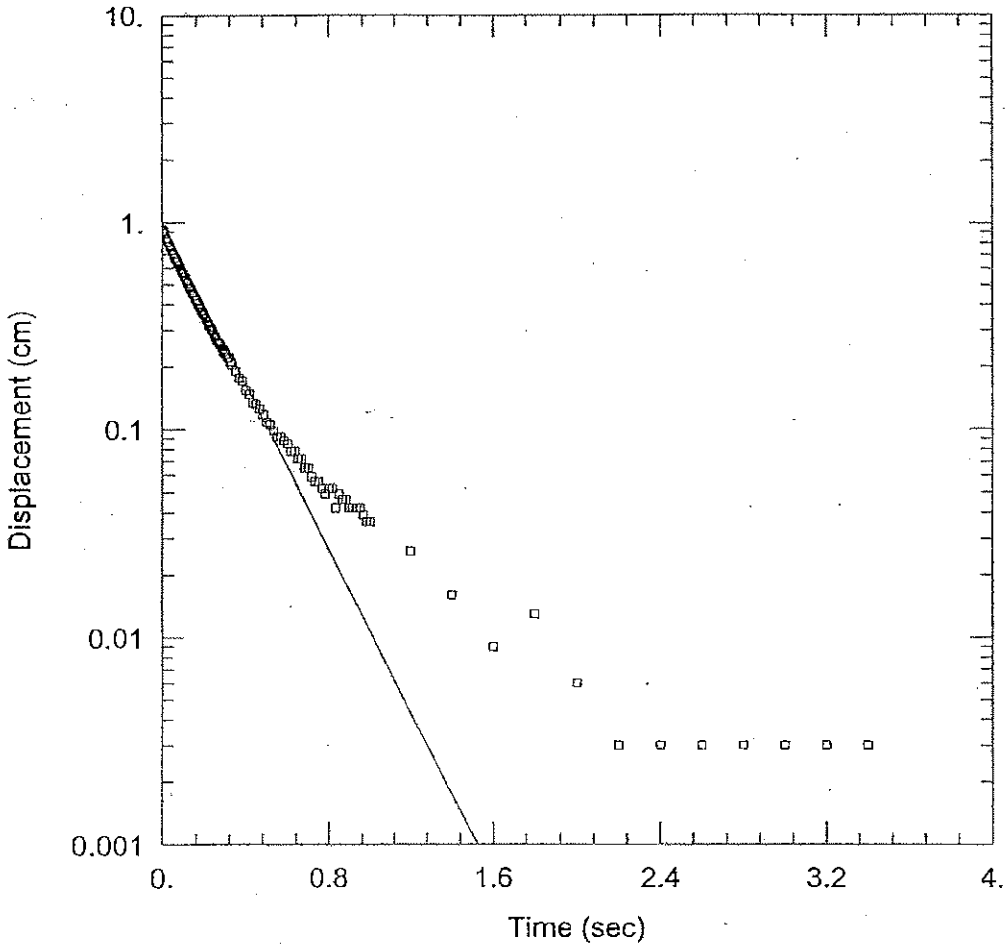
SWMUs AND AOCs TO BE INVESTIGATED IN THE CMS

SWMU No.	SWMU Name
1	Shooting Pond
2	Burning Cage/Incinerator
3	Copper Wire Burning Area
4	Iron Wire Burning Area
5	Wire Burning Area III
6-7	Open Burning Pads
8	Former Burning Area
9	Waste Powder Catch Basins - Building 2037
10	Waste Powder Catch Basins - Building 2048
11	Waste Powder Catch Basins - Building 2049
13	Former Waste Powder Catch Basins - Lead Azide Building
21	Lead Recycling Unit Area
22	Former Landfill
23	Former Dump
24	Former Wastewater Treatment Facility
26D, E, & G	Burnable Waste Satellite Accumulation Areas (3 locations)
29	Drainage ditch (Downgrade of Building 2049)
30	Drainage Ditch (Downgrade of Building 2036)
32	Old Dump (near water tower)
33	Mercury Fulminate Tanks Area
35	Stone Fence Dump
37	Shell Plant Drum Storage Area
39	Former Wash Water Discharge Area - Building 2009
40	Pilot Line Condensate Collection Sump
42	SAC Building Steam Collection Containers
47	Building 2058 Fuse Room
48	Mercury Fulminate Area

AOC	AOC Name
A	Kerosene Tank Leak
B	Open Burning Pads Area
C	Open Detonation Pit
D	Detonation Test Building

APPENDIX A

SLUG TEST RESULTS
(WELLS COMPLETED DURING RFI)



MW-20D

Data Set: P:\HYDRO\DYNO\SLUG\MW-20d.aqt
Date: 10/07/99 Time: 09:51:20

PROJECT INFORMATION

Company: Brown & Cladwell
Client: Dyno Nobel
Project: 60192
Test Location: Port Ewen, NY
Test Well: MW-20d

AQUIFER DATA

Saturated Thickness: 10. cm Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-20d)

Initial Displacement: 0.927 cm Water Column Height: 1339. cm
Casing Radius: 5. cm Wellbore Radius: 15. cm
Screen Length: 335.3 cm

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 0.5244 cm/sec y0 = 1. cm

TABLE 6-15
INORGANIC PARAMETERS EXCEEDING SCREENING CRITERIA
AOC B (SWMU 6, 7 & 8)
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum	Antimony	Barium	Chromium	Lead	Mercury	Potassium	Selenium	TPH
06-25-1.0	5/4/98								110 *	
06-27-1.0	10/20/98								7.9	
06-28-1.0	10/20/98								11	
06-29-1.0	10/20/98								25	
06-31-1.0	10/20/98								230	
06-34-1.0	10/21/98								100	
06-35-1.0	10/21/98								35	
06-36-1.0	10/21/98					1000			930	
06-36 4-6	7/15/99								6.1	
06-37-1.0	10/21/98								13	

TABLE 6-16
INORGANIC PARAMETERS EXCEEDING SCREENING CRITERIA
SWMU No. 32
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Selenium	
Screening Conc.		5	
32-01-1.0	9/4/97	32	E
32-04-1.0	9/4/97	160	E*
32-04-1.0	4/28/98	28	

TABLE 6-17
DETECTED BASE NEUTRAL COMPOUNDS
AOC B (SWMU 6, 7 8)

SAMP_ID	SAMP_DATE	2-Methylnaphthalene		Naphthalene	
06-07-1.0	10/20/98	130	J	100	J
06-09-1.0	10/20/98	79	J	88	J
06-10-1.0	10/20/98	160	J		

TABLE 6-18
TCL VOLATILE ORGANICS
ANALYTICAL SUMMARY FOR WELL MW-1
(All values in ppb)

SAMPLE NAME	MW- 1		MW- 1	
SAMPLE DATE	9/12/95		10/21/97	
1,1,1-Trichloroethane	1	U	1	U
1,1,2,2-Tetrachloroethane	1	U	1	U
1,1,2-Trichloroethane	1	U	1	U
1,1-Dichloroethane	1	U	1	U
1,1-Dichloroethene	1	U	1	U
1,2-Dichloroethane	1	U	1	U
1,2-Dichloropropane	1	U	1	U
2-Butanone	10	U	10	U
2-Hexanone	2	U	2	U
4-Methyl-2-pentanone	2	U	2	U
Acetone	5	U	5	U
Benzene	1	U	1	U
Bromodichloromethane	1	U	1	U
Bromoform	1	U	1	U
Bromomethane	2	U	2	U
Carbon disulfide	1	U	1	U
Carbon tetrachloride	1	U	1	U
Chlorobenzene	1	U	1	U
Chloroethane	2	U	2	U
Chloroform	1	U	1	U
Chloromethane	2	U	2	U
cis-1,3-Dichloropropene	1	U	1	U
Dibromochloromethane	1	U	1	U
Ethylbenzene	1	U	1	U
Methylene chloride	1	J	1	U
Styrene	1	U	1	U
Tetrachloroethene	1	U	1	U
Toluene	1	U	1	U
trans-1,3-Dichloropropene	1	U	1	U
Trichloroethene	1	U	1.8	J
Vinyl chloride	2	U	2	U
Xylene (total)	1	U	1	U

TABLE 6-19
INORGANIC SAMPLING RESULTS
SWMU NO. 9
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum	Antimony		Arsenic	Barium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury		Potassium	Selenium		Silver		Zinc
09-01-1.0	9/12/97	13000	0.32	U	6	91	0.36	16	12	23	30	25		630	1.2	N	0.063	U	78
09-02-1.0	9/12/97	15000	0.28	U	8.4	59	0.35	20	12	35	15	0.75		1700	0.56	U	0.056	U	76
09-03-1.0	9/12/97	10000	0.31	U	7.4	47	0.24	14	9.2	25	12	0.84		1000	0.62	U	0.062	U	59
09-04-1.0	9/12/97	14000	0.31	U	9.3	100	0.3	20	13	27	17	0.52		1200	0.62	U	0.062	U	94
09-05-1.0	9/12/97	15000	0.3	U	8.1	93	0.27	20	15	25	18	1.4		900	0.6	U	0.06	U	66
09-06-1.0	9/12/97	16000	0.3	U	6.1	86	0.17	21	18	25	18	14		1000	0.6	U	0.06	U	63
09-07-1.0	9/12/97	19000	3.2	U	6.1	110	0.36	20	13	24	49	110		1100	1.7	N	0.065	U	94
09-07 2-4	7/12/99											49							
09-07 4-6	7/12/99											0.063	U						
09-08-1.0	9/12/97	9100	0.32	U	4.2	50	0.18	11	7.6	14	14	2.8		480	0.63	U	0.063	U	43
09-09-1.0	9/12/97	15000	0.31	U	8.1	96	0.39	20	12	27	27	0.99		1400	0.84	N	0.063	U	80
09-10-1.0	9/12/97	7600	0.28	U	8	59	0.9	13	11	27	12	0.056	U	930	0.56	U	0.095		90
09-11-1.0	9/12/97	15000	0.3	U	7.6	99	0.54	20	13	27	44	2		980	1	N	0.06	U	92
09-12-1.0	9/12/97	14000	0.28	U	8.4	61	0.35	19	12	35	17	0.38		1200	0.56	U	0.056	U	78
09-13-1.0	9/12/97	17000	0.31	U	8.2	100	0.35	22	14	27	21	16		1100	0.63	U	0.063	U	80
09-14-1.0	9/12/97	14000	0.29	U	8.9	82	0.31	20	12	30	17	0.7		1300	0.59	U	0.059	U	74
09-15-1.0	9/12/97	17000	0.33	U	5.9	96	0.29	20	15	17	19	0.53		970	0.66	U	0.066	U	64
09-16-1.0	4/28/98											3.6	N*						
09-17-1.0	4/28/98											0.51	N*						
09-18-1.0	4/28/98											50	N*						
09-19-1.0	4/28/98											0.2	N*						

TABLE 6-20
INORGANIC PARAMETERS EXCEEDING SCREENING CRITERIA
SWMU No. 9
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Mercury	
Screening Conc.		10	
09-01-1.0	9/12/97	25	
09-06-1.0	9/12/97	14	
09-07-1.0	9/12/97	110	
09-07 2-4	7/12/99	49	
09-13-1.0	9/12/97	16	
09-18-1.0	4/28/98	50	N*

TABLE 6-21
INORGANIC SAMPLING RESULTS
SWMU NO. 10
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum	Antimony	Arsenic	Barium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Potassium	Selenium	Silver	Zinc
10-01-1.0	9/15/97	17000 E	0.42 N	8.5 E*	95	0.19	21 NE*	16 E	32	26 E	330	1100 *	0.66 N	0.063 U	130 NE*
10-02-1.0	9/15/97	20000 E	0.38 N	13 E*	120	0.21	24 NE*	17 E	28	42 E	51	1500 *	0.69 N	0.063 U	100 NE*
10-03-1.0	9/15/97	9800 E	0.29 U	7.9 E*	66	0.44	14 NE*	9.1 E	32	48 E	16	1100 *	0.72 N	0.059 U	140 NE*
10-04-1.0	9/15/97	16000 E	0.32 U	14 E*	130	0.43	24 NE*	16 E	36	24 E	120	1300 *	0.64 U	0.064 U	110 NE*
10-04 2-4	7/9/99										0.16				
10-04 4-6	7/9/99										0.091				
10-05-1.0	9/15/97	18000 E	0.31 U	9.9 E*	110	0.28	23 NE*	16 E	31	25 E	34	1300 *	0.62 U	0.062 U	85 NE*
10-06-1.0	9/15/97	18000 E	0.32 U	6.1 E*	120	0.11	20 NE*	17 E	31	25 E	600	880 *	0.65 U	0.065 U	72 NE*
10-06 2-4	7/8/99										1.2				
10-06 4-6	7/8/99										0.4				
10-07-1.0	9/15/97	9100 E	0.29 U	6.3 E*	48	0.18	12 NE*	8.6 E	22	17 E	5	960 *	0.58 U	0.058 U	92 NE*
10-08-1.0	9/15/97	17000 E	0.31 U	9.6 E*	110	0.16	25 NE*	17 E	33	18 E	37	1200 *	0.63 U	0.063 U	110 NE*
10-09-1.0	9/15/97	17000 E	0.32 U	5.7 E*	94	0.065 U	19 NE*	17 E	17	21 E	58	900 *	0.65 U	0.065 U	61 NE*
10-10-1.0	9/15/97	16000 E	0.32 U	6.7 E*	82	0.064 U	20 NE*	18 E	18	31 E	17	800 *	0.64 U	0.064 U	63 NE*
10-11-1.0	4/29/98										0.68 N*				
10-12-1.0	4/29/98										1.2				
10-13-1.0	4/29/98										4.6				
10-14-1.0	4/29/98										77				
10-15-1.0	4/29/98										180				
10-16-1.0	4/29/98										0.35				
10-17-1.0	4/29/98										3.6				
10-18-1.0	4/29/98										750				
10-19-1.0	10/22/98										200				
10-19 2-4	7/8/99										38				
10-19 4-6	7/8/99										0.54				
10-20-1.0	10/22/98										5.1				
10-21-1.0	10/22/98										540				
10-22-1.0	10/22/98										580				
10-23-1.0	4/29/99										160				
10-24-1.0	4/29/99										20				
10-25-1.0	4/29/99										0.21				

TABLE 6-22
INORGANIC PARAMETERS EXCEEDING SCREENING CRITERIA
SWMU No. 10
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum		Mercury
Screening Conc.		19265		10
10-01-1.0	9/15/97			330
10-02-1.0	9/15/97	20000	E	51
10-03-1.0	9/15/97			16
10-04-1.0	9/15/97			120
10-05-1.0	9/15/97			34
10-06-1.0	9/15/97			600
10-08-1.0	9/15/97			37
10-09-1.0	9/15/97			58
10-10-1.0	9/15/97			17
10-14-1.0	4/29/98			77
10-15-1.0	4/29/98			180
10-18-1.0	4/29/98			750
10-19-1.0	10/22/98			200
10-19 2-4	7/8/99			38
10-21-1.0	10/22/98			540
10-22-1.0	10/22/98			580
10-23-1.0	4/29/99			160
10-24-1.0	4/29/99			20

TABLE 6-23
INORGANIC SAMPLING RESULTS
SWMU NO. 11
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum	Antimony		Arsenic	Barium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury		Potassium	Selenium		Silver		Zinc
11-01-1.0	9/11/97	7600	0.27	U	4.3	34	0.11	9.3	6.3	12	8.1	0.71		660	0.54	U	0.054	U	38
11-02-1.0	9/11/97	13000	0.32	U	8.5	160	0.26	18	9.4	18	20	12		900	0.82	N	0.063	U	68
11-03-1.0	9/11/97	7200	0.28	U	9.2	51	0.46	10	7.3	32	160	240		1000	0.56	U	0.056	U	66
11-03 2-4	7/12/99											37							
11-03 4-6	7/12/99											0.14							
11-04-1.0	9/11/97	8400	0.28	U	11	51	0.27	17	6.8	21	20	20		740	0.56	U	0.056	U	58
11-05-1.0	9/11/97	7800	0.29	U	5.1	32	0.11	13	6.4	12	13	0.83		860	0.58	U	0.058	U	41
11-06-1.0	9/11/97	18000	0.31	U	12	120	0.42	26	21	39	22	0.98		2200	0.63	U	0.063	U	94
11-07-1.0	4/28/98											8.5	N*						
11-08-1.0	4/28/98											41	N*						
11-09-1.0	4/28/98											4.1	N*						
11-10-1.0	4/28/98											4.9	N*						
11-11-1.0	4/28/98											4	N*						
11-12-1.0	10/22/98											51							
11-13-1.0	10/22/98											5.7							
11-14-1.0	4/29/99											13							

TABLE 6-24
PARAMETERS EXCEEDING SCREENING CRITERIA
SWMU No. 11
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Mercury		Potassium
Screening Conc.		10		1900
11-02-1.0	9/11/97	12		
11-03-1.0	9/11/97	240		
11-03 2-4	7/12/99	37		
11-04-1.0	9/11/97	20		
11-06-1.0	9/11/97			2200
11-08-1.0	4/28/98	41	N*	
11-12-1.0	10/22/98	51		
11-14-1.0	4/29/99	13		

TABLE 6-25
INORGANIC SAMPLING RESULTS
SWMU NO. 13
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Lead		Mercury	
13-01-1.0	9/18/97	20	E	0.56	N
13-02-1.0	9/13/97	22	E	2.3	
13-03-1.0	9/13/97	190	E	5.2	
13-04-1.0	9/13/97	18	E	0.13	
13-05-1.0	9/13/97	26	E	0.081	
13-06-1.0	9/13/97	29	E	1.2	
13-07-1.0	9/13/97	65	E	0.99	
13-08-1.0	9/13/97	34	E	21	
13-09-1.0	9/13/97	190	E	110	
13-09 2-4	6/29/99			0.23	
13-09 4-6	6/29/99			0.096	
13-10-1.0	9/13/97	31	E	16	
13-10 2-4	6/29/99			0.11	
13-10 4-6	6/29/99			0.063	U
13-11-1.0	9/13/97	33	E	61	
13-12-1.0	9/13/97	35	E	14	
13-13-1.0	9/13/97	31	E	120	
13-14-1.0	4/30/98			0.59	N
13-15-1.0	4/30/98			0.1	N
13-16-1.0	4/30/98			0.21	N
13-17-1.0	4/30/98			20	N
13-18-1.0	4/30/98			5.2	N
13-19-1.0	4/30/98			22	N
13-19 2-4	6/30/99			0.13	
13-19 4-6	6/30/99			0.19	U
13-20-1.0	4/30/98			6.4	N
13-21-1.0	10/21/98			150	
13-22-1.0	4/29/99			0.078	
13-23-1.0	4/29/99			0.11	

TABLE 6-26
INORGANIC PARAMETERS EXCEEDING SCREENING CRITERIA
SWMU No. 13
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Mercury	
Screening Conc.		10	
13-08-1.0	9/13/97	21	
13-09-1.0	9/13/97	110	
13-10-1.0	9/13/97	16	
13-11-1.0	9/13/97	61	
13-12-1.0	9/13/97	14	
13-13-1.0	9/13/97	120	
13-17-1.0	4/30/98	20	N
13-19-1.0	4/30/98	22	N
13-21-1.0	10/21/98	150	

TABLE 6-27
INORGANIC SAMPLING RESULTS
SWMU NO. 15
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Mercury	Zinc
15-01-1.0	9/12/97	0.58	58
15-02-1.0	9/12/97	0.71	65
15-03-1.0	9/12/97	0.25	82
15-04-1.0	9/12/97	0.66	60
15-05-1.0	9/12/97	0.72	60
15-06-1.0	9/12/97	0.39	62
15-07-1.0	9/12/97	1.3	59
15-08-1.0	9/12/97	0.12	74

TABLE 6-28
INORGANIC SAMPLING RESULTS
SWMU NO. 21
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum		Antimony		Arsenic		Barium	Cadmium	Chromium		Cobalt		Copper	Lead		Mercury		Potassium		Selenium		Silver		Zinc	
21-01-1.0	9/16/97	12000	E	97	N	14	E*	6200	0.63	18	NE*	14	E	430	27000	E	0.46		1100	*	1300	N	1.2		130	NE*
21-01 2-4	7/1/99			3.1	U			170							38						1.8					
21-01 4-6	7/1/99			3.2	U			190							18						1.7	U				
21-02-1.0	9/16/97	19000	E	1.2	N	14	E*	310	0.37	27	NE*	26	E	50	680	E	0.12	U	1400	*	23	N	0.062	U	92	NE*
21-03-1.0	9/16/97	20000	E	0.32	U	10	E*	87	0.19	27	NE*	9.8	E	32	16	E	0.064	U	1400	*	0.84	N	0.064	U	66	NE*
21-04-1.0	9/16/97	17000	E	0.31	U	12	E*	100	0.41	22	NE*	14	E	35	21	E	0.079		1800	*	0.63	U	0.063	U	71	NE*
21-05-1.0	9/16/97	19000		0.33	U	9.5	N	130	0.28	22		12		40	65		0.24		1300		8.1	N	0.067	U	87	
21-06-1.0	9/16/97	24000		0.34	U	12	N	130	0.33	27		17		320	36		0.094		1700		2.9	N	0.068	U	78	
21-07-1.0	9/16/97	8200		0.31	N	7.3	N	62	0.53	12		7.4		39	81		0.36		1400		1.1	N	0.056	U	160	
21-08-1.0	9/16/97	11000		0.45	N	9.7	N	93	0.14	14		10		240	150		1.6		1300		1.8	N	0.058	U	45	
21-09-1.0	9/16/97	24000		0.38	U	15	N	220	0.21	27		14		140	120		0.44		1500		24	N	0.076	U	120	
21-10-1.0	4/29/98			1.8	U			680							760	*					120					
21-10 2-4	7/1/99			3	U			81							20						1.6	U				
21-10 4-6	7/1/99			3.1	U			130							17						1.6	U				
21-11-1.0	4/29/98			1.7	U			94							51	*					3.5	U				
21-12-1.0	4/29/98			1.7	U			180							200	*					27					
21-13-1.0	4/29/98			1.5	U			110							1200	*					3	U				
21-14-1.0	4/29/98			1.5	U			100							43	*					5.4					
21-15-1.0	4/29/98			1.6	U			270							60	*					18					
21-16-1.0	4/29/98			1.7	U			190							460	*					18					
21-16 2-4	7/1/99			3.1	U			140							29						1.6	U				
21-16 4-6	7/1/99			3.1	U			120							21						1.6	U				
21-17-1.0	10/21/98			1.5	U			73	N						31						1.5	U				
21-18-1.0	10/21/98			1.5	U			90	N						40						1.8					
21-19-1.0	10/21/98			1.5	U			98	N						210						5.8					
21-20-1.0	10/21/98			1.5	U			100	N						200						1.8					
21-21-1.0	10/21/98			1.5	U			150	N						25						1.5	U				
21-22-1.0	10/21/98			1.6	U			120	N						41						4.2					
21-23-1.0	10/21/98			1.6	U			180	N						200						24					
21-24-1.0	10/21/98			1.7	U			120	N						47						1.7	U				

TABLE 6-29
INORGANIC PARAMETERS EXCEEDING SCREENING CRITERIA
SWMU No. 21
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum		Antimony		Barium	Lead		Selenium	
Screening Conc.		19265		5		1600	400		5	
21-01-1.0	9/16/97			97	N	6200	27000	E	1300	N
21-02-1.0	9/16/97						680	E	23	N
21-03-1.0	9/16/97	20000	E							
21-05-1.0	9/16/97								8.1	N
21-06-1.0	9/16/97	24000								
21-09-1.0	9/16/97	24000							24	N
21-10-1.0	4/29/98						760	*	120	
21-12-1.0	4/29/98								27	
21-13-1.0	4/29/98						1200	*		
21-14-1.0	4/29/98								5.4	
21-15-1.0	4/29/98								18	
21-16-1.0	4/29/98						460	*	18	
21-19-1.0	10/21/98								5.8	
21-23-1.0	10/21/98								24	

TABLE 6-30
INORGANIC SAMPLING RESULTS
SWMU NO. 23
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum		Antimony		Arsenic	Barium	Cadmium	Chromium		Cobalt		Copper	Lead		Mercury		Potassium		Selenium		Silver		Zinc	
23-01-1.0	9/9/97	12000	N*	0.31	U	3.9	93	0.14	16	N	9.5	E	16	18	E	0.088		940	*	0.63	U	0.063	U	60	NE*
23-02-1.0	9/9/97	17000	N*	0.29	U	5.5	82	0.14	20	N	18	E	17	19	E	0.059	U	950	*	0.59	U	0.059	U	62	NE*
23-03-1.0	9/9/97	16000	N*	0.3	U	6	110	0.25	20	N	15	E	17	18	E	0.06	U	950 *	*	0.6	U	0.06	U	64	NE*
23-04-1.0	9/9/97	21000	N*	0.3	U	8	80	0.22	26	N	19	E	22	19	E	0.066		1400	*	0.61	U	0.061	U	81	NE*
23-05-1.0	9/9/97	27000	N*	0.31	U	12	130	0.46	36	N	15	E	42	25	E	0.28		2200	*	0.63	U	0.063	U	110	NE*
23-06-1.0	9/9/97	17000	N*	0.31	U	10	110	0.44	24	N	18	E	33	20	E	0.062	U	1300	*	0.62	U	0.062	U	82	NE*
23-07-1.0	9/9/97	17000	N*	0.3	U	8.8	56	0.32	23	N	14	E	21	17	E	0.066		1100	*	0.6	U	0.06	U	59	NE*
23-08-1.0	9/9/97	20000	N*	0.32	U	5	140	0.27	22	N	12	E	18	23	E	0.082		1100	*	0.63	U	0.063	U	74	NE*

TABLE 6-31
INORGANIC PARAMETERS EXCEEDING SCREENING CRITERIA
SWMU No. 23
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum		Potassium	
Screening Conc.		19265		1900	
23-04-1.0	9/9/97	21000	N*		
23-05-1.0	9/9/97	27000	N*	2200	*
23-08-1.0	9/9/97	20000	N*		

TABLE 6-32
TCL VOLATILE ORGANICS
ANALYTICAL RESULTS SUMMARY
MONITORING WELLS MW-6 AND MW-7
(All values in ug/L)

SAMPLE NAME	MW- 6		MW- 6		MW- 7		MW- 7	
SAMPLE DATE	9/15/95		10/21/97		9/15/95		10/21/97	
1,1,1-Trichloroethane	1	U	1	U	1	U	1	U
1,1,2,2-Tetrachloroethane	1	U	1	U	1	U	1	U
1,1,2-Trichloroethane	1	U	1	U	1	U	1	U
1,1-Dichloroethane	1	U	1	U	1	U	1	U
1,1-Dichloroethene	1	U	1	U	1	U	1	U
1,2-Dichloroethane	1	U	1	U	1	U	1	U
1,2-Dichloropropane	1	U	1	U	1	U	1	U
2-Butanone	10	U	10	U	10	U	10	U
2-Hexanone	2	U	2	U	2	U	2	U
4-Methyl-2-pentanone	2	U	2	U	2	U	2	U
Acetone	5	U	5	U	5	U	5	U
Benzene	1	U	1	U	1	U	1	U
Bromodichloromethane	1	U	1	U	1	U	1	U
Bromoform	1	U	1	U	1	U	1	U
Bromomethane	2	U	2	U	2	U	2	U
Carbon disulfide	1	U	1	U	1	U	1	U
Carbon tetrachloride	1	U	1	U	1	U	1	U
Chlorobenzene	1	U	1	U	1	U	1	U
Chloroethane	2	U	2	U	2	U	2	U
Chloroform	1	U	1	U	1	U	1	U
Chloromethane	2	U	2	U	2	U	2	U
cis-1,3-Dichloropropene	1	U	1	U	1	U	1	U
Dibromochloromethane	1	U	1	U	1	U	1	U
Ethylbenzene	1	U	1	U	1	U	1	U
Methylene chloride	1	U	1	U	1	U	1	U
Styrene	1	U	1	U	1	U	1	U
Tetrachloroethene	1	U	1	U	1	U	1	U
Toluene	1	U	1	U	1	U	1	U
trans-1,3-Dichloropropene	1	U	1	U	1	U	1	U
Trichloroethene	1	U	1	U	1	U	1	U
Vinyl chloride	2	U	2	U	2	U	2	U
Xylene (total)	1	U	1	U	1	U	1	U

TABLE 6-33
INORGANIC ANALYTICAL RESULTS SUMMARY
MONITORING WELLS MW-6 AND MW-7
(All values in ug/L)

SAMPLE NAME SAMPLE DATE	Standard	MW- 6 9/15/95		MW- 6 10/21/97		MW- 7 9/15/95		MW- 7 10/21/97	
Aluminum		200000		10000		120000		840	
Aluminum soluble		86		50	U	53		50	U
Antimony		5	U	5	U	5	U	5	U
Antimony soluble		5.7		5	U	5	U	5	U
Arsenic	10	88		7	U	100		7	U
Arsenic soluble		7	U	7	U	7	U	7	U
Barium	20	1500		270		1300		130	
Barium soluble		86		57		96		120	
Cadmium	5	2.6		1	U	2.4		1	U
Cadmium soluble		1	U	1	U	1	U	1	U
Chromium	10	300		65		190		8.8	
Chromium soluble		5	U	5	U	5	U	5	U
Cobalt	50	140		10		110		6.5	
Cobalt soluble		1	U	1	U	1	U	2	
Copper	20	470		47		330		4	U
Copper soluble		4	U	4	U	4	U	4	U
Lead	5	140		22		110		5	U
Lead soluble		5	U	5	U	5	U	5	U
Mercury	0.5	0.72		0.22		0.6		0.2	U
Mercury soluble		0.2	U	0.2	U	0.2	U	0.2	U
Potassium		53		6.1		25		1.1	
Potassium, soluble		5		2.1		1	U	1	U
Selenium	5	5	U	5	U	5	U	5	U
Selenium, soluble		5	U	5	U	5	U	5	U
Silver	10	1		1	U	1.2		1	U
Silver soluble		1	U	1	U	1	U	1	U
Zinc		810		70		640		28	
Zinc soluble		20	U	20	U	30		20	U

TABLE 6-34
TCL VOLATILE ORGANICS
ANALYTICAL RESULTS SUMMARY
MONITORING WELL CLUSTER MW-20, MW-21 AND MW-22
(All values in ug/L)

SAMPLE NAME	MW-20D		MW-20R		MW-21D		MW-21R		MW-22D		MW-22R	
SAMPLE DATE	10/20/97		10/20/97		10/20/97		10/15/97		10/20/97		10/20/97	
1,1,1-Trichloroethane	1	U	1	U	1	U	1	U	1	U	1	U
1,1,2,2-Tetrachloroethane	1	U	1	U	1	U	1	U	1	U	1	U
1,1,2-Trichloroethane	1	U	1	U	1	U	1	U	1	U	1	U
1,1-Dichloroethane	1	U	1	U	1	U	1	U	1	U	1	U
1,1-Dichloroethene	1	U	1	U	1	U	1	U	1	U	1	U
1,2-Dichloroethane	1	U	1	U	1	U	1	U	1	U	1	U
1,2-Dichloro ethene(total)	1	U	1	U	1	U	1	U	1	U	1	U
1,2-Dichloropropane	1	U	1	U	1	U	1	U	1	U	1	U
2-Butanone	10	U	10	U	10	U	10	U	10	U	10	U
2-Hexanone	2	U	2	U	2	U	2	U	2	U	2	U
4-Methyl-2-pentanone	2	U	2	U	2	U	2	U	2	U	2	U
Acetone	5	U	5	U	5	U	5	U	5	U	5	U
Benzene	1	U	1	U	1	U	1	U	1	U	1	U
Bromo dichloro methane	1	U	1	U	1	U	1	U	1	U	1	U
Bromoform	1	U	1	U	1	U	1	U	1	U	1	U
Bromo methane	2	U	2	U	2	U	2	U	2	U	2	U
Carbon disulfide	1	U	1	U	1	U	1	U	1	U	1	U
Carbon tetra chloride	1	U	1	U	1	U	1	U	1	U	1	U
Chloro benzene	1	U	1	U	1	U	1	U	1	U	1	U
Chloroethane	2	U	2	U	2	U	2	U	2	U	2	U
Chloroform	1	U	1	U	1	U	1	U	1	U	1	U
Chloromethane	2	U	2	U	2	U	2	U	2	U	2	U
cis-1,3-Dichloropropene	1	U	1	U	1	U	1	U	1	U	1	U
Dibromochloromethane	1	U	1	U	1	U	1	U	1	U	1	U
Ethylbenzene	1	U	1	U	1	U	1	U	1	U	1	U
Methylene chloride	1	U	1	U	1	U	1	U	1	U	1	U
Styrene	1	U	1	U	1	U	1	U	1	U	1	U
Tetrachloroethene	1	U	1	U	1	U	1	U	1	U	1	U
Toluene	1	U	1	U	1	U	1	U	1	U	1	U
trans-1,3-Dichloropropene	1	U	1	U	1	U	1	U	1	U	1	U
Trichloroethene	1	U	1	U	1	U	1	U	1	U	1	U
Vinyl chloride	2	U	2	U	2	U	2	U	2	U	2	U
Xylene(total)	1	U	1	U	1	U	1	U	1	U	1	U

TABLE 6-35
INORGANIC SAMPLING RESULTS
SWMU No. 26D
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum	Antimony		Arsenic		Barium	Cadmium		Chromium	Cobalt	Copper	Lead		Mercury		Potassium		Selenium		Silver		Zinc	
26D-01-1.0	9/18/97	6900	0.29	U	4.8	N	25	0.058	U	9.2	6.1	13	7.4	E	0.12	U	800	*	0.58	U	0.058	U	41	E
26D-02-1.0	9/18/97	9000	0.28	U	4.9	N	85	0.13		13	8.6	37	13	E	0.13		1000	*	0.57	U	0.057	U	60	E
26D-03-1.0	9/18/97	14000	0.39		8.5	N	88	0.095		18	13	200	40	E	1.2		1700	*	4.4	N	0.057	U	67	E
26D-04-1.0	9/18/97	20000	0.3		11	N	120	0.059	U	24	20	3400	110	E	0.42	N	1700	*	0.85	N	0.059	U	85	E
26D-04 2-4	7/1/99											460	46						1.6	U				
26D-04 4-6	7/1/99											40	22						1.6	U				
26D-05-1.0	9/18/97	4200	0.32	U	11	N	66	0.32	U	8.3	1.1	500	600	E	0.59	N	1900	*	1.2	N	0.085		13	E
26D-06-1.0	9/18/97	8000	0.33		11	N	100	0.17		11	8	160	370	E	2.2	N	1100	*	21	N	0.06	U	44	E
26D-07-1.0	4/30/98												35						16					
26D-08-1.0	4/30/98												1800						140					
26D-08 2-4	6/30/99											39	25						1.6	U				
26D-08 4-6	6/30/99											19	9.1						1.6	U				
26D-09-1.0	4/30/98												120						140					
26D-10-1.0	10/21/98												1000						41					
26D-11-1.0	10/21/98												180						15					
26D-12-1.0	10/21/98												35						4.5					
26D-13-1.0	4/28/99												120						18					

TABLE 6-36
INORGANIC PARAMETERS EXCEEDING SCREENING CRITERIA
SWMU No. 26D
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum	Copper	Lead		Selenium	
Screening Conc.		19265	600	400		5	
26D-04-1.0	9/18/97	20000	3400				
26D-05-1.0	9/18/97			600	E		
26D-06-1.0	9/18/97					21	N
26D-07-1.0	4/30/98					16	
26D-08-1.0	4/30/98			1800		140	
26D-09-1.0	4/30/98					140	
26D-10-1.0	10/21/98			1000		41	
26D-11-1.0	10/21/98					15	
26D-13-1.0	4/28/99					18	

TABLE 6-37
INORGANIC SAMPLING RESULTS
SWMU No. 26E
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum		Antimony		Arsenic		Barium	Cadmium		Chromium		Cobalt		Copper	Lead		Mercury		Potassium		Selenium		Silver		Zinc	
26E-01-1.0	9/15/97	17000	E	0.31	U	7.6	E*	68	0.098		21	NE*	16	E	18	23	E	1		1100	*	0.63	U	0.063	U	58	NE*
26E-02-1.0	9/15/97	14000	E	0.32	U	7.3	E*	66	0.063	U	19	NE*	8.6	E	220	67	E	0.2		820	*	0.72	N	0.063	U	48	NE*
26E-03-1.0	9/15/97	12000	E	0.37	N	8.7	E*	77	0.27		16	NE*	10	E	57	140	E	17		780	*	2.1	N	0.068	U	84	NE*
26E-04-1.0	9/15/97	6700	E	0.38	N	11	E*	120	1.3		12	NE*	6.4	E	100	96	E	3		1100	*	7	N	0.13		91	NE*
26E-05-1.0	4/30/98																	6.6	N								
26E-06-1.0	4/30/98																	7	N								

TABLE 6-38
INORGANIC PARAMETERS EXCEEDING SCREENING CRITERIA
SWMU No. 26E
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Mercury	Selenium	
Screening Conc.		10	5	
26E-03-1.0	9/15/97	17		
26E-04-1.0	9/15/97		7	N

TABLE 6-39
INORGANIC SAMPLING RESULTS
SWMU 26F
(All values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum	Antimony		Arsenic	Barium	Cadmium	Chromium	Cobalt		Copper	Lead		Mercury		Potassium	Selenium		Silver		Zinc	
26F-01-1.0	9/10/97	18000	0.32	U	5.9	69	0.13	21	15	E	15	25	E	0.57		930	0.65	U	0.065	U	63	E
26F-02-1.0	9/10/97	18000	0.33	U	6.1	80	0.18	20	17	E	16	20	E	0.15		850	0.66	U	0.066	U	64	E
26F-03-1.0	9/10/97	17000	0.32	U	5.6	62	0.15	19	16	E	17	20	E	0.79		770	0.63	U	0.063	U	59	E
26F-04-1.0	9/10/97	17000	0.34	U	7.5	51	0.19	22	9.4	E	20	14	E	0.068	U	1100			0.068	U	55	E

TABLE 6-40
INORGANIC SAMPLING RESULTS
SWMU No. 26G
(All values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum	Antimony		Arsenic	Barium	Cadmium	Chromium	Cobalt		Copper		Lead		Mercury		Potassium	Selenium		Silver		Zinc	
26G-01-1.0	9/10/97	16000	0.31	N	6.8	79	0.17	21	13	E	140		36	E	2		780	25	E*	0.06	U	60	E
26G-02-1.0	9/10/97	16000	0.31	U	15	110	0.34	23	30	E	530		91	E	37		740	44	E*	0.063	U	70	E
26G-03-1.0	9/10/97	14000	0.29	U	11	100	0.58	21	13	E	340		24	E	130		1200	2.9	E*	0.14		92	E
26G-04-1.0	9/10/97	18000	0.33	N	10	100	0.31	24	16	E	240		20	E	2.6		1000	6.9	E*	0.062	U	79	E
26G-05-1.0	4/30/98														1500	N		16					
26G-06-1.0	4/30/98														9.7	N		3	U				
26G-07-1.0	4/30/98														1.6	N		1600					
26G-08-1.0	4/30/98														0.22	N		24					
26G-09-1.0	4/30/98														0.34	N		17					
26G-10-1.0	4/30/98														3.8	N		1400					
26G-11-1.0	4/30/98														17	N		23					
26G-11 2-4	7/2/99										48	EN	26	N	0.062	U		4.3					
26G-11 4-6	7/2/99										20	N	11		0.062	U		1.6	U				
26G-12-1.0	4/30/98														16	N		24					
26G-16 2-4	7/6/99										86	EN	38	N	1.8			6.3					
26G-16 4-6	7/6/99										23	N	13		0.079	U		1.6	U				

TABLE 6-41
INORGANIC SAMPLING RESULTS
AOC C, D & SWMU 26G
(All values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Arsenic		Barium	Cadmium		Copper		Lead		Mercury		Selenium		Silver		Zinc	
AOC-C-01-1.0	9/17/97	8.1	N	120	0.066	U	21		31	E	0.17	N	1.4	N	0.13	U	71	E
AOC-C-02-1.0	9/17/97	8.9	N	50	0.06	U	22		13	E	0.35	N	3.7	N	0.06	U	51	E
AOC-C-03-1.0	9/17/97	9.4	N	150	0.14		170		110	E	19	N	48	N	0.068	U	88	E
AOC-C-04-1.0	9/17/97	9.7	N	220	0.29		57		43	E	1.7	N	7.2	N	0.14	U	86	E
AOC-C-04 2-4	7/2/99	8.6			0.31	U	23	EN					1.6	U				
AOC-C-04 4-6	7/2/99	10			0.31	U	29	N					1.6	U				
AOC-C-05-1.0	9/17/97	25	N	300	0.5		8800		870	E	20	N	180	N	0.54		640	E
AOC-C-05 2-4	7/2/99						30	EN	18	N	0.099		1.8					
AOC-C-05 4-6	7/2/99						29	N	16		0.063	U	1.6	U				
AOC-C-06-1.0	9/17/97	5.4	N	70	0.059	U	14		12	E	0.12	U	0.59	U	0.059	U	40	E
AOC-C-07-1.0	9/17/97	17	N	180	0.31		19		38	E	0.12	U	3	U	0.3	U	72	E
AOC-C-08-1.0	9/17/97	10	N	49	0.063	U	30		16	E	0.13	U	0.75	N	0.063	U	63	E
AOC-C-09-1.0	9/17/97	7.9	N*	77	0.061	U	22		17	E	0.12	U	0.61	U	0.061	U	57	NE
AOC-C-10-1.0	9/17/97	11	N*	52	0.061	U	32		47	E	0.12	U	2	N	0.061	U	62	NE
AOC-C-11-1.0	9/17/97	8.3	N	76	0.063	U	28		16	E	0.13	U	0.63	U	0.063	U	74	E
AOC-C-12-1.0	9/17/97	12	N	78	0.063	U	31		18	E	0.13	U	0.63	U	0.063	U	71	E
AOC-C-13-1.0	9/17/97	7.2	N	75	0.068	U	28		25	E	0.35	N	0.82	N	0.068	U	72	E
AOC-C-14-1.0	4/30/98						400		190		16		39					
AOC-C-15-1.0	4/30/98						32		27		0.12		4.2					
AOC-C-16-1.0	4/30/98						3400		950		310		180					
AOC-C-17-1.0	10/19/98						100		39				4.8					
AOC-C-18-1.0	10/19/98						19		22				1.6	U				
AOC-C-19-1.0	10/19/98						23		18				1.5	U				
AOC-C-20-1.0	10/19/98						490		35				9.7					

TABLE 6-42
INORGANIC PARAMETERS EXCEEDING SCREENING CRITERIA
SWMU No. 26G
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Mercury		Selenium	
Screening Conc.		10		5	
26G-01-1.0	9/10/97			25	E*
26G-02-1.0	9/10/97	37		44	E*
26G-03-1.0	9/10/97	130			
26G-04-1.0	9/10/97			6.9	E*
26G-05-1.0	4/30/98	1500	N	16	
26G-07-1.0	4/30/98			1600	
26G-08-1.0	4/30/98			24	
26G-09-1.0	4/30/98			17	
26G-10-1.0	4/30/98			1400	
26G-11-1.0	4/30/98	17	N	23	
26G-12-1.0	4/30/98	16	N	24	
26G-16 2-4	7/6/99			6.3	

TABLE 6-43
INORGANIC PARAMETERS EXCEEDING SCREENING CRITERIA
AOC C, D & SWMU 26G
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Copper	Lead		Mercury		Selenium	
Screening Conc.		600	400		10		5	
AOC-C-03-1.0	9/17/97				19	N	48	N
AOC-C-04-1.0	9/17/97						7.2	N
AOC-C-05-1.0	9/17/97	8800	870	E	20	N	180	N
AOC-C-14-1.0	4/30/98				16		39	
AOC-C-16-1.0	4/30/98	3400	950		310		180	
AOC-C-20-1.0	10/19/98						9.7	

TABLE 6-44
INORGANIC SAMPLING RESULTS
SWMU No. 27
(All values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum	Antimony		Arsenic	Barium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury		Potassium	Selenium		Silver		Zinc
27-01-1.5	9/11/97	21000	0.34	U	6.7	160	0.61	25	13	98	190	0.96		1400	0.9	N	0.092		180
27-02-1.5	9/11/97	17000	0.32	U	3.9	64	0.31	19	14	150	51	0.064	U	920	0.64	U	0.064	U	100
27-03-1.5	9/11/97	11000	0.29	U	10	67	0.22	14	8.9	41	28	0.34		840	0.58	U	0.058	U	50
27-04-1.5	9/11/97	14000	0.3	U	12	80	0.22	16	10	35	32	0.49		940	0.61	U	0.061	U	62

TABLE 6-45
INORGANIC PARAMETERS EXCEEDING SCREENING CRITERIA
SWMU No. 27
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum
Screening Conc.		19265
27-01-1.5	9/11/97	21000

TABLE 6-46
INORGANIC SAMPLING RESULTS
SWMU No. 29
(All values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum	Antimony		Arsenic		Barium	Cadmium		Chromium	Cobalt	Copper	Lead	Mercury		Potassium	Selenium		Silver		Zinc
29-01-1.0	9/17/97	14000	0.36	N	14	N	140	1.5		19	11	26	61	140		730	3.2	N	0.065	U	660
29-02-1.0	9/17/97	14000	0.3	U	10	N	110	0.061	U	20	12	9.7	20	0.94		900	0.61	U	0.061	U	57
29-03-1.0	9/17/97	18000	0.42	N	11	N	120	0.061	U	23	13	11	17	0.12	U	1300	0.61	U	0.061	U	60
29-04-1.0	9/17/97	16000	0.31	U	8.4	N	120	0.25	U	22	14	19	17	0.25		1100	0.62	U	0.062	U	58
29-05-1.0	5/5/98													5.9	N						
29-06-1.0	5/5/98													0.3	N						
29-07-1.0	5/5/98													0.075	N						

TABLE 6-47
INORGANIC PARAMETERS EXCEEDING SCREENING CRITERIA
SWMU No. 29
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Mercury
Screening Conc.		10
29-01-1.0	9/17/97	140

TABLE 6-48
TCL VOLATILE ORGANIC ANALYTICAL SUMMARY
MONITORING WELL MW-23S
(All values in ug/L)

SAMPLE NAME	MW-23S	
SAMPLE DATE	10/15/97	
1,1,1-Trichloroethane	1	U
1,1,2,2-Tetrachloroethane	1	U
1,1,2-Trichloroethane	1	U
1,1-Dichloroethane	1	U
1,1-Dichloroethene	1	U
1,2-Dichloroethane	1	U
1,2-Dichloroethene(total)	1	U
1,2-Dichloropropane	1	U
2-Butanone	10	U
2-Hexanone	2	U
4-Methyl-2-pentanone	2	U
Acetone	5	U
Benzene	1	U
Bromodichloromethane	1	U
Bromoform	1	U
Bromomethane	2	U
Carbon disulfide	1	U
Carbon tetrachloride	1	U
Chlorobenzene	1	U
Chloroethane	2	U
Chloroform	1	U
Chloromethane	2	U
cis-1,3-Dichloropropene	1	U
Dibromochloromethane	1	U
Ethylbenzene	1	U
Methylene chloride	1	U
Styrene	1	U
Tetrachloroethene	1	U
Toluene	1	U
trans-1,3-Dichloropropene	1	U
Trichloroethene	1	U
Vinyl chloride	2	U
Xylene(total)	1	U

TABLE 6-49
INORGANIC ANALYTICAL RESULTS SUMMARY
MONITORING WELL MW-23S
(All values in ug/L)

SAMPLE NAME		MW-23S	
SAMPLE DATE		10/15/97	
Aluminum		730	
Aluminum soluble		50	U
Antimony		5	U
Antimony soluble		5	U
Arsenic	10	7	U
Arsenic soluble		7	U
Barium	20	110	
Barium soluble		87	
Cadmium	5	1	U
Cadmium soluble		1	U
Chromium	10	74	
Chromium soluble		5	U
Cobalt	50	120	
Cobalt soluble		6.8	
Copper	20	19	
Copper soluble		6.7	
Lead	5	5	U
Lead soluble		5	U
Mercury	0.5	0.2	U
Mercury soluble		0.2	U
Potassium		2	
Potassium, soluble		1.4	
Selenium	5	6.4	
Selenium, soluble		8.2	
Silver	10	1	U
Silver soluble		1	U
Zinc		670	
Zinc soluble		360	

TABLE 6-50
INORGANIC SAMPLING RESULTS
SWMU No. 33
(All values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Lead		Mercury		Silver	
33-01-1.0	9/11/97	30	E	130		0.12	U
33-01-1.0	4/28/98			74	N*		
33-02-1.0	9/11/97	22	E	13		0.063	U
33-02-1.0	4/28/98			82	N*		
33-03-1.0	9/11/97	140	E	8.9		0.068	U
33-04-1.0	9/11/97	48	E	630		0.14	U
33-04-1.0	4/28/98			890	N*		
33-05-1.0	9/11/97	15	E	46		0.06	U
33-05-1.0	4/28/98			43	N*		
33-06-1.0	9/11/97	64	E	6.5		0.062	U
33-07-1.0	9/11/97	27	E	38		0.065	U
33-07-1.0	4/28/98			28	N*		
33-08-1.0	9/11/97	35	E	52		0.06	U
33-08-1.0	4/28/98			37	N*		
33-09-1.0	9/11/97	48	E	6.1		0.06	U
33-10-1.0	9/11/97	11	E	4.9		0.062	U
33-11-1.0	9/11/97	20	E	0.11		0.062	U
33-12-1.0	9/11/97	22	E	0.15		0.064	
33-13-1.0	4/28/98			7400	N*		
33-13 4-6	7/12/99			18			
33-13 6-8	7/12/99			5.3			
33-13 10-12	7/12/99			1.2			
33-14-1.0	4/28/98			7.2	N*		
33-15-1.0	4/28/98			22	N*		
33-16-1.0	4/28/98			0.25	N*		
33-17-1.0	10/22/98			63			
33-18-1.0	10/22/98			0.76			

TABLE 6-51
INORGANIC PARAMETERS EXCEEDING SCREENING CRITERIA
SWMU No. 33
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Mercury	
Screening Conc.		10	
33-01-1.0	9/11/97	130	
33-01-1.0	4/28/98	74	N*
33-02-1.0	9/11/97	13	
33-02-1.0	4/28/98	82	N*
33-04-1.0	9/11/97	630	
33-04-1.0	4/28/98	890	N*
33-05-1.0	9/11/97	46	
33-05-1.0	4/28/98	43	N*
33-07-1.0	9/11/97	38	
33-07-1.0	4/28/98	28	N*
33-08-1.0	9/11/97	52	
33-08-1.0	4/28/98	37	N*
33-13 4-6	7/12/99	18	
33-13-1.0	4/28/98	7400	N*
33-15-1.0	4/28/98	22	N*
33-17-1.0	10/22/98	63	

TABLE 6-52
INORGANIC SAMPLING RESULTS
SWMU No. 34
(All values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum		Antimony		Arsenic		Barium		Cadmium	Chromium		Cobalt		Copper	Lead		Mercury		Potassium		Selenium		Silver		Zinc	
34-01-1.0	9/8/97	19000	N*	0.32	U	6.8		63		0.18	24	N	18	E	20	19	E	0.064	U	1200	*	0.64	U	0.064	U	71	NE*
34-02-1.0	9/8/97	7800	N*	0.29	U	7.2		39		7.2	13	N	6.6	E	140	35	E	1.1		710	*	1.5		0.59		63	NE*
34-03-1.0	9/8/97	26000	N*	0.31	U	9.4		90		0.45	30	N	17	E	20	22	E	0.063	U	1800	*	2.9		0.063	U	75	NE*
34-04-1.0	9/8/97	22000		0.3	U	11	*	79	N*	0.39	29		14		37	19	*	0.061	U	2000	E*	0.61	U	0.061	U	80	
34-05-1.0	9/8/97	20000		0.31	U	8.2	*	75	N*	0.64	25		14		95	23	*	0.062	U	1200	E*	0.66		0.065	*	68	
34-06-1.0	9/8/97	23000		0.31	U	8	*	69	N*	0.78	30		10		57	15	*	0.063	U	1800	E*	0.63	U	0.063	U	77	
34-07-1.0	9/8/97	21000		0.3	U	8.7	*	71	N*	0.27	28		10		28	15	*	0.061	U	1900	E*	0.61	U	0.061	U	64	
34-08-1.0	9/8/97	18000		0.3	U	9.3	*	61	N*	0.23	25		11		51	18	*	0.06	U	1500	E*	0.6	U	0.06	U	64	
34-09-1.0	9/8/97	21000		0.31	N U	11	*	62	N*	0.28	29		13		28	19	*	0.06	U	1600	E*	0.6	U	0.06	U	70	
34-10-1.0	9/8/97	19000		0.3	U	8.1	*	52	N*	0.32	24		10		26	15	*	0.079		1200	E*	0.61	U	0.061	U	61	
34-11-1.0	9/8/97	20000		0.32	U	7.9	*	76	N*	0.3	24		12		22	23	*	0.21		1400	E*	0.65	U	0.065	U	68	
34-12-1.0	9/8/97	16000		0.29	U	8.7	*	47	N*	0.2	21		8.8		25	16	*	0.11		1200	E*	0.59	U	0.059	U	54	
34-13-1.0	9/8/97	18000		0.3	U	8.1	*	62	N*	0.23	25		12		26	13	*	0.061		1400	E*	0.6	U	0.06	U	71	
34-14-1.0	9/8/97	16000		0.32	U	4.8	*	59	N*	0.12	18		16		13	16	*	0.064	U	800	E*	0.64	U	0.064	U	57	
34-15-1.0	9/8/97	19000		0.3	U	8.6	*	74	N*	0.22	24		11		33	15	*	0.061	U	1400	E*	0.61	U	0.061	U	63	

TABLE 6-53
INORGANIC PARAMETERS EXCEEDING SCREENING CRITERIA
SWMU No. 34
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum		Potassium	
Screening Conc.		19265		1900	
34-03-1.0	9/8/97	26000	N*		
34-04-1.0	9/8/97	22000		2000	E*
34-05-1.0	9/8/97	20000			
34-06-1.0	9/8/97	23000			
34-07-1.0	9/8/97	21000			
34-09-1.0	9/8/97	21000			
34-11-1.0	9/8/97	20000			

TABLE 6-54
INORGANIC SAMPLING RESULTS
SWMU No. 38S
(All values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum		Antimony		Arsenic	Barium	Cadmium		Chromium		Cobalt		Copper		Lead		Mercury		Potassium		Selenium		Silver		Zinc	
38S-01-1.0	9/9/97	1400	E	0.32	U	2.9	54	0.064	U	5		1.8		99	N	160		0.81		540		0.66		0.18		3.4	
38S-02-1.0	9/9/97	22000	E	0.31	U	12	200	0.44		31		23		41	N	24		0.069		1900		0.62	U	0.062	U	98	
38S-03-1.0	9/9/97	24000	E	0.3	U	8.9	170	0.27		32		28		31	N	26		0.066		2000		0.61	U	0.061	U	96	
38S-04-1.0	9/9/97	21000	E	0.3	U	12	130	0.29		29		24		0.24	U	22		0.06	U	1800		0.6	U	0.06	U	95	
38S-05-1.0	9/9/97	14000	E	0.31	U	4.7	66	0.063	U	19		8.4		69	N	20		0.063	U	730		0.63	U	0.063	U	45	
38S-06-1.0	9/9/97	17000	E	0.3	U	6.4	53	0.17		20		10		16	N	16		0.06	U	800		0.6	U	0.06	U	56	
38S-07-1.0	9/9/97	21000	E	0.3	U	9.6	71	0.24		28		10		30	N	17		0.061	U	1500		0.61	U	0.061	U	68	
38S-08-1.0	9/9/97	17000	N*	0.31	U	8.3	87	0.23		22	N	15	E	230		240	E	0.58		1300	*	0.62	U	0.062	U	72	NE*
38S-09-1.0	9/9/97	18000	N*	0.3	U	8	52	0.15		23	N	10	E	120		15	E	0.061	U	910	*	0.99		0.061	U	56	NE*
38S-10-1.0	9/9/97	16000	N*	0.3	U	4.5	44	0.09		20	N	10	E	14		12	E	0.06	U	820	*	0.6	U	0.06	U	53	NE*
38S-11-1.0	9/9/97	19000	N*	0.3	U	10	130	0.52		26	N	14	E	45		18	E	0.06	U	1500	*	0.6	U	0.06	U	85	NE*
38S-12-1.0	9/9/97	18000	N*	0.3	U	7.1	66	0.3		23		16	E	20		18	E	0.06	U	1000	*	0.6	U	0.06	U	58	NE*

TABLE 6-55
INORGANIC PARAMETERS EXCEEDING SCREENING CRITERIA
SWMU No. 38S
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum		Potassium
Screening Conc.		19265		1900
38S-02-1.0	9/9/97	22000	E	
38S-03-1.0	9/9/97	24000	E	2000
38S-04-1.0	9/9/97	21000	E	
38S-07-1.0	9/9/97	21000	E	

TABLE 6-56
INORGANIC SAMPLING RESULTS
SWMU No. 39
(All values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum	Antimony		Arsenic		Barium	Cadmium	Chromium	Cobalt		Copper	Lead		Mercury		Potassium		Selenium		Silver		Zinc	
39-01-1.0	9/13/97	18000	0.31	U	9.8	N	97	0.35	24	15	E	32	70	E	0.15		1500	*	15		0.063	U	84	E
39-01 2-4	7/9/99																		1.6	U				
39-01 4-6	7/9/99																		1.6	U				
39-02-1.0	9/13/97	17000	0.32	U	9.6	N	97	0.29	22	16	E	40	41	E	0.13		1900	*	4.9		0.064	U	71	E
39-03-1.0	9/13/97	19000	0.31	U	11	N	120	0.34	25	17	E	37	20	E	0.063	U	2300	*	0.63	U	0.063	U	81	E
39-04-1.0	9/13/97	14000	0.44	U	8.1		99	0.86	20	14		32	65	E	0.13		1200		7	N	0.087		87	
39-04 2-4	7/6/99																		1.6	U				
39-04 4-6	7/6/99																		1.7	U				
39-05-1.0	9/13/97	14000	0.31	U	8.3		95	0.76	20	14		31	17	E	0.063	U	1100		0.63	U	0.083		72	
39-06-1.0	9/13/97	11000	0.32	U	8.8		160	0.53	15	8.7		27	38	E	0.09		1100		2.3	N	0.065	U	100	
39-07-1.0	9/13/97	15000	0.32	U	10		75	0.39	20	13		32	59	E	0.17		1200		9.1	N	0.064	U	85	
39-08-1.0	9/13/97	18000	0.34	U	7.5		92	0.27	21	15		21	27	E	0.12		850		0.68	U	0.068	U	70	
39-09-1.0	9/13/97	21000	0.37	N	16		120	0.64	29	34		42	45	E	0.15		1600		1.4	N	0.063	U	100	
39-09 2-4	6/30/99																		1.7	U				
39-09 4-6	6/30/99																		1.7	U				
39-10-1.0	9/13/97	20000	0.31	U	9.7		140	0.37	28	15		35	19	E	0.083		1600		0.63	U	0.099		90	
39-11-1.0	5/8/98																		3.1	U				
39-12-1.0	5/8/98																		3.1	U				
39-13-1.0	5/8/98																		3.2	U				
39-14-1.0	5/8/98																		3.2	U				
39-15-1.0	5/8/98																		3.1	U				

TABLE 6-57
INORGANIC PARAMETERS EXCEEDING SCREENING CRITERIA
SWMU No. 39
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum	Cobalt	Potassium		Selenium	
Screening Conc.		19265	30	1900		5	
39-01-1.0	9/13/97					15	
39-03-1.0	9/13/97			2300	*		
39-04-1.0	9/13/97					7	N
39-07-1.0	9/13/97					9.1	N
39-09-1.0	9/13/97	21000	34				
39-10-1.0	9/13/97	20000					

TABLE 6-58
INORGANIC SAMPLING RESULTS
SWMU No. 40
(All values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum	Antimony		Arsenic		Barium	Cadmium		Chromium	Cobalt	Copper	Lead		Mercury		Potassium	Selenium		Silver		Zinc
40-01-1.0	9/16/97	7100	0.3	U	4.2	N	29	0.06	U	9	6.6	14	10		0.16		740	0.6	U	0.06	U	44
40-02-1.0	9/16/97	7100	0.29	U	5.4	N	26	0.059	U	11	6.6	18	2000		0.17		790	0.59	U	0.059	U	58
40-02 2-4	7/2/99												19									
40-02 4-6	7/2/99												17									
40-03-1.0	9/16/97	7700	0.37	N	5.5	N	24	0.06	U	9.5	6.8	16	27		0.12	U	700	0.6	U	0.06	U	45
40-04-1.0	9/16/97	12000	0.3	U	5	N	62	0.06	U	15	9.6	36	18		0.12	U	590	0.6	U	0.06	U	44
40-05-1.0	9/16/97	5900	0.32	U	7.4	N	47	0.41		12	4.7	49	42		0.25		440	2.8	N	0.065	U	46
40-06-1.0	9/16/97	8000	0.4	N	8.1	N	54	0.23		16	7.9	51	240		0.2		590	1.8	N	0.064	U	71
40-07-1.0	4/29/98												33	*								
40-08-1.0	4/29/98												21	*								
40-09-1.0	4/29/98												12	*								

TABLE 6-59
INORGANIC PARAMETERS EXCEEDING SCREENING CRITERIA
SWMU No. 40
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Lead
Screening Conc.		400
40-02-1.0	9/16/97	2000

TABLE 6-60
INORGANIC SAMPLING RESULTS
SWMU No. 42
(All values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum	Antimony		Arsenic		Barium	Cadmium	Chromium		Cobalt		Copper	Lead		Mercury		Potassium		Selenium		Silver		Zinc	
42-01-1.0	9/13/97	17000	0.34	U	9.9	N	100	0.33	23		14	E	370	76	E	0.76		1100	*	7.6		0.068	U	87	E
42-01-1.0	5/6/98								20	N*										4.3	N*				
42-02-1.0	9/13/97	13000	0.32	U	6.5	N	76	0.13	17		14	E	15	20	E	0.31		680	*	0.86		0.064	U	49	E
42-03-1.0	9/13/97	17000	0.32	U	5.8	N	84	0.34	20		13	E	61	34	E	0.47		950	*	1.8		0.065	U	60	E
42-04-1.0	9/13/97	16000	0.33	U	5	N	80	0.19	17		13	E	12	18	E	0.066	U	730	*	0.66	U	0.066	U	54	E
42-05-1.0	9/13/97	15000	0.33	U	5.8	N	89	0.19	17		13	E	15	22	E	0.17		730	*	0.83		0.066	U	54	E
42-06-1.0	9/13/97	10000	0.31	U	7.2	N	180	0.15	94		9.3	E	46	20	E	0.1		910	*	1.7		0.063	U	60	E
42-06-1.0	5/6/98								32	N*										3.9	N*				
42-07-1.0	9/13/97	16000	0.32	U	9	N	95	0.41	20		14	E	36	95	E	0.36		1500	*	12		0.065	U	74	E
42-07 2-4	7/7/99								27											1.5	U				
42-07 4-6	7/7/99								26											1.6	U				
42-07-1.0	5/6/98								25	N*										12	N*				
42-08-1.0	9/13/97	10000	0.3	U	10	N	68	0.22	15		9.1	E	59	28	E	0.11		1000	*	1.3		0.061	U	60	E
42-09-1.0	9/13/97	17000	0.31	U	9.4	N	100	0.44	24		14	E	34	20	E E	0.084		1900	*	0.69		0.063	U	79	E

TABLE 6-61
INORGANIC PARAMETERS EXCEEDING SCREENING CRITERIA
SWMU No. 42
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Chromium	Selenium	
Screening Conc.		38	5	
42-01-1.0	9/13/97		7.6	
42-06-1.0	9/13/97	94		
42-07-1.0	9/13/97		12	
42-07-1.0	5/6/98		12	N*

TABLE 6-62
INORGANIC SAMPLING RESULTS
SWMU No. 46
(All values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum	Antimony		Arsenic		Barium	Cadmium		Chromium	Cobalt	Copper	Lead	Mercury		Potassium	Selenium		Silver		Zinc
46-01-1.0	9/16/97	16000	0.3	U	7	N	73	0.18	U	20	11	19	15	0.12	U	1100	0.61	U	0.061	U	55
46-02-1.0	9/16/97	19000	0.33	N	9.4	N	60	0.19	U	25	9	29	15	0.13	U	1400	0.63	U	0.063	U	61
46-03-1.0	9/16/97	18000	0.36	N	10	N	47	0.19	U	24	9.2	30	16	0.12	U	1300	0.62	U	0.062	U	61

TABLE 6- 63
INORGANIC SAMPLING RESULTS
SWMU No. 47
(All values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum	Antimony		Arsenic		Barium	Cadmium	Chromium	Cobalt		Copper	Lead		Mercury	Potassium		Selenium		Silver		Zinc	
47-01-1.0	9/13/97	18000	0.32	U	7.1	N	77	0.22	23	13	E	27	110	E	0.082	1400	*	20		0.064	U	62	E
47-02-1.0	9/13/97	23000	0.34	U	11	N	87	0.36	29	18	E	28	100	E	0.56	1400	*	32		0.068	U	76	E
47-02 4-6	7/1/99																	12					
47-02 6-8	7/1/99																	15					
47-02 10-12	7/1/99																	1.7	U				
47-03-1.0	9/13/97	17000	0.33	U	7.8	N	110	0.12	19	17	E	15	25	E	1.7	770	*	1.4		0.067	U	57	E
47-04-1.0	9/13/97	17000	0.35	U	5.5	N	97	0.25	18	17	E	14	23	E	0.33	1000	*	0.69	U	0.069	U	63	E
47-05-1.0	9/13/97	18000	0.32	U	5.8	N	70	0.2	21	15	E	15	17	E	0.1	1100	*	2.6		0.065	U	54	E
47-06-1.0	5/8/98																	3.1	U				
47-07-1.0	5/8/98																	22					
47-08-1.0	5/8/98																	3.3	U				
47-09-1.0	10/21/98																	99					
47-10-1.0	10/21/98																	6.1					

TABLE 6-64
INORGANIC PARAMETERS EXCEEDING SCREENING CRITERIA
SWMU No. 47
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum	Selenium
Screening Conc.		19265	5
47-01-1.0	9/13/97		20
47-02-1.0	9/13/97	23000	32
47-02 4-6	7/1/99		12
47-02 6-8	7/1/99		15
47-07-1.0	5/8/98		22
47-09-1.0	10/21/98		99
47-10-1.0	10/21/98		6.1

TABLE 6-65
INORGANIC SAMPLING RESULTS
SWMU No. 48
(All values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum	Antimony		Arsenic	Barium	Cadmium	Chromium	Cobalt		Copper		Lead		Mercury		Potassium	Selenium		Silver		Zinc	
48-01-1.0	9/10/97	22000	0.31	U	9.8	120	0.45	29	18	E	200		32	E	15		2300	0.63	U	0.063	U	93	E
48-02-1.0	9/10/97	21000	0.35	N	9.1	150	0.94	24	14	E	1300		88	E	7.4		1600	3.4	E*	0.065	U	260	E
48-03-1.0	9/10/97	16000	0.3	U	9.6	67	0.31	22	21	E	36		27	E	0.079		1100	0.8	E*	0.06	U	52	E
48-04-1.0	9/10/97	19000	0.31	U	8.6	140	0.46	23	15	E	3900		140	E	1.1		1400	3.4	E*	0.062	U	150	E
48-05-1.0	9/10/97	18000	0.32	U	6.1	88	0.31	20	14	E	43		21	E	0.32		990	0.64	U	0.064	U	97	E
48-06-1.0	9/10/97	21000	0.3	U	11	130	0.4	28	19	E	34		20	E	0.062		1900	0.6	U	0.06	U	83	E
48-07-1.0	9/10/97	18000	0.3	U	8.5	150	0.4	25	17	E	30		18	E	0.061	U	1400	0.61	U	0.061	U	79	E
48-08-1.0	9/10/97	18000	0.31	U	9.6	130	0.43	26	15		29		16		0.063	U	1400	0.63	U	0.13		77	
48-09-1.0	9/10/97	19000	0.3	U	11	140	0.56	26	21		34		22		0.061	U	1300	0.61	U	0.061	U	83	
48-10-1.0	5/4/98										96	*											
48-11-1.0	5/4/98										120	*											

TABLE 6-66
INORGANIC PARAMETERS EXCEEDING SCREENING CRITERIA
SWMU No. 48
(all values in MG/KG)

SAMPLE LOCATION	SAMPLE DATE	Aluminum	Copper	Mercury	Potassium
Screening Conc.		19265	600	10	1900
48-01-1.0	9/10/97	22000		15	2300
48-02-1.0	9/10/97	21000	1300		
48-04-1.0	9/10/97		3900		
48-06-1.0	9/10/97	21000			

ANALYTICAL REPORT NOTES, TERMS AND QUALIFIERS (INORGANIC)

Notes:

The metals and cyanide reporting limits (RLs) have been statistically determined to be no less than three standard deviations as defined in 40 CFR 136, Appendix B, Revision 1.11. All other reporting limits are referenced from the specific analytical method.

Terms:

NA	Not Applicable
NR	Not Requested
U	Below Reporting Limits

Qualifiers:

B	The reported value is less than the practical quantitation limit (PQL, project defined) but greater than or equal to the RL.
E	The reported value is estimated due to the presence of matrix interference.
N	Predigested spike recovery not within control limits.
W	Post digestion spike recovery not within control limits.
*	RPD or absolute difference for Duplicate analysis not within control limits.
**	Reference Standard Methods 19th edition.
(1)	pH analyzed outside USEPA specified holding time. pH must be measured immediately after sample collection.
(2)	The sample pH did not meet the preservation guidelines. Therefore the pH was adjusted upon receipt.
(3)	The sample had to be diluted because of matrix interferences.
(4)	Reference Standard Methods 17th edition for the distillation method.
(5)	The sample was analyzed out of the USEPA holding time.
(6)	The sample was received in the laboratory out of the USEPA holding time.
(7)	The shipping cooler temperature exceeded 6°C upon receipt to Eckenfelder Laboratory, LLC.
(8)	When the concentration of the analyte is below the detection limit, the detection limit must be divided by the %Solids (in decimal form) in order to obtain the sample's true detection limit on a dry weight basis.
(9)	Analysis was subcontracted

ANALYTICAL REPORT TERMS AND QUALIFIERS (GC/MS)

MDL: The method detection limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero. The MDL is determined from analysis of a sample containing the analyte in a given matrix.

EQL: The estimated quantitation limit (EQL) is defined as the estimated concentration above which quantitative results can be obtained with a specific degree of confidence. Eckenfelder Laboratory, LLC. defines the EQL to be ten times the MDL.

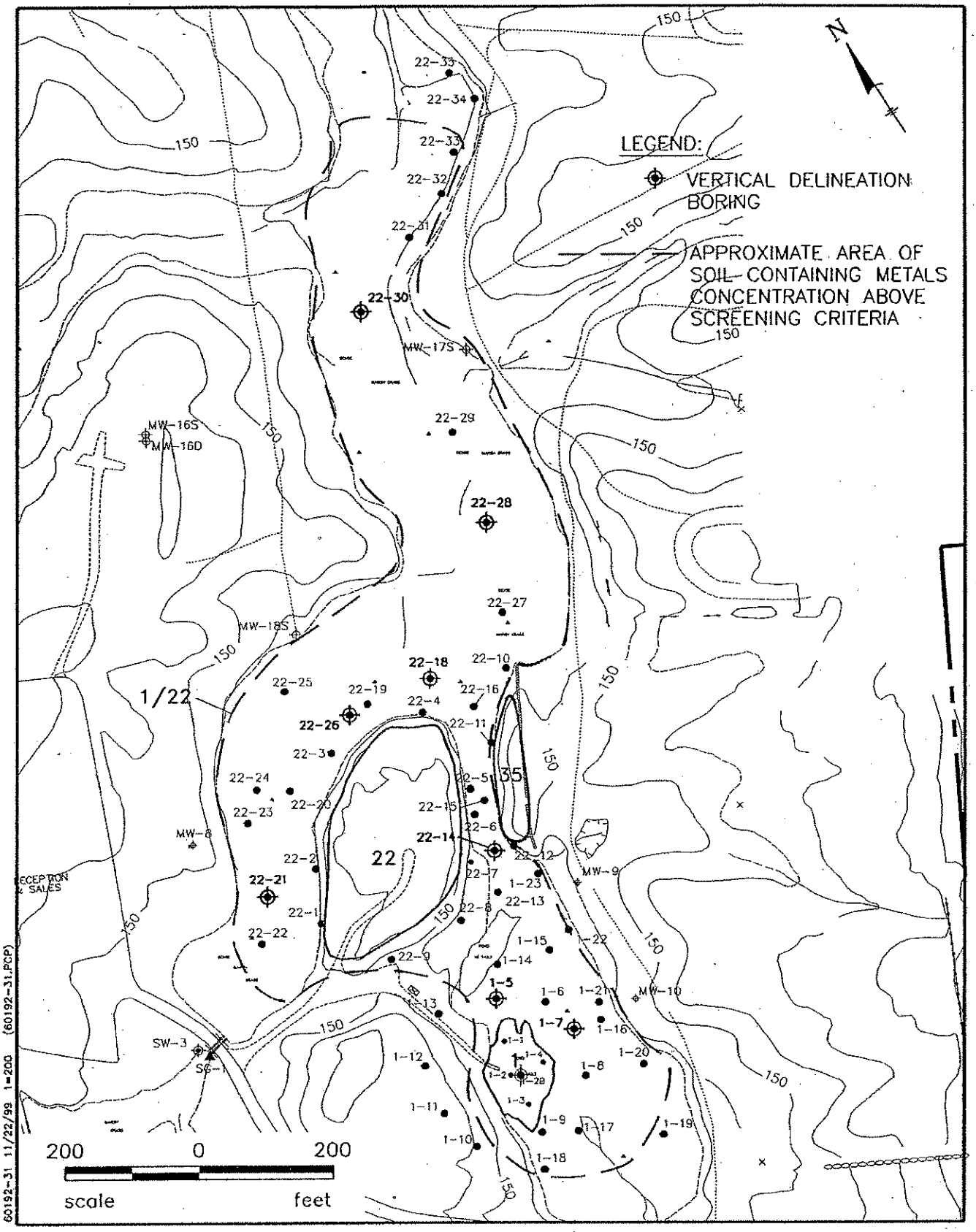
U: The presence of a "U" indicates that the analyte was analyzed for but was not detected or the concentration of the analyte quantitated below the MDL.

B: The presence of a "B" to the right of an analytical value indicates that this compound was also detected in the method blank and the data should be interpreted with caution. One should consider the possibility that the correct sample result might be less than the reported result and, perhaps, zero.

D: When a sample (or sample extract) is rerun diluted because one of the compound concentrations exceeded the highest concentration range for the standard curve, all of the values obtained in the dilution run will be flagged with a "D".

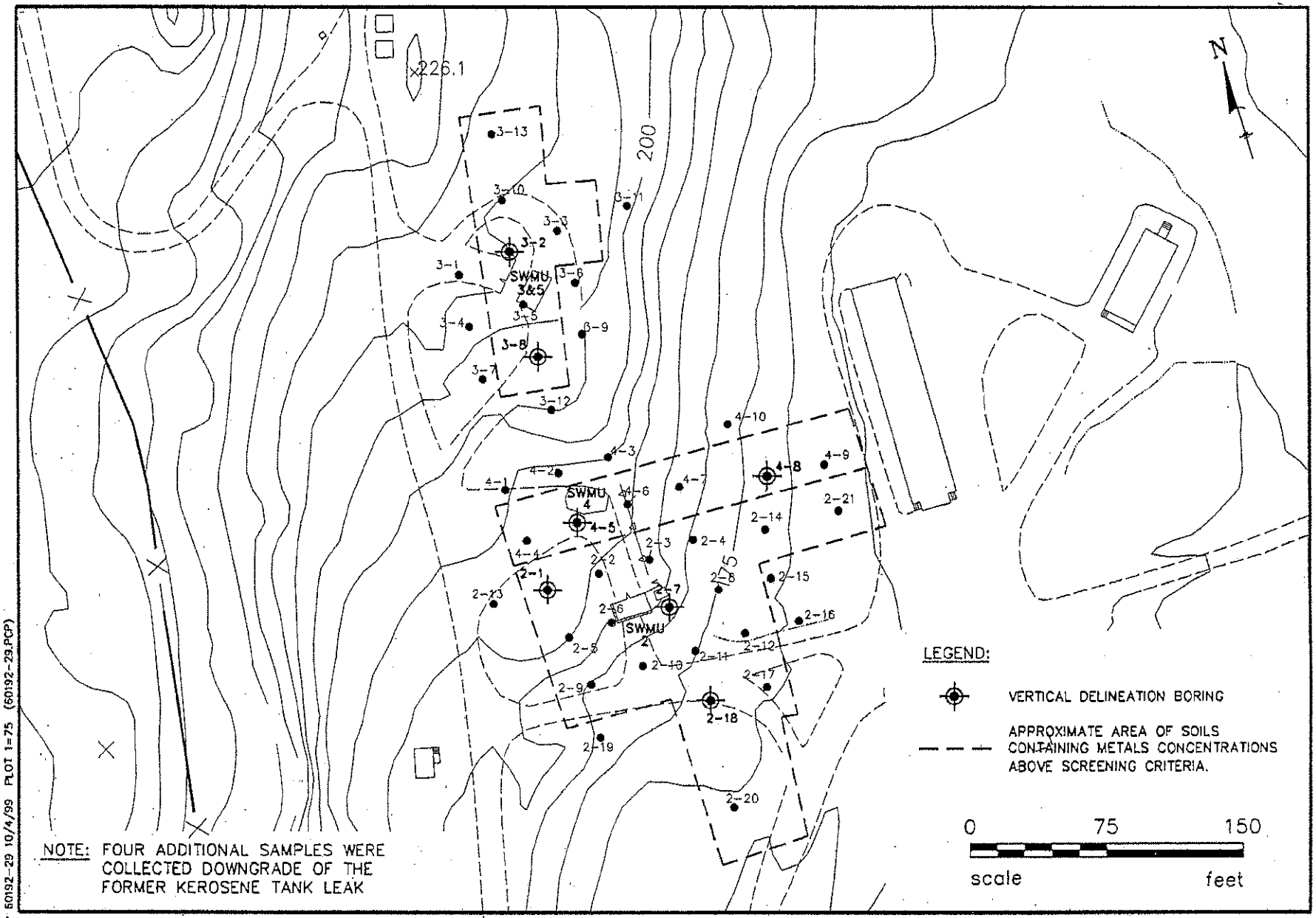
E: The concentration for any compound found which exceeds the highest concentration level on the standard curve for that compound will be flagged with an "E". Usually the sample will be rerun at a dilution to quantitate the flagged compound.

J: The presence of a "J" to the right of an analytical result indicates that the reported result is estimated. The mass spectral data pass the identification criteria showing that the compound is present, but the calculated result is less than the EQL. One should feel confident that the result is greater than zero and less than the EQL.



BROWN AND CALDWELL

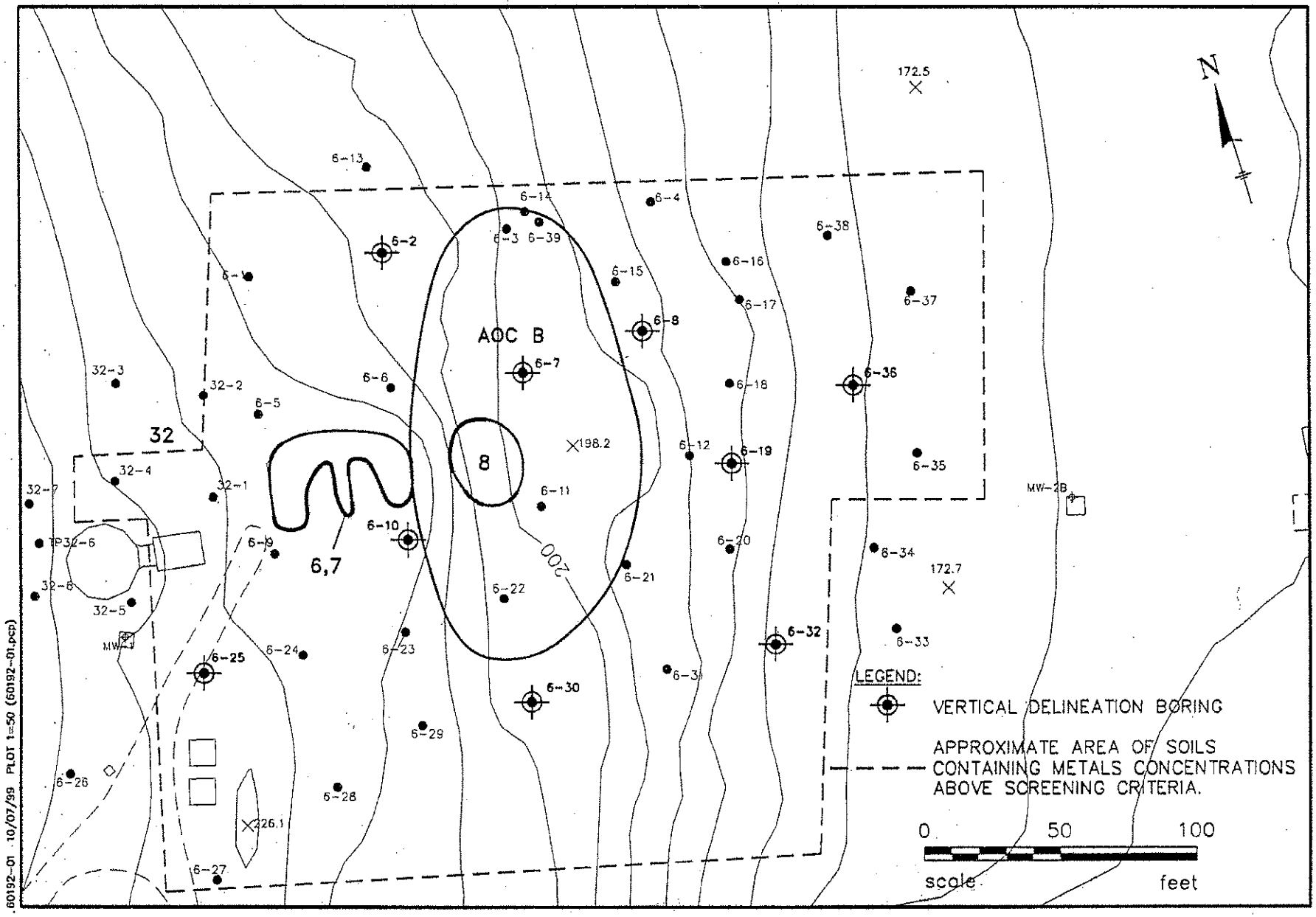
FIGURE 6-1
SWMU NOS. 1 & 22



50192-29 10/4/99 PLOT 1=75 (50192-29.PCP)

BROWN AND CALDWELL

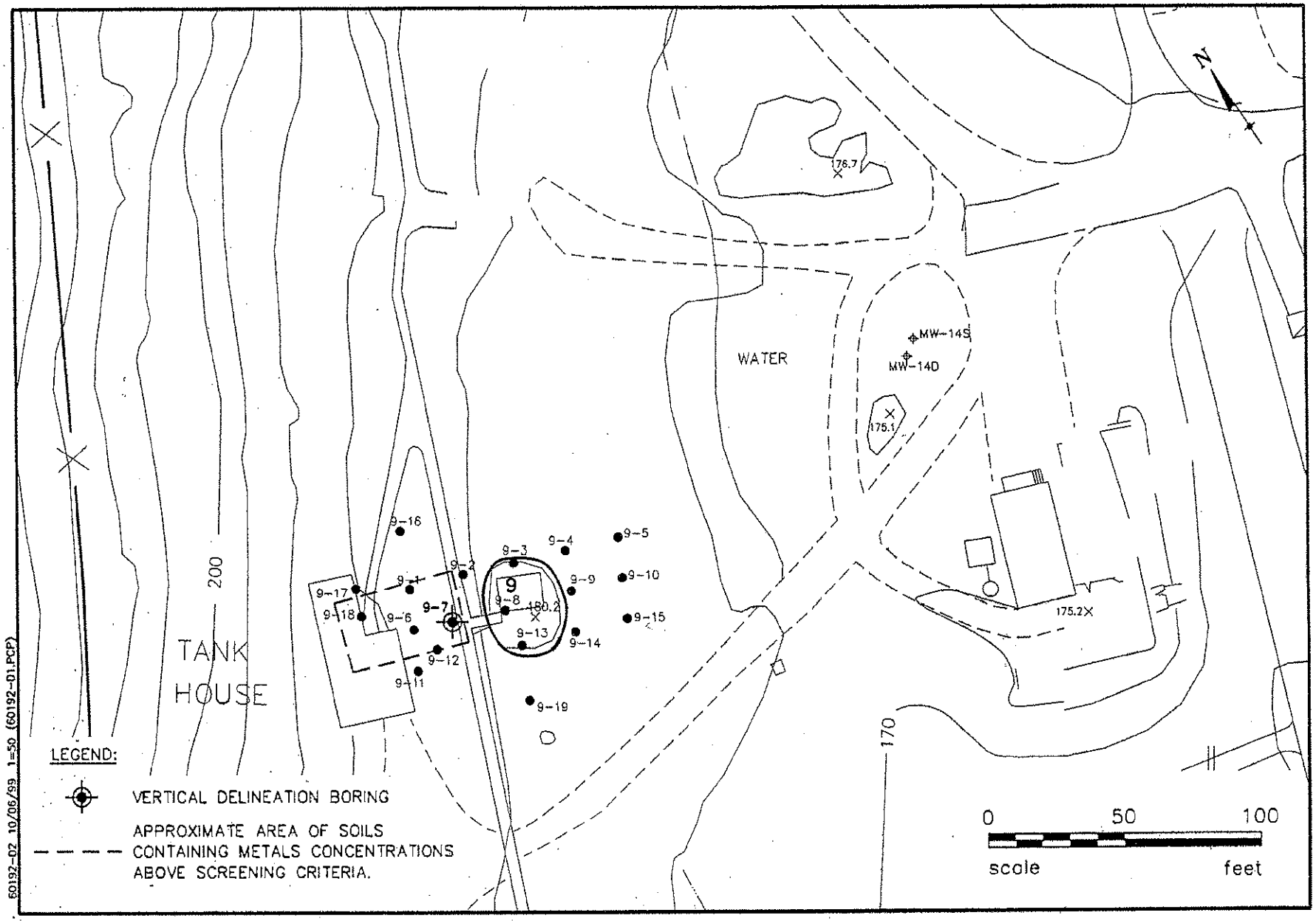
FIGURE 6-2
SWMU 2,3 & 4



.60192-01 10/07/99 PLOT 1=50 (60192-01.pcp)

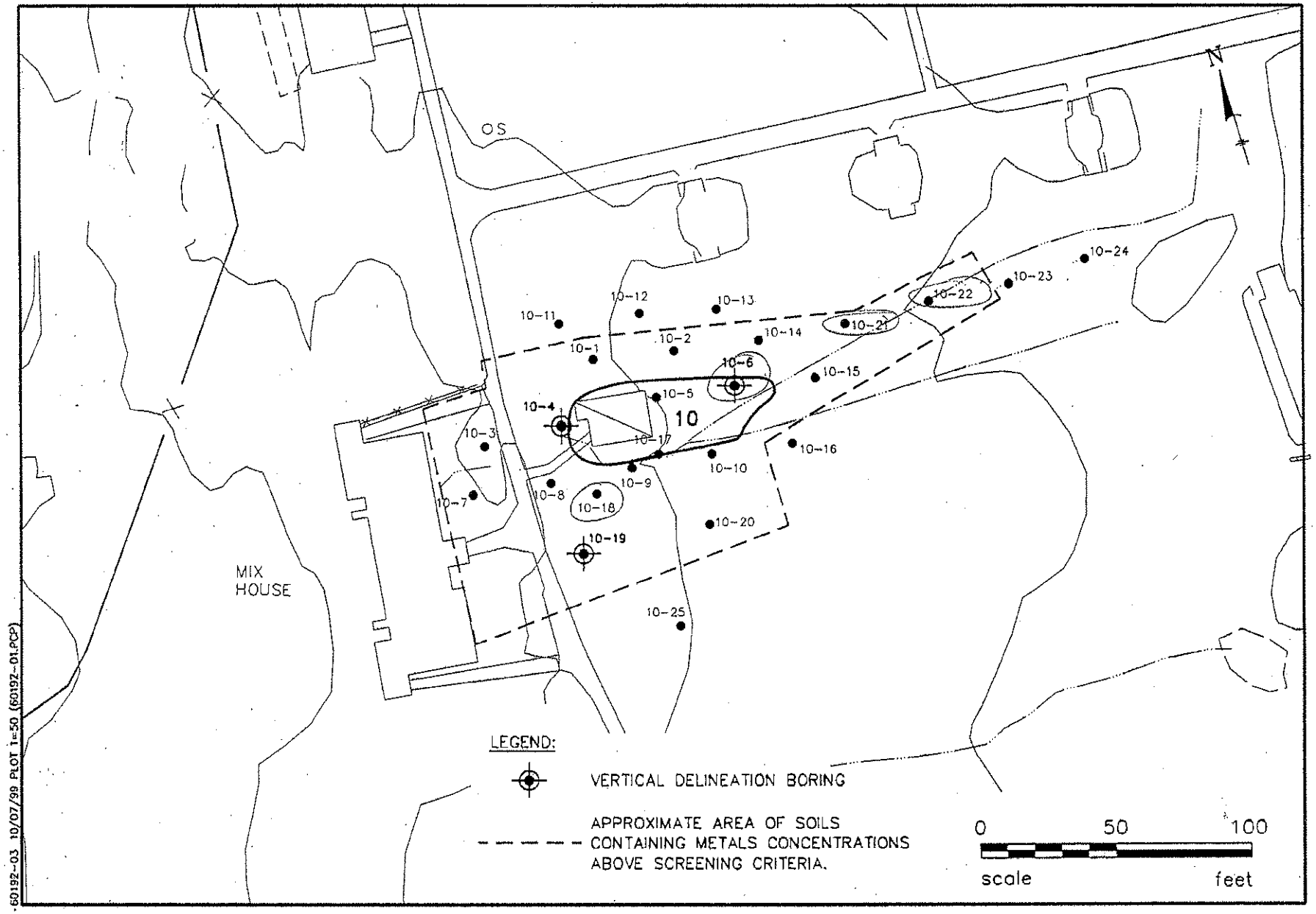
BROWN AND CALDWELL

FIGURE 6-3
AOC B (SWMU 6,7,8) & 32



BROWN AND CALDWELL

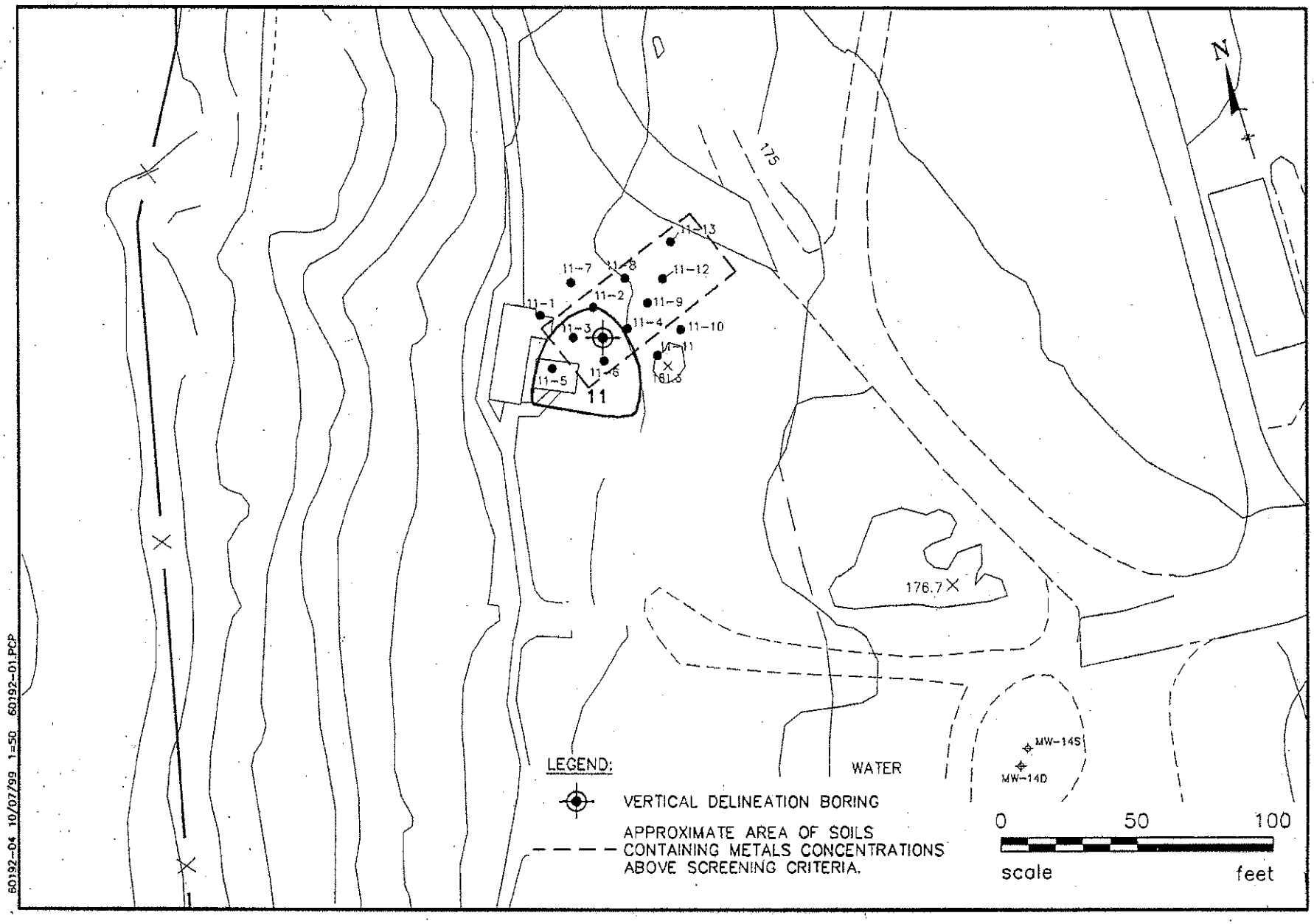
FIGURE 6-4
SWMU NO. 9



60192-03 10/07/99 PLOT 1=50 (60192-01.PCP)

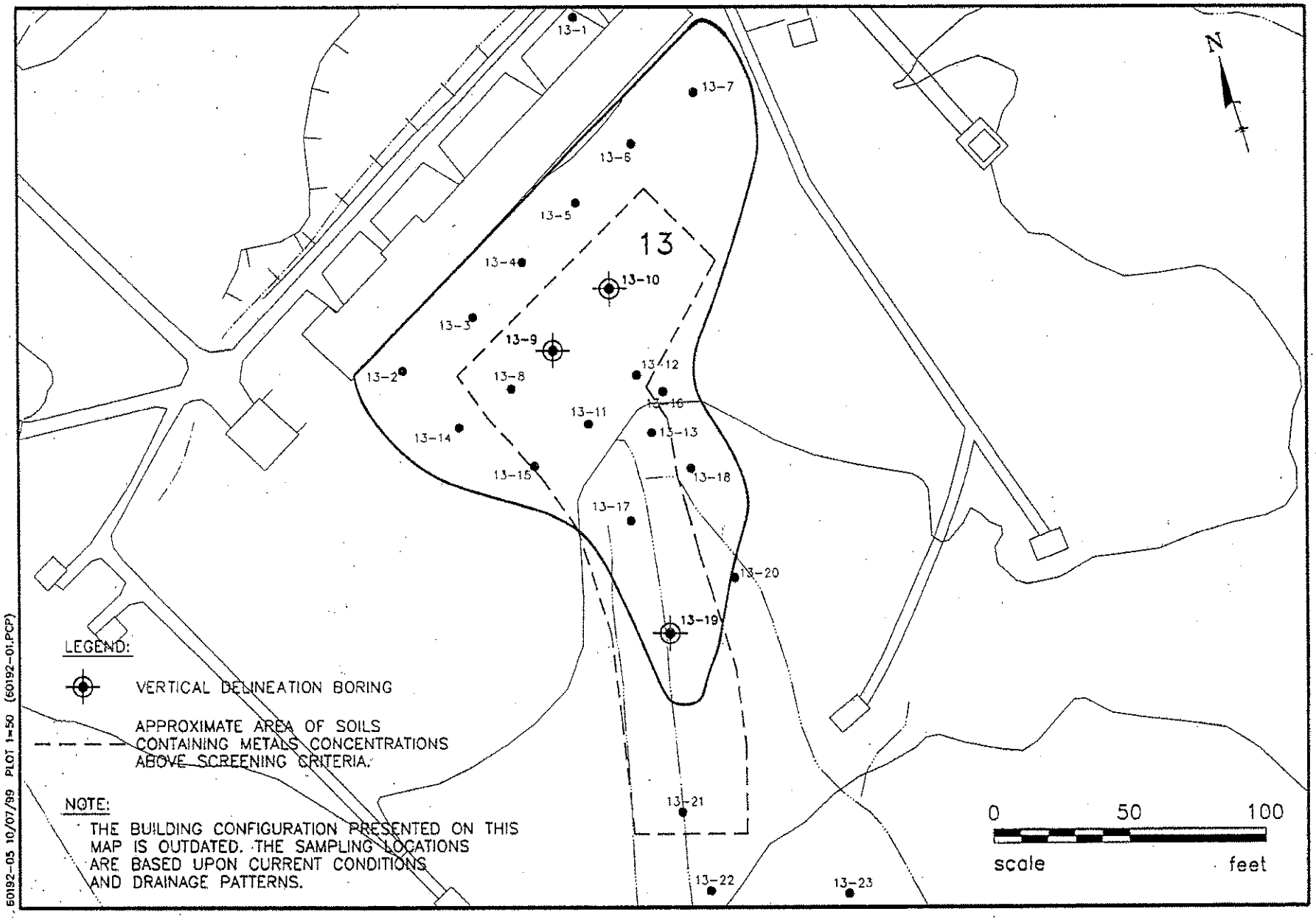
BROWN AND CALDWELL

FIGURE 6-5
SWMU NO. 10



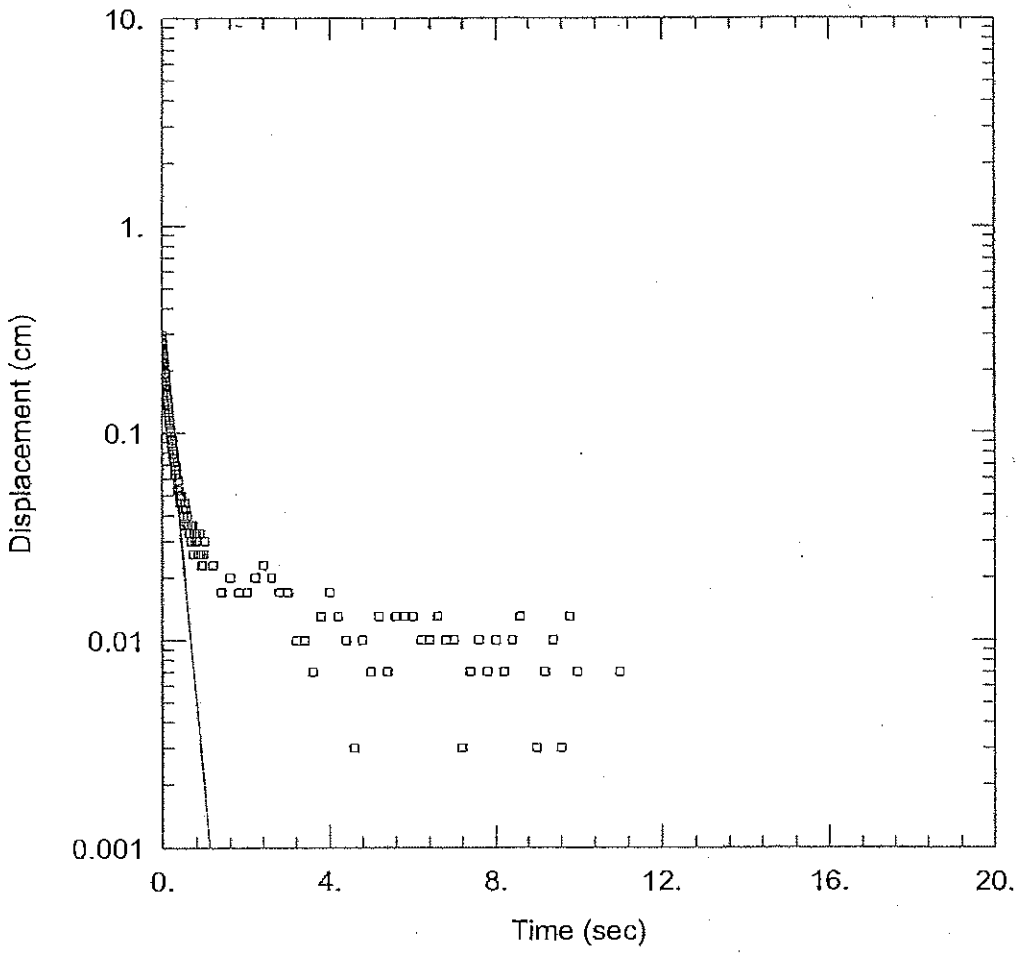
BROWN AND CALDWELL

FIGURE 6-6
SWMU NO. 11



BROWN AND CALDWELL

FIGURE 6-7
SWMU NO. 13



MW-20R

Data Set: P:\HYDRO\DYNO\SLUG\MW-20r.aqt
Date: 10/07/99 Time: 11:16:55

PROJECT INFORMATION

Company: Brown & Caldwell
Client: Dyno Nobel
Project: 60192
Test Location: Port Ewen, NY
Test Well: Mw-20r

AQUIFER DATA

Saturated Thickness: 304.8 cm Anisotropy Ratio (Kz/Kr): 1.

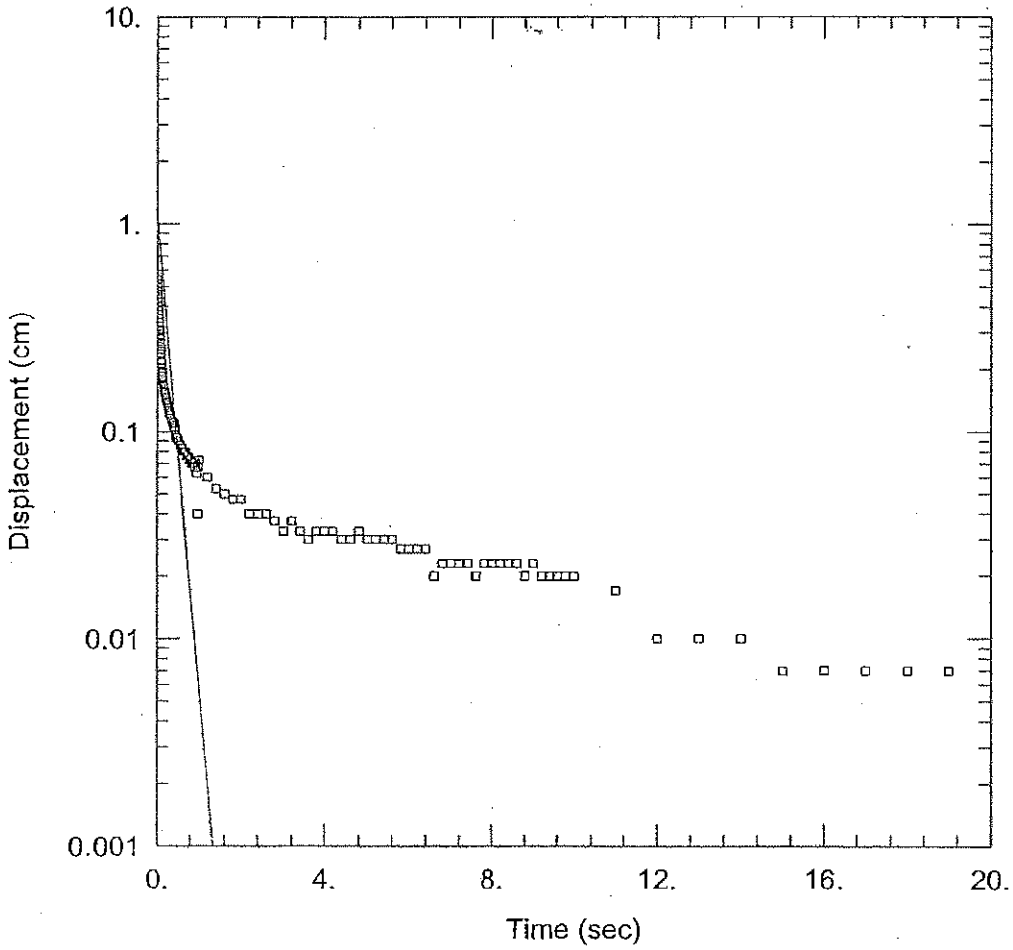
WELL DATA (MW-20r)

Initial Displacement: 0.297 cm Water Column Height: 1987.6 cm
Casing Radius: 5. cm Wellbore Radius: 5. cm
Screen Length: 540. cm

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 0.5062 cm/sec y0 = 0.2712 cm



MW-21D

Data Set: P:\HYDRO\DYNO\SLUG\MW-21d.aqt
Date: 10/07/99 Time: 10:45:11

PROJECT INFORMATION

Company: Brown & Caldwell
Client: DynoNobel
Project: 60192
Test Location: Port Ewen
Test Well: MW-21d

AQUIFER DATA

Saturated Thickness: 304.8 cm Anisotropy Ratio (Kz/Kr): 1.

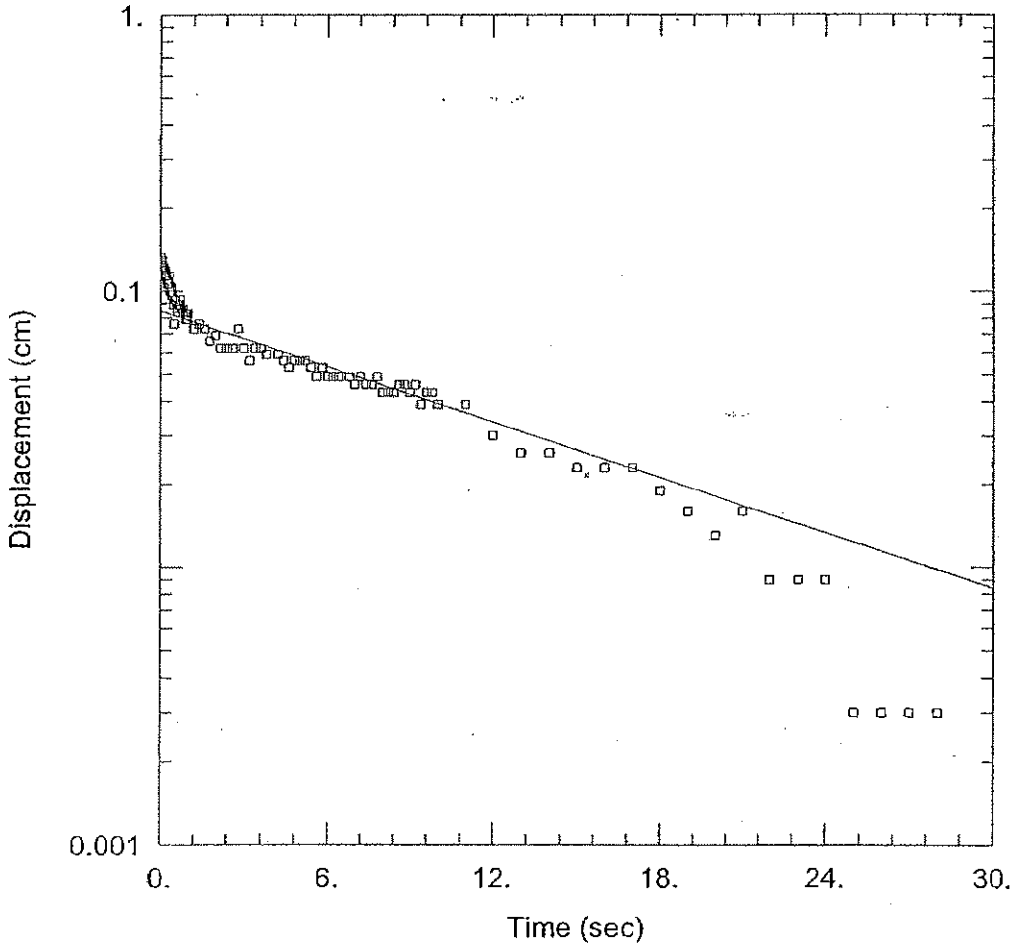
WELL DATA (MW-21d)

Initial Displacement: 0.541 cm Water Column Height: 1271.3 cm
Casing Radius: 5. cm Wellbore Radius: 15. cm
Screen Length: 300. cm

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 0.6585 cm/sec y0 = 1.089 cm



MW-21R

Data Set: P:\HYDRO\DYNO\SLUG\MW-21r.aqt
Date: 10/07/99 Time: 10:47:32

PROJECT INFORMATION

Company: Brown & Cladwell
Client: Dyno Nobel
Project: 60192
Test Location: Port Ewen, NY
Test Well: MW-21r

AQUIFER DATA

Saturated Thickness: 609.6 cm Anisotropy Ratio (Kz/Kr): 1.

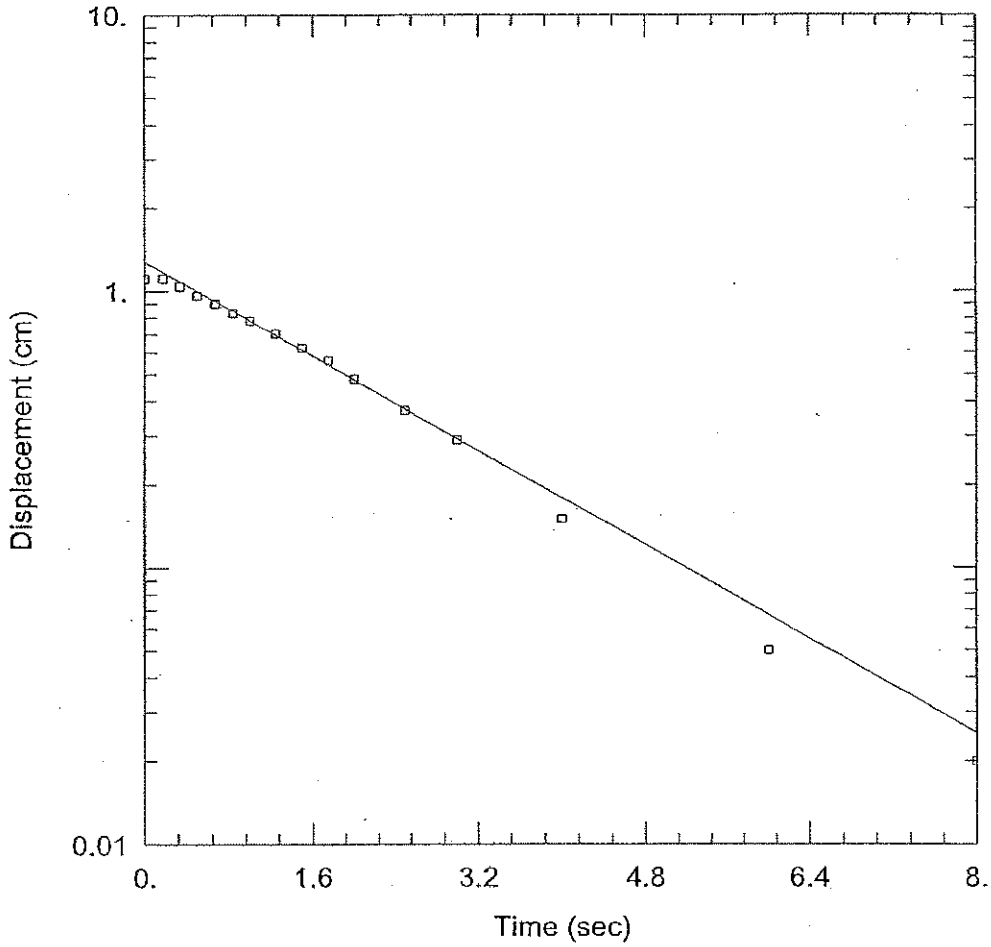
WELL DATA (MW-21r)

Initial Displacement: 0.132 cm Water Column Height: 1271.6 cm
Casing Radius: 5. cm Wellbore Radius: 15. cm
Screen Length: 600. cm

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 0.005258 cm/sec y0 = 0.08468 cm



MW-22D

Data Set: P:\HYDRO\DYNO\SLUG\MW-22d.aqt
Date: 10/07/99 Time: 10:49:55

PROJECT INFORMATION

Company: Brown & Caldwell
Client: Dyno Nobel
Project: 60192
Test Location: Port Ewen , NY
Test Well: MW-22d

AQUIFER DATA

Saturated Thickness: 579.1 cm Anisotropy Ratio (Kz/Kr): 1.

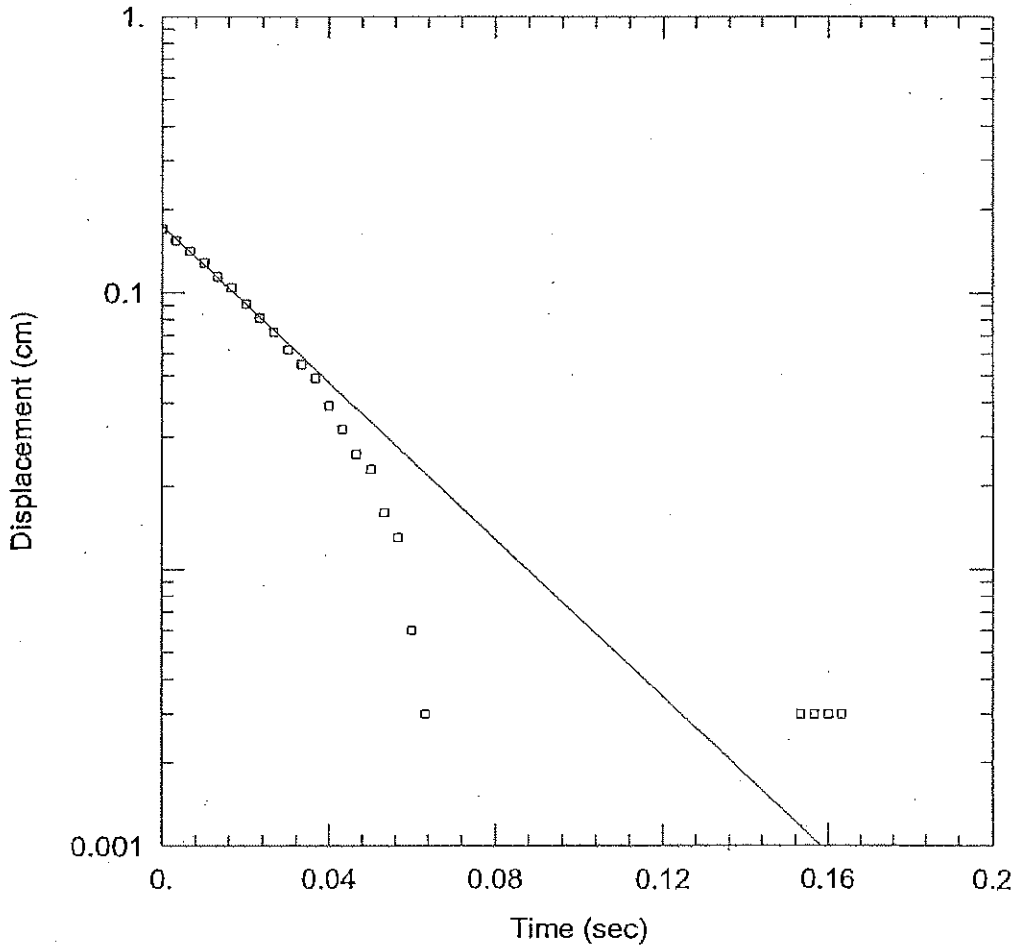
WELL DATA (MW-22d)

Initial Displacement: 1.11 cm Water Column Height: 680.3 cm
Casing Radius: 5. cm Wellbore Radius: 15. cm
Screen Length: 150. cm

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 0.09814 cm/sec y0 = 1.276 cm



MW-22R

Data Set: P:\HYDRO\DYNO\SLUG\MW-22r.aqt
Date: 10/07/99 Time: 11:15:38

PROJECT INFORMATION

Company: Brwon & Caldwell
Client: Dyno Nobel
Project: 60192
Test Location: Port Ewen, NY
Test Well: MW-22r

AQUIFER DATA

Saturated Thickness: 609.6 cm Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-22r)

Initial Displacement: 0.17 cm Water Column Height: 1380.1 cm
Casing Radius: 5. cm Wellbore Radius: 5. cm
Screen Length: 600. cm

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 2.869 cm/sec y0 = 0.1744 cm

APPENDIX B

SOIL BORING AND MONITORING WELL LOGS

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: C-4

Project: *Vertical Delineation*
Client: *Dyno-Nobel*
Project No.: *60192.001*
Start Date: *7/2/99*
Finish Date: *7/2/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

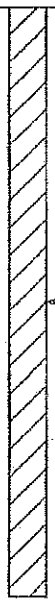
Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

WELL CONSTRUCTION



SAMPLE DATA

Depth (feet)	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.) / Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0		1	5-11-12-11				MF Sandy Silt	
		2	10-11-20-12				MF Brown Sandy Silt (-clay) damp	
5		3	5-6-7-10				F Sandy Silt (+clay), damp	
		4	10-11-12-10				Brown to gray Silty Clay to Clayey Silt, Damp	
		5	4-5-8-7				Gray Silty Clay, damp	
10		6	2-4-5-6					Boring backfilled w/ Grout.
		7	3-5-6-9				Gray Silty Clay, Pebbles, F SAND, saturated	
15		8	10-12-14-12				Brown F SAND, saturated	
							End of Boring @ 16'	
20								
25								
30								

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: C-5

Project: *Vertical Delineation*
Client: *Dyno-Nobel*
Project No.: *60192.001*
Start Date: *7/2/99*
Finish Date: *7/2/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)	WELL CONSTRUCTION	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0			1	8-10-5-6				MF Gravel, Sand and Silt	
			2	7-7-11-10				MF Brown Clayey Silt to Silt	
5			3	3-5-8-10				Brown F Silt (-sand), damp	
			4	10-10-12-10				Brown F Clayey Silt, moist, mottled	
	Backfilled w/ Cement Grout		5	2-4-6-6					
10			6	1-3-5-6				Red Brown to gray, F Silty Clay to Clay, mottled	Boring backfilled w/ Grout.
			7	5-8-8-5				Gray Silty Clay, saturated	
15			8	5-5-5-5				End of Boring @ 16'	
20									
25									
30									

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 1-1

Project: *Vertical Delineation*
Client: *Dyno-Nobel*
Project No.: *60192.001*
Start Date: *7/26/99*
Finish Date: *7/26/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Tripod/Barge*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments: *Detonation Pond*

Depth (feet)	WELL CONSTRUCTION	soil / rock	Samp. No.	Blows/ 6 in.	Rec. (ft.)	USCS	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0	Boring collapse		1	1-1-1-1				Gray CLAY, w/ Live Detonators, wire, ash	Live Detonator, wire, ash
			2	1-1-1-1				End of Boring @ 4'	
5									
10									
15									
20									
25									
30									

Run No. | Hydraul. Cond. cm/sec | Rec. (ft.) | RQD

Brown and Caldwell	Subsurface Boring Log	Well Name/Location: 1-2

Project: *Vertical Delineation* | Project No.: *60192.001* | Start Date: *7/27/99* | Finish Date: *7/27/99*

Client: *Dyno-Nobel*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Tripod/Barge*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments: *Detonation Pond*

Depth (feet)	WELL CONSTRUCTION	soil / rock	Samp. No. / Run No.	Blows/6 in. / Hydraul. Cond. cm/sec	Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0	Boring collapse		1	1-1-1-1				Gray CLAY, 4 Live Detonators, wire, ash	Live Detonator, wire, ash
			2	1-1-1-1				End of Boring @ 4'	
5									Boring was Canceled by Dyno-Nobel due to the presence of Live Detonators in split-spoon, deemed IDLH.
10									
15									
20									
25									
30									

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 1-5

Project: *Vertical Delineation*
Client: *Dyno-Nobel*
Project No.: *60192.001*
Start Date: *7/26/99*
Finish Date: *7/26/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *550 ATV Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

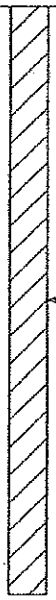
Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

WELL CONSTRUCTION



SAMPLE DATA

Depth (feet)	Samp. No. (soil) / Run No. (rock)	Blows/ 6 in.	Hydraul. Cond. cm/sec	Rec. (ft.)	USCS	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0	1	1-3-5-5					Gray CLAY, w/ plant material	
	2	1-3-5-7					Gray/Red Brown Silty Clay to Clayey Silt	Dead plants/root material create 3' gap above soil, samples were collected where soil began
5	3	5-7-8-9					Red Brown F Silty Clay to Clayey Silt, Varved & Mottled	
	4	4-5-5-7					Red Brown to Gray CLAY, (+) Clayey Silt (-) Silty Clay, Saturated	
	5	1-2-3-4					Gray CLAY, Plastic, saturated	
10	6	5-3-3-2						
	7	1-1-2-2						Boring backfilled w/ Grout.
15	8	1-2-2-3					End of Boring @ 16'	
20								
25								
30								

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 1-7

Project: *Vertical Delineation*
Client: *Dyno-Nobel*
Project No.: *60192.001*
Start Date: *7/26/99*
Finish Date: *7/26/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *550 ATV Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

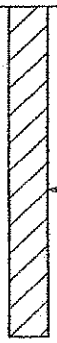
WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)	WELL CONSTRUCTION	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.) / Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0	 Boring Collapse		1	1-1-1-1				Gray CLAY, w/ wire, plant material	
			2	2-2-4-4				Gray/Blue CLAY to Clayey Silt	Dead plants/root material create 3' gap above soil, samples were collected where soil began
5			3	5-10-12-10					
			4	6-4-3-4				Gray CLAY, Plastic, saturated	
			5	2-12-100/.4				End of Boring @ 9'	
10									Boring collapse.
15									
20									
25									
30									

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 2-01

Project: *Vertical Delineation*
Client: *Dyno-Nobel*
Project No.: *60192.001*
Start Date: *7/12/99*
Finish Date: *7/12/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

WELL CONSTRUCTION

SAMPLE DATA

soil / rock

Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
1	8-18-16-18				Debris, Brown MF Sandy Silt to Silty Sand	
2	6-12-8-14				Fill, Asphault material @ 4'	
3	3-2-1-1				Fill, Wood, Brick, Concrete, Orange MF Sand, damp	Boring backfilled w/ Grout. Refusal @ 12.6'
4	2-3-4-5					
5	5-6-9-10					
6	12-16-17-12					
	12-100/.4				Split Spoon Refusal @ 12.6 End of Boring @ 12.6	

Depth (feet): 0, 5, 10, 15, 20, 25, 30

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 2-7

Project: *Vertical Delineation*
Client: *Dyno-Nobel*
Project No.: *60192.001*
Start Date: *7/14/99*
Finish Date: *7/14/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)	WELL CONSTRUCTION	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0			1	2-18-20-35				Debri, fill, rock, wood, ash, wire (green Cu Stains)	
			2	35-12-10-9					
5	Backfilled w/ Cement Grout		3	0-12-30-80				Orange F Silty Sand w/ pebbles	Boring backfilled w/ Grout.
	Split Spoon Refusal @ 6.9		4	30-100/.4				Split Spoon Refusal @ 6.9 End of Boring @ 6.9	Refusal @ 6.9'
10									
15									
20									
25									
30									

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 2-18

Project: *Vertical Delineation*
Client: *Dyno-Nobel*
Project No.: *60192.001*
Start Date: *7/13/99*
Finish Date: *7/13/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)	WELL CONSTRUCTION	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0			1	4-6-7-9				LT Brown F Clayey Silt to Silt	
			2	6-19-20-20				Red Brown F Clayey Silt to Silt	
5			3	4-7-9-11					
			4	13-13-15-16				Red Brown MF Silty Clay to Clayey Silt, damp, varved, mottled	
	Backfilled w/ Cement Grout		5	4-6-7-9					
10			6	2-4-4-6					Boring backfilled w/ Grout.
			7	5-5-3-4				Dark gray CLAY, platic, moist	
15			8	2-3-4-4					
								End of Boring @ 16'	
20									
25									
30									

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 3-2

Project: *Vertical Delineation*
Client: *Dyno-Nobel*
Project No.: *60192.001*
Start Date: *7/14/99*
Finish Date: *7/14/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)	WELL CONSTRUCTION	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0			1	7-11-4-4				Debris fill, rock, slag, ash, wire, Sand & Silt	
			2	4-5-10-8					
5	Backfilled w/ Cement Grout		3	2-4-8-12				Orange MF Silty Sand, mottled	Boring backfilled w/ Grout.
			4	8-10-10-35					
	Split Spoon Refusal @ 8.1'			100/.3				Split Spoon Refusal @ 8.1 End of Boring @ 8.1'	Refusal @ 8.1'
10									
15									
20									
25									
30									

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 3-8

Project: *Vertical Delineation*
Client: *Dyno-Nobel*
Project No.: *60192.001*
Start Date: *7/14/99*
Finish Date: *7/14/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)	WELL CONSTRUCTION	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0			1	7-5-4-3				Debris fill, rock, wood, ash, wire, Sand & Silt	
			2	1-2-2-1					
5	Backfilled w/ Cement Grout		3	1-1-1-1				Pink Ash, Clay, wires, Sand & Silt	Boring backfilled w/ Grout.
			4	7-9-13-12				F Orange SAND	
			5	9-14-14-22				Orange Pebbly Conglmerate, MF SAND	
10	Split Spoon Refusal @ 10.7			45-100/.2				Split Spoon Refusal @ 10.7 End of Boring @ 10.7	Refusal @ 10.7'
15									
20									
25									
30									

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 4-5

Project: *Vertical Delineation*
Client: *Dyno-Nobel*
Project No.: *60192.001*
Start Date: *7/12/99*
Finish Date: *7/12/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)	WELL CONSTRUCTION	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0			1	16-19-14-13				Orange to brown MF Silty Sand	
			2	24-40-30-40					
5	Backfilled w/ Cement Grout		3	45-60-60-40					Boring backfilled w/ Grout.
	Split Spoon Refusal @ 7.6'		4	20-10-100/.3				Split Spoon Refusal @ 7.6 End of Boring @ 7.6	Refusal @ 7.6'
10									
15									
20									
25									
30									

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 4-8

Project: *Vertical Delineation* | Project No.: *60192.001* | Start Date: *7/13/99* | Finish Date: *7/13/99*

Client: *Dyno-Nobel*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA

DATUM: NA
Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)	WELL CONSTRUCTION	soil / rock	Run No.	Hydraul. Cond. cm/sec	Rec. (ft.)	RQD	Samp. No.	Blows/ 6 in.	Rec. (ft.)	USCS	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0							1	1-5-2-1				LT Brown F SILT, roots, top soil	
							2	3-5-10-20				LT Brown F Clayey Silt to Silt	
5							3	8-12-15-16					
							4	36-34-36-27				Red Brown MF Silty Clay to Clayey Silt, damp, varved, mottled	
	Backfilled w/ Cement Grout						5	5-6-9-10					
10							6	3-6-6-7					Boring backfilled w/ Grout.
							7	10-10-9-8					
15							8	5-6-6-5				Dark gray CLAY, platic, moist	
												End of Boring @ 16'	
20													
25													
30													

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 9-7

Project: *Vertical Delineation*
Client: *Dyno-Nobel*
Project No.: *60192.001*
Start Date: *7/12/99*
Finish Date: *7/12/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)	WELL CONSTRUCTION	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0			1	11-8-8-8				Top Soil, mf brown Silty Clay, loose, dry	
			2	12-12-15-17				Gravel, MF Sand to F Silty Clay, dry	
5			3	6-7-10-13				Red, F Silty Sand and Sandy Silt, to Silty Clay	
			4	20-15-19-15				CMF Silty Clay and Gravel	
	Backfilled w/ Cement Grout		5	2-4-7-11				CMF SAND to brown Silty Clay, moist	
10			6	2-2-3-3					Boring backfilled w/ Grout.
			7	3-7-4-5				Dark gray F CLAY w/ Sand & Gravel	
15			8	2-2-2-2				Gray Clay, w/ trace Silt, some Sand (+) Gravel	
								End of Boring @ 16'	
20									
25									
30									

Brown and Caldwell	Subsurface Boring Log	Well Name/Location: 6-2

Project: *Vertical Delineation* | Project No.: *60192.001* | Start Date: *7/14/99* | Finish Date: *7/14/99*

Client: *Dyno-Nobel*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)	WELL CONSTRUCTION	soil / rock	Samp. No.	Blows/ 6 in.	Rec. (ft.)	USCS	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0	Refusal @ 1.6'		1	4-20-100/.4					Refusal @ 1.6'
5									
10									
15									
20									
25									
30									

Run No. | Hydraul. Cond. cm/sec | Rec. (ft.) | RQD

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 6-7

Project: *Vertical Delineation*
Client: *Dyno-Nobel*
Project No.: *60192.001*
Start Date: *7/15/99*
Finish Date: *7/15/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)	WELL CONSTRUCTION	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0	Refusal @ 1'								Refusal @ 1'
5									
10									
15									
20									
25									
30									

Brown and Caldwell	Subsurface Boring Log	Well Name/Location: 6-10

Project: *Vertical Delineation* | Project No.: *60192.001* | Start Date: *7/14/99*
Client: *Dyno-Nobel* | Finish Date: *7/14/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)	WELL CONSTRUCTION	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0			1	3-3-5-4				Ash, Rock Debris, Caps, wire, Sulfer odor	
				3-4-20-100/.1				Ash, Bedrock	
	Refusal @ 4.0'								
5									Refusal @ 4.0'
10									
15									
20									
25									
30									

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 6-19

Project: *Vertical Delineation*
Client: *Dyno-Nobel*
Project No.: *60192.001*
Start Date: *7/15/99*
Finish Date: *7/15/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)	WELL CONSTRUCTION	soil / rock	Samp. No.	Blows/ 6 in.	Rec. (ft.)	USCS	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
			Run No.	Hydraul. Cond. cm/sec	Rec. (ft.)	RQD			
0			1	4-18-5-6				brown Silty Sand w/slag material	
	Backfilled w/ Cement Grout		2	4-6-7-11					Boring backfilled w/ Grout.
5	Split Spoon Refusal @ 5'		3	20-100/.4				Split Spoon Refusal @ 5' End of Boring @ 5'	Refusal @ 5'
10									
15									
20									
25									
30									

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 6-25

Project: *Vertical Delineation*
Client: *Dyno-Nobel*
Project No.: *60192.001*
Start Date: *7/14/99*
Finish Date: *7/14/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)	WELL CONSTRUCTION	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0	Refusal @ 2.3'		1	12-13-9-9					Refusal @ 2.3'
				20-100/.4					
5									
10									
15									
20									
25									
30									

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 6-30

Project: *Vertical Delineation*
Project No.: *60192.001*
Start Date: *7/15/99*
Finish Date: *7/15/99*
Client: *Dyno-Nobel*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)	WELL CONSTRUCTION	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.) / Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0	Refusal @ 1'								Refusal @ 1'
5									
10									
15									
20									
25									
30									

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 6-32

Project: *Vertical Delineation* | Project No.: *60192.001* | Start Date: *7/16/99* | Finish Date: *7/16/99*

DRILLING DATA	
Inspector:	*Marc Conger*
Contractor:	*Maxim Technologies*
Equipment:	*Acker Auger Rig*
Method:	*Direct Push*

SAMPLING METHODS	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT	
Method: *NA*	
Duration: *NA*	
Gals. Purged: *NA*	
Slug Test: *NA* (cm/sec)	

SURVEY DATA DATUM: NA	
Grade: *NA*	
TWC: *NA*	
TPC: *NA*	
North: *NA*	
East: *NA*	

Geophysical Log: ☐ yes ☒ no

Comments:

Depth (feet)	WELL CONSTRUCTION	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0			1	4-9-11-13				Brown/Orange MF SAND (+) Silt	
	Backfilled w/ Cement Grout		2	0-10-34-39					Boring backfilled w/ Grout.
5			3	16-18-18-19					
			4	23-32-46-53				Brown w/ Black Ash/Peat, F SILT (+) Sand	
				65-88-100/.2					
10	Split Spoon Refusal @ 9.6'							Split Spoon Refusal @ 9.6' End of Boring @ 9.6'	Refusal @ 9.6
15									
20									
25									
30									

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 6-36

Project: *Vertical Delineation* | Project No.: *60192.001* | Start Date: *7/19/99* | Finish Date: *7/19/99*

Client: *Dyno-Nobel*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA

DATUM: NA
Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)	WELL CONSTRUCTION	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.)	USCS / RQD %	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0			1	4-6-16-16				Dark Brown SILT (+) Sand, roots	
	Backfilled w/ Cement Grout		2	16-18-28-28				Brown MF Sandy Silt, damp	Boring backfilled w/ Grout.
5			3	10-12-18-28					
	Split Spoon Refusal @ 7'			24-100/.4				Split Spoon Refusal @ 7' End of Boring @ 7'	Refusal @ 7.0'
10									
15									
20									
25									
30									

Brown and Caldwell	Subsurface Boring Log	Well Name/Location: 10-04
		Page 1 of 0

Project: *Vertical Delineation*	Project No.:	Start Date: *7/9/99*
Client: *Dyno-Nobel*	*60192.001*	Finish Date: *7/9/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

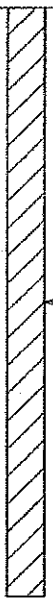
WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)	WELL CONSTRUCTION	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.) / Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0	 Backfilled w/ Cement Grout		1	5-6-11-14				Top Soil, grass, roots, loose F SILT, dry	Boring backfilled w/ Grout.
			2	14-19-15-17				F Red to Brown Silty Clay to Clayey Silt, varved	
5			3	5-7-10-11				F Brown to Gray CLSY and Silt, moist	
			4	6-12-16-16				(3") MF FLowing Sand, MF Silty Sand, saturated	
			5	4-4-6-6				Red Brown F Silty Clay, varved	
10			6	4-4-2-5				Red Brown CLAY, varved, mottled, damp	
			7	4-5-5-4					
15			8	5-4-4-4				Dark gray CLAY, platic, moist	
								End of Boring @ 16'	
20									
25									
30									

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 10-06

Project: *Vertical Delineation*
Client: *Dyno-Nobel*
Project No.: *60192.001*
Start Date: *7/8/99*
Finish Date: *7/8/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)

WELL CONSTRUCTION

SAMPLE DATA

Samp. No. (soil) / Run No. (rock)	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
1	1-6-8-9				Top Soil, grass, roots, loose F SILT, dry	Boring backfilled w/ Grout.
2	9-10-11-12				F Gray to Brown Silty Clay to Clayey Silt	
3	4-6-8-10				F Brown to Gray CLSY and Silt, moist	
4	8-12-12-12				F Silty Clay and Silty Sand, varved, moist	
5	4-6-7-8				Red Brown F Silty Clay	
6	2-3-4-4				Red Brown CLAY, varved, mottled, damp	
7	4-4-4-4					
8	3-3-4-4				Dark gray CLAY, platic, moist	
					End of Boring @ 16'	

0, 5, 10, 15, 20, 25, 30

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 10-19

Project: *Vertical Delineation*
Client: *Dyno-Nobel*
Project No.: *60192.001*
Start Date: *7/8/99*
Finish Date: *7/8/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

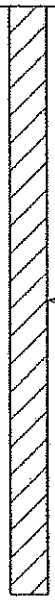
Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

WELL CONSTRUCTION



SAMPLE DATA

Depth (feet)	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.) / Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0		1	5-6-11-14				Top Soil, grass, roots, loose F SILT, dry	
		2	10-19-20-20				F Gray to Brown Silty Clay to Clayey Silt	
5		3	7-7-9-11				F Brown to Gray CLSY and Silt, moist	
		4	8-12-12-18				F Silty Clay and Silty Sand, varved, moist	
		5	5-7-10-9				Red Brown F Silty Clay	
10		6	3-4-4-5				Red Brown CLAY, varved, mottled, damp	Boring backfilled w/ Grout.
		7	5-7-8-5					
15		8	4-4-4-4				Dark gray CLAY, platic, slight fuel odor, moist	
							End of Boring @ 16'	
20								
25								
30								

Brown and Caldwell	Subsurface Boring Log	Well Name/Location: 11-03 Page 1 of 0

Project: *Vertical Delineation* | Project No.: *60192.001* | Start Date: *7/12/99* | Finish Date: *7/12/99*

Client: *Dyno-Nobel*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)	WELL CONSTRUCTION (soil / rock)	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.) / Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0		1	4-35-55-11				Orange to brown CMF Sand, Silt, and F Gravel	
		2	5-14-30-26					
5	Backfilled w/ Cement Grout	3	20-12-19-18				F Brown to Gray CLAY and Silt	Boring backfilled w/ Grout. Refusal @ 8'
		4	3-19-27-32					
	Split Spoon Refusal @ 8'		100/.2				Split Spoon Refusal @ 8' End of Boring @ 8'	
10								
15								
20								
25								
30								

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 13-09

Project: *Vertical Delineation*
Client: *Dyno-Nobel*
Project No.: *60192.001*
Start Date: *6/29/99*
Finish Date: *6/29/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)	WELL CONSTRUCTION	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.) / Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0			1	12-8-9-10				light brown Clayey Silt and top soil, dry	
			2	12-8-12-10				brown to gray Clayey Silt, varved	
5			3	5-26-23-18				dark brown SILT to Clayey Silt, moist	
			4	18-17-19-20				Gray to Brown Clayey Silt to Silty Clay, varved, moist	
	Backfilled w/ Cement Grout		5	4-6-7-10					
10			6	7-6-10-8				red to brown CLAY to Silty Clay, mottled, varved	Boring backfilled w/ Grout.
			7	4-5-7-7				Brown to gray plastic CLAY, varved, moist	
15			8	7-12-14-8				Dark gray CLAY, platic, wet	
								End of Boring @ 16'	
20									
25									
30									

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 13-10

Project: *Vertical Delineation*
Client: *Dyno-Nobel*
Project No.: *60192.001*
Start Date: *6/29/99*
Finish Date: *6/29/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)	WELL CONSTRUCTION	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.) / Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0			1	5-8-8-8				light brown Clayey Silt and top soil, dry	
			2	25-28-18-12				brown to gray Clayey Silt	
5			3	8-9-11-12				dark brown SILT to Clayey Silt, moist	
			4	11-18-14-12				red, brown to gray Silty Clay, varved, moist	
	Backfilled w/ Cement Grout		5	4-4-8-10					
10			6	9-20-18-14				red to brown CLAY to Silty Clay, mottled, varved	Boring backfilled w/ Grout.
			7	3-4-7-8				brown to gray plastic CLAY, varved, moist	
15			8	7-6-7-8					
								End of Boring @ 16'	
20									
25									
30									

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 13-19

Project: *Vertical Delineation* | Project No.: *60192.001* | Start Date: *6/30/99*

Client: *Dyno-Nobel* | Finish Date: *6/30/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)	WELL CONSTRUCTION (soil / rock)	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0		1	3-4-9-11				loose, mf SILT to Silty Clay, dry	
		2	8-10-14-13				F Clayey Silt to Silty Clay, damp	
5		3	5-8-15-14				F Clayey Silt w/ Silty Clay, varved	
		4	6-14-20-22				Brown to Gray CLAY, varved, moist	
	Backfilled w/ Cement Grout	5	5-6-8-11				F Gray to Brown Clay (-silt) damp, varved	
10		6	8-10-10-10				Gray CLAY, moist, varved	Boring backfilled w/ Grout.
		7	10-8-9-15				Gray plastic CLAY, varved, moist	
15		8	2-2-5-4					
							End of Boring @ 16'	
20								
25								
30								

Brown and Caldwell	Subsurface Boring Log	Well Name/Location: 21-01

Project: *Vertical Delineation*	Project No.:	Start Date: *7/1/99*
Client: *Dyno-Nobel*	*60192.001*	Finish Date: *7/1/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

WELL CONSTRUCTION

SAMPLE DATA

Depth (feet)	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.) / Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0		1	4-10-7-5				Light Brown, MF Clayey Silt, dry	Boring backfilled w/ Grout.
		2	2-3-4-6				F Brown Silty Clay, ReDox staining	
5		3	5-6-7-11				Red to brown Clayey Silt with thin gray CLAY layers, moist	
		4	11-12-19-15					
		5	4-6-10-12				Red to Brown, gray Silty Clay, mottled, varved	
10		6	2-3-5-4					
		7	12-13-12-11				Red to gray CLAY, moist mottled, varved, saturated	
15		8	2-2-2-2				Dark Gray CLAY, platic, no structure, saturated	
							End of Boring @ 16'	
20								
25								
30								

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 21-10

Project: *Vertical Delineation*
Client: *Dyno-Nobel*
Project No.: *60192.001*
Start Date: *7/1/99*
Finish Date: *7/1/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)	WELL CONSTRUCTION	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0			1	3-4-4-7				Light Brown, MF Clayey Silt, dry	
			2	7-7-10-11				F Brown Silty Clay, ReDox staining	
5			3	4-6-10-11				Red to brown Clayey Silt with thin gray CLAY layers, moist	
			4	12-14-16-18					
	Backfilled w/ Cement Grout		5	9-9-13-13				Red to Brown, gray Silty Clay, mottled, varved	
10			6	3-8-12-12					Boring backfilled w/ Grout.
			7	10-11-10-7				Red to gray CLAY, moist mottled, varved, saturated	
15			8	1-2-1-3				Dark Gray CLAY, platic, no structure, saturated	
								End of Boring @ 16'	
20									
25									
30									

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 21-16

Project: *Vertical Delineation* | Project No.: *60192.001* | Start Date: *7/1/99* | Finish Date: *7/1/99*

Client: *Dyno-Nobel*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

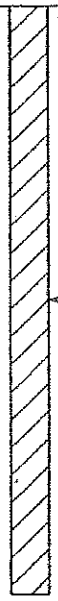
SURVEY DATA

DATUM: NA
Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

WELL CONSTRUCTION / SAMPLE DATA

Depth (feet): 0, 5, 10, 15, 20, 25, 30



Samp. No. (soil)	Blows/ 6 in.	Rec. (ft.)	USCS	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
1	2-7-8-10				Light Brown, MF Clayey Silt, dry	Boring backfilled w/ Grout.
2	5-10-15-12				F Brown Clayey Silt, loose	
3	6-10-16-19				Red to brown Clayey Silt with thin gray CLAY layers, moist	
4	17-17-19-16					
5	3-6-8-9				Red to Brown, gray Silty Clay, mottled, varved	
6	2-3-5-4					
7	3-4-4-4				Red to gray CLAY, moist mottled, varved, saturated	
8	1-1-1-1				Dark Gray CLAY, platic, no structure, saturated	
					End of Boring @ 16'	

Run No. / Hydraul. Cond. cm/sec / Rec. (ft.) / RQD

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 22-14

Project: *Vertical Delineation*
Client: *Dyno-Nobel*
Project No.: *60192.001*
Start Date: *7/23/99*
Finish Date: *7/23/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *550 ATV Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

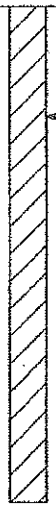
SURVEY DATA

DATUM: *NA*
Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

WELL CONSTRUCTION / SAMPLE DATA

Depth (feet)



Backfilled w/ Cement Grout

Split Spoon refusal @ 13.5'

Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.) / Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
1	1-1-1-1				Plant Material, wire, metal, Red Brown Silty Clay	Dead plants/root material create 2' gap above soil, samples were collected where soil began
2	1-1-2-1				Red Brown Silty Clay	
3	H-1-H-1				Gray to Red Brown Silty Clay (+) Clay	H= Wiehgt of Hammer (140lbs), no blows
4	1-2-3-4				Gray CLAY, Plastic, saturated	
5	1-2-2-4					Boring backfilled w/ Grout.
6	3-7-4-17					
7	17-100/.4				End of Boring @ 13.5'	

0, 5, 10, 15, 20, 25, 30

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 22-18

Project: *Vertical Delineation* | Project No.: *60192.001* | Start Date: *7/20/99* | Finish Date: *7/20/99*

Client: *Dyno-Nobel*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *550 ATV Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA

DATUM: NA
Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

WELL CONSTRUCTION / SAMPLE DATA

Depth (feet)	Run No.	Samp. No. (soil)	Blows/ 6 in.	Hydraul. Cond. cm/sec	Rec. (ft.)	USCS	RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0	1		3-4-5-6						Red/Gray MF Sandy Silt to Silty Clay	
	2		5-5-5-5						Gray/Brown Silty Clay	
5	3		2-3-3-4						Gray/Brown Clayey Silt	Dead plants/root material create 4' gap above soil, samples were collected where soil began
	4		1-1-4-2						Gray/Black (salt & pepper) F SAND (+) Silt	
									Backfilled w/ Cement Grout	
10	5		3-2-2-2						Gray Clay, Plastic	
	6		1-1-1-1							
	7		3-7-10-12						Layered F Gravel (clean) w/ F SAND, Gray to Black	Boring backfilled w/ Grout.
15	8		22-22-20-24						F Gravel, F SAND (+) Silt (-) Clay, saturated	
									End of Boring @ 18'	
20										
25										
30										

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 22-21

Project: *Vertical Delineation*
Client: *Dyno-Nobel*
Project No.: *60192.001*
Start Date: *7/19/99*
Finish Date: *7/19/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *550 ATV Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

WELL CONSTRUCTION

SAMPLE DATA

Depth (feet)	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0		1	1-2-3-5				Gray CLAY, w/ plant material (Diesel Odor)	
		2	5-15-12-7				Gray CLAY to brown Silty Clay	
5		3	4-6-4-3					Dead plants/root material create 4' gap above soil, samples were collected where soil began
		4	1-2-1-1					
		5	1-1-1-1					
10		6	1-1-1-2					
		7	7-8-5-4				Layered F Gravel (clean) w/ F SAND, Gray to Black	Boring backfilled w/ Grout.
15		8	5-4-4-4				F Gravel, F SAND (+) Silt (-) Clay, saturated	
							End of Boring @ 16'	
20								
25								
30								

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 22-26

Project: *Vertical Delineation*
Client: *Dyno-Nobel*
Project No.: *60192.001*
Start Date: *7/20/99*
Finish Date: *7/20/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *550 ATV Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)	WELL CONSTRUCTION (soil / rock)	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0		1	2-3-5-7				Red/Gray/brown MF Silty Clay, (diesel odor)	
		2	6-5-5-5				Gray/Brown Silty Sand to Silty Clay	
5		3	3-2-1-1					Dead plants/root material create 4' gap above soil, samples were collected where soil began
		4	2-5-10-7					
	Backfilled w/ Cement Grout	5	6-7-13-7				Layered F Gravel (clean) w/ F SAND, Gray to Black	
10	Split Spoon refusal @ 10.6'	6	20-100/.3				End of Boring @ 10.6'	Boring backfilled w/ Grout.
15								
20								
25								
30								

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 22-2~~0~~8

Project: *Vertical Delineation*
Client: *Dyno-Nobel*
Project No.: *60192.001*
Start Date: *7/22/99*
Finish Date: *7/22/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *550 ATV Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)

WELL CONSTRUCTION

SAMPLE DATA

Samp. No. (soil) / Run No. (rock)	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (fL) / Rec. (ft.)	USCS	RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
1	2-4-7-3					Blue/Gray Silty Clay to Clay, mottled	
2	2-2-7-12						
3	2-7-12-7					Gray Silty Clay to Clayey Silt	Dead plants/root material create 4' gap above soil, samples were collected where soil began
4	3-5-5-6						
5	13-22-45-100/.3					End of Boring @ 10'	Boring backfilled w/ Grout.

0, 5, 10, 15, 20, 25, 30

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 22-30

Project: *Vertical Delineation*
Client: *Dyno-Nobel*
Project No.: *60192.001*
Start Date: *7/23/99*
Finish Date: *7/23/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim-Technologies*
Equipment: *550 ATV Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)	WELL CONSTRUCTION	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.) / Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0			1	1-1-3-4				Gray/Blue Gray, CLAY to Silty Clay, Roots	
			2	2-4-3-3					
5			3	1-2-7-8				Gray CLAY, Mottles, plastic	Dead plants/root material create 4' gap above soil, samples were collected where soil began
			4	4-9-7-9				Gray F Silty Clay to Clayey Silt	
	Backfilled w/ Cement Grout		5	1-1-1-2				Gray Clay, Mottled, Plastic	
10			6	1-1-1-1					
			7	1-1-1-1					Boring backfilled w/ Grout.
15			8	1-3-8-7				End of Boring @ 16'	
20									
25									
30									

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 22-32

Project: *Vertical Delineation*
Client: *Dyno-Nobel*
Project No.: *60192.001*
Start Date: *7/23/99*
Finish Date: *7/23/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *550 ATV Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)	WELL CONSTRUCTION	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.) / Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0	Backfilled w/ Cement Grout		1	1-1-2-4				Gray/Brown CLAY to Silty Clay, Mottled	Dead plants/root material create 2' gap above soil, samples were collected where soil began
			2	9-5-5-6					
5			3	2-100/.2				End of Boring @ 16'	Boring backfilled w/ Grout.
10									
15									
20									
25									
30									

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 26D-4

Project: *Vertical Delineation*
Project No.: *60192.001*
Start Date: *7/1/99*
Finish Date: *7/1/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

WELL CONSTRUCTION

SAMPLE DATA

Depth (feet)	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0		1	18-15-12-15				brown to Blakc MF SILT to Clayey Silt	
		2	12-12-18-19				F Brown Clayey Silt, loose	
5		3	4-6-11-22				Red to brown Clayey Silt with thin gray CLAY layers, moist	
		4	4-6-12-13					
		5	4-7-11-11				Red to Brown, gray Silty Clay, mottled, varved	
10		6	3-5-9-10					Boring backfilled w/ Grout.
		7	8-4-6-10				Red to gray CLAY, moist mottled, varved	
15		8	1-1-3-3				Dark gray CLAY, platic, wet	
							End of Boring @ 16'	
20								
25								
30								

Brown and Caldwell	Subsurface Boring Log	Well Name/Location: 26D-8
		Page 1 of 0

Project: *Vertical Delineation* | Project No.: *60192.001* | Start Date: *6/30/99* | Finish Date: *6/30/99*

Client: *Dyno-Nobel*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)	WELL CONSTRUCTION	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0			1	3-5-5-5				Asphault, F brown Clayey Silt, loose	
			2	6-6-10-11				F Brown Clayey Silt, loose	
5			3	4-6-9-10				Red to brown Clayey Silt with thin gray CLAY layers, moist	
			4	7-9-12-15					
	Backfilled w/ Cement Grout		5	3-6-9-11				Red to Brown, gray Silty Clay, mottled, varved	
10			6	8-9-12-13					Boring backfilled w/ Grout.
			7	9-9-13-18				Red to gray CLAY, moist mottled, varved	
15			8	1-2-3-5				Dark gray CLAY, platic, wet	
								End of Boring @ 16'	
20									
25									
30									

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 26G-11

Project: *Vertical Delineation*
Client: *Dyno-Nobel*
Project No.: *60192.001*
Start Date: *7/2/99*
Finish Date: *7/2/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)	WELL CONSTRUCTION	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0			1	4-3-3-3				Fill, Brown Clayey Silt	
			2	5-5-8-8				Brown F Clayey Silt, damp	
5			3	5-2-9-11					
			4	11-11-14-15				Lt. Brown to red Clayey Silt, moist	
	Backfilled w/ Cement Grout		5	5-7-10-12				Lt. Brown to red Clay and Silty Clay	
10			6	3-4-7-7					Boring backfilled w/ Grout.
			7	4-8-9-8					
15			8	3-5-7-9				Brown to Gray CLAY, saturated	
								End of Boring @ 16'	
20									
25									
30									

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 26G-16

Project: *Vertical Delineation*
Client: *Dyno-Nobel*
Project No.: *60192.001*
Start Date: *7/6/99*
Finish Date: *7/6/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)	WELL CONSTRUCTION	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0			1	4-4-3-4				Fill, gravel, wire, brown Silty Clay	
			2	4-5-9-9				Brown to red Clayey Silt, damp	
5			3	4-5-7-10					
			4	10-12-13-14				Lt. Brown to red Clayey Silt w/ trace Sand	
	Backfilled w/ Cement Grout		5	3-4-6-7				Lt. Brown to red Clay and Silty Clay	
10			6	2-5-5-5				Brown to Gray Silty Clay, moist	Boring backfilled w/ Grout.
			7	5-9-10-10					
15			8	6-9-9-9				Gray CLAY and Silty Clay	
								End of Boring @ 16'	
20									
25									
30									

Brown and Caldwell	Subsurface Boring Log	Well Name/Location: 33-04
		Page 1 of 0

Project: *Vertical Delineation* | Project No.: *60192.001* | Start Date: *7/12/99*
Client: *Dyno-Nobel* | Finish Date: *7/12/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)	WELL CONSTRUCTION	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.) / Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0	Refusal @ 2.0'								Refusal @ 2.0'
5									
10									
15									
20									
25									
30									

Brown and Caldwell	Subsurface Boring Log	Well Name/Location: 33-13
		Page 1 of 0

Project: *Vertical Delineation* | Project No.: *60192.001* | Start Date: *7/12/99*
Client: *Dyno-Nobel* | Finish Date: *7/12/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)	WELL CONSTRUCTION (soil / rock)	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.) / Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0		1	4-7-8-24				Red F Sand, Rock Frags, & F Gravel	
		2	34-10-18-20				Orange F Sand, trace Silt (-) Clay	
5		3	5-4-4-3				Red-Brown F Sand, trace Silt (-) Clay	
		4	6-5-10-8					
	Backfilled w/ Cement Grout	5	4-6-11-12					
10		6	2-3-3-3					Boring backfilled w/ Grout.
		7	3-4-4-5				MF Brown Silty Clay to Clayey Silt, Moist	
15		8	8-5-5-0				Gray Clay, w/ trace Silt, some Sand, (+) Gravel	
							End of Boring @ 16'	
20								
25								
30								

Brown and Caldwell	Subsurface Boring Log	Well Name/Location: 39-09 Page 1 of 0

Project: *Vertical Delineation*	Project No.:	Start Date: *6/30/99*
Client: *Dyno-Nobel*	*60192.001*	Finish Date: *6/30/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)	WELL CONSTRUCTION	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0			1	5-5-10-12				Lt. to Dark MF Silty Clay to Clay and Silt, dry	
			2	10-10-19-13				Dark brown F Clayey Silt	
5			3	9-9-11-12				Red to brown Clayey Silt to Silty Clay, moist, varved	
			4	10-9-12-8					
	Backfilled w/ Cement grout		5	6-6-9-10					
10			6	2-2-3-4					Boring backfilled w/ Grout.
			7	2-4-1-2				Red to gray CLAY, moist mottled, varved	
15			8	1-1-1-1				Dark gray CLAY, platic, wet	
								End of Boring @ 16'	
20									
25									
30									

Brown and Caldwell	Subsurface Boring Log	Well Name/Location: 42-07	Page 1 of 0

Project: *Vertical Delineation*	Project No.: *60192.001*	Start Date: *7/7/99*
Client: *Dyno-Nobel*		Finish Date: *7/8/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)	WELL CONSTRUCTION	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0			1	9-10-12-17				CMF Top Soil, roots, Silt, dry	
			2	25-32-38-36				M Clayey Silt, w/ some Sandy Silt	
5			3	38-38-38-28				MF Sandy Silt to Silty Clay	
			4	11-19-28-25				Red Brown F Silty Clay, moist	
	Backfilled w/ Cement Grout		5	25-26-32-38					
10			6	26-28-34-30					Boring backfilled w/ Grout.
			7	28-36-28-21				Red to Brown Silty Clay to Clayey Silt, varved	
15			8	14-14-12-14					
								End of Boring @ 16'	
20									
25									
30									

Brown and Caldwell

Subsurface Boring Log

Well Name/Location: 47-02

Project: *Vertical Delineation*
Client: *Dyno-Nobel*
Project No.: *60192.001*
Start Date: *7/1/99*
Finish Date: *7/1/99*

DRILLING DATA

Inspector: *Marc Conger*
Contractor: *Maxim Technologies*
Equipment: *Acker Auger Rig*
Method: *Direct Push*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split-Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*NA*	*NA*
Diameter (ID):	*NA*	*NA*
Coupling:	*NA*	*NA*

WELL DEVELOPMENT

Method: *NA*
Duration: *NA*
Gals. Purged: *NA*
Slug Test: *NA* (cm/sec)

SURVEY DATA
DATUM: NA

Grade: *NA*
TWC: *NA*
TPC: *NA*
North: *NA*
East: *NA*

Geophysical Log: ☐ yes ☒ no
Comments:

WELL CONSTRUCTION

SAMPLE DATA

Depth (feet)	soil / rock Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.) / Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0	1	1-1-2-2				Dark Brown to Black top soil, MF SILT, moist	
	2	3-7-11-12				Red to Gray, and Brown, MF Silty Clay to Clayey Silt, damp	Smell of Selenium, fuse powder
5	3	5-8-12-16				Red to brown Clayey Silt to Silty Clay, moist, varved	
	4	8-10-20-22					
	5	4-6-11-13					
10	6	4-5-6-8					Boring backfilled w/ Grout.
	7	1-4-6-10				Red to gray CLAY, moist mottled, varved	
15	8	1-3-3-3				Dark gray CLAY, platic, wet	
						End of Boring @ 16'	
20							
25							
30							

ECKENFELDER INC.

Subsurface Boring Log

Well Name/Location: **MW-19S**

Project: *RFI*
Client: *DYNO Nobel, Port Ewen, NY*
Project No.: *0192.02*
Start Date: *09/16/97*
Finish Date: *09/16/97*

DRILLING DATA

Inspector: *E.R.Limbrick*
Contractor: *Maxim Technologies, Inc., C.Dinovo*
Equipment: *Acker Soil Max*
Method: *4 1/4" HAS*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split Spoon*	*NA*	*NA*
Diameter:	*2 inch*	*NA*	*NA*
Other:	*140 lb/30 inch*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*Schd. 40 PVC*	*Schd. 40 pvc .010 slot*
Diameter (ID):	*2"*	*2"*
Coupling:	*Flush-threaded*	*Flush-threaded*

WELL DEVELOPMENT

Method:
Duration:
Gals. Purged:
Slug Test: (cm/sec)

SURVEY DATA DATUM:

Grade:
TWC: *156.2*
TPC:
North: *686911.12*
East: *594141.46*

Geophysical Log: ☐ yes ☒ no
Comments:

WELL CONSTRUCTION

SAMPLE DATA

Depth (feet)	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0		S-1	2-2-3-7	1.4'			LACUSTRINE DEPOSITS Dark brown f SAND and silty CLAY	
		S-2	7-10-13-22	1.2'			Dry Light-brown Silty CLAY, trace (-) f Sand, trace (-) to no c Sand	
5		S-3	8-12-14-20	1.4'				
		S-4	21-20-25-24	1.8'			Slightly moist Silty CLAY tace (-) to no cf Sand	
		S-5	4-6-8-12	2.0'				
10		S-6	5-5-6-6	1.2'			Moist brownish-gray Silty CLAY	
		S-7	6-6-7-6	2.0'				
15		S-8	2-2-3-3	1.7'			Moist Gray Silty CLAY with brown mottling	
		S-9	5-5-3-5	1.5'				
		S-10	3-1-2-3	1.7'			Wet Gray Silty CLAY	Water table @ 18'
20		S-11	1-2-2-3	1.3'				
		S-12	1-2-1-1	1.8'			24.0	
25							End of Boring at 24.0 feet.	
30								

ECKENFELDER INC.

Subsurface Boring Log

Well Name/Location: **MW-20D**

Project: *RFI*
Client: *DYNO Nobel, Port Ewen, NY*
Project No.: *0192.02*
Start Date: *09/12/97*
Finish Date: *09/15/97*

DRILLING DATA

Inspector: *E.R.Limbrick*
Contractor: *Maxim Technologies, Inc., C.Dinovo*
Equipment: *Acker Soil Max*
Method: *4 1/4" HAS*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split Spoon*	*NA*	*NA*
Diameter:	*2 inch*	*NA*	*NA*
Other:	*140 lb/30 inch*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*type 304 S.S*	*type 304 S.S. .010 slot*
Diameter (ID):	*2 inch ID*	*2"*
Coupling:	*Flush-threaded*	*Flush-threaded*

WELL DEVELOPMENT

Method:
Duration:
Gals. Purged:
Slug Test: (cm/sec)

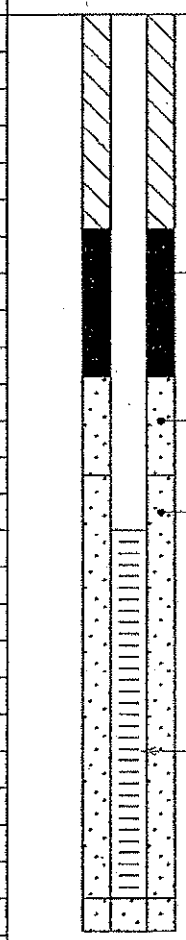
SURVEY DATA DATUM:

Grade:
TWC: *161.40*
TPC:
North: *685366.27*
East: *594189.91*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)	WELL CONSTRUCTION	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0	4" Locking Protective Casing							For soil description between the 0-44' interval refer to the boring log MW-20R.	
5	Cement/ Bentonite Grout; 2" SS Riser								
10									
15									
20									
25									
30									

ECKENFELDER INC.	Subsurface Boring Log	Well Name/Location: MW-20D	Page 2 of 2
Project: *RFI*	Project No.: *0192.02*	Start Date: *09/12/97*	
Client: *DYNO Nobel, Port Ewen, NY*		Finish Date: *09/15/97*	



Depth (feet)	WELL CONSTRUCTION	soil / rock	SAMPLE DATA: Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.) / Rec. (ft.)	USCS / RQD	HNU (ppm)	(CONTINUATION) VISUAL CLASSIFICATION	REMARKS
30									
35									
40									
								44	
45			S-1	3-4-15-18	0.0'			SAND & GRAVEL Gray cm SAND, some (+) Silty CLAY, little (+) Gravel	
			S-2	14-5-17-16	1.1'			c GRAVEL, lens of brown Silty CLAY	
			S-3	13-31-18-22	0.5'			cm SAND and to trace c GRAVEL, trace (+) Silty CLAY	
50			S-4	58-24-29-32	0.9'				
			S-5	28-37-38-41	1.8'			c GRAVEL, some (+) cm SAND, trace silty CLAY	
55			S-6	76-100/4"	0.7'			Weathered Shale-- BEDROCK @ 54.0'	54.9
								End of Boring at 54.9 feet.	
60									
65									
70									

ECKENFELDER INC.	Subsurface Boring Log	Well Name/Location: MW-21D

Project: *RFI* | Project No.: *0192.02* | Start Date: *09/08/97*
Client: *DYNO Nobel, Port Ewen, NY* | Finish Date: *09/09/97*

DRILLING DATA

Inspector: *E.R.Limbrick*
Contractor: *Maxim Technologies, Inc., C.Dinovo*
Equipment: *Acker Soil Max*
Method: *4 1/4" HAS*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split Spoon*	*NA*	*NA*
Diameter:	*2"*	*NA*	*NA*
Other:	*NA*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*Type 304 S.S.*	*Type 304 S.S .010" slot*
Diameter (ID):	*2 inch ID*	*2"*
Coupling:	*Flush-threaded*	*Flush-threaded*

WELL DEVELOPMENT

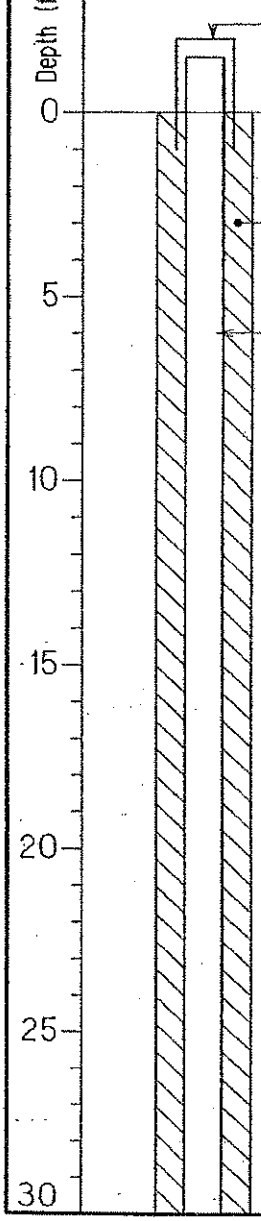
Method:
Duration:
Gals. Purged:
Slug Test: (cm/sec)

SURVEY DATA DATUM:

Grade:
TWC: *164.10*
TPC:
North: *685492.08*
East: *594355.78*

Geophysical Log: ☐ yes ☒ no
Comments:

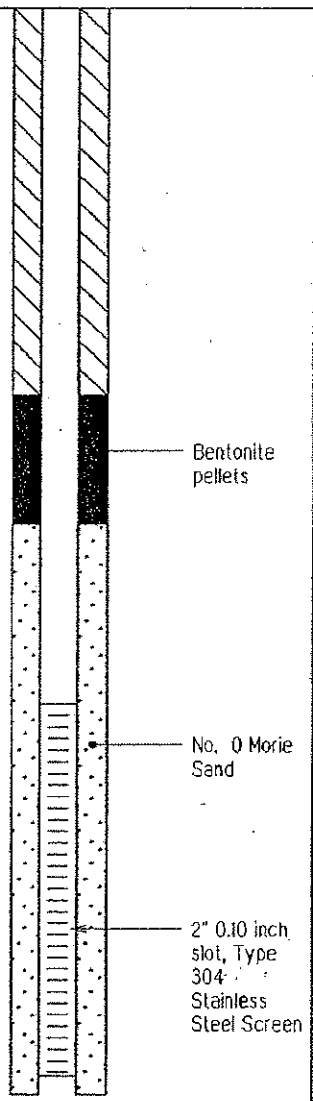
WELL CONSTRUCTION



SAMPLE DATA

soil / rock	Samp. No. / Run No.	Blows/ 6 in.	Hydraul. Cond. cm/sec	Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
							OVERBURDEN/LACUSTRINE DEPOSIT	
							Refer to the MW-21R log for soil descriptions.	

ECKENFELDER INC.	Subsurface Boring Log	Well Name/Location: MW-21D
Project: *RFI*	Project No.: *0192.02*	Start Date: *09/08/97*
Client: *DYNO Nobel, Port Ewen, NY*		Finish Date: *09/09/97*

Depth (feet)	WELL CONSTRUCTION	soil / rock	SAMPLE DATA: Samp. No. / Run No.	Blows/6 in. / Hydraul. Cond. cm/sec	Rec. (ft.) / Rec. (ft.)	USCS / RQD	HNU (ppm)	*(CONTINUATION)* VISUAL CLASSIFICATION	REMARKS
30									
35									
40									
45									
50								SAND & GRAVEL	
55									
60								BEDROCK-GRAY SHALE	
65									
70									

ECKENFELDER INC.

Subsurface Boring Log

Well Name/Location: **MW-22D**

Project: *RFI*
Client: *DYNO Nobel, Port Ewen, NY*
Project No.: *0192.02*
Start Date: *09/24/97*
Finish Date: *09/24/97*

DRILLING DATA

Inspector: *E.R.Limbrick*
Contractor: *Maxim Technologies, Inc., C.Dinovo*
Equipment: *Acker Soil Max*
Method: *4 1/4" HAS*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split Spoon*	*NA*	*NA*
Diameter:	*2 inch*	*NA*	*NA*
Other:	*140 lb/30 inch*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*stainless steel*	*stainless steel*
Diameter (ID):	*2 inch ID*	*2 1/8*
Coupling:	*npt*	*npt*

WELL DEVELOPMENT

Method: *na*
Duration: *na*
Gals. Purged: *na*
Slug Test: *na* (cm/sec)

SURVEY DATA

DATUM: na
Grade: *na*
TWC: *151.9*
TPC:
North: *685412.14*
East: *594639.41*

Geophysical Log: ☐ yes ☒ no
Comments:

Depth (feet)	WELL CONSTRUCTION	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
0	4" Locking Cap							OVERBURDEN?LACUSTRINE DEPOSIT	
5	Cement/ Bentonite Grout							For soil descriptions above and below the 27.5'-32.2' interval refer to the MW-22R log.	
10									
15	2" Stainless steel riser								
20	Cement/ Bentonite Grout; No. 00 secondary filterpack								
25	No. 0 primary filterpack								
30	2" Stainless steel .010 slot screen		S-1	2-1-2-3				Gray f GRAVEL, little silty clay and cmf sand.	
			S-2	5-7-11-13				Gray cmf GRAVEL and cmf SAND.	

ECKENFELDER INC.	Subsurface Boring Log	Well Name/Location: MW-22D	Page 2 of 2
Project: *RFI*	Project No.: *0192.02*	Start Date: *09/24/97*	
Client: *DYNO Nobel, Port Ewen, NY*		Finish Date: *09/24/97*	

Depth (feet)	WELL CONSTRUCTION	soil / rock	SAMPLE DATA					(CONTINUATION)	
		Samp. No.	Blows/ 6 in.	Rec. (ft.)	USCS	HNU (ppm)			
		Run No.	Hydraul. Cond. cm/sec	Rec. (ft.)	RQD			VISUAL CLASSIFICATION	REMARKS
30		S-2	5-7-11-13						
		S-3	6-9-9-10					Gray cm SAND, trace silty clay. 32.2	
								Refusal @ 32.2'.	
35									
40									
45									
50									
55									
60									
65									
70									

ECKENFELDER INC.

Subsurface Boring Log

Well Name/Location: **MW-23S**

Project: *RFI*
Client: *DYNO Nobel, Port Ewen, NY*
Project No.: *0192.02*
Start Date: *09/16/97*
Finish Date: *09/16/97*

DRILLING DATA

Inspector: *E.R.Limbrick*
Contractor: *Maxim Technologies, Inc., C.Dinovo*
Equipment: *Acker Soil Max*
Method: *4 1/4" HAS*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split Spoon*	*NA*	*NA*
Diameter:	*2 inch*	*NA*	*NA*
Other:	*140 lb/30 inch*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*Type 304 S.S.*	*Type 304 S.S.*
Diameter (ID):	*2" ID*	*2" ID*
Coupling:	*Flush-threaded*	*Flush-threaded*

WELL DEVELOPMENT

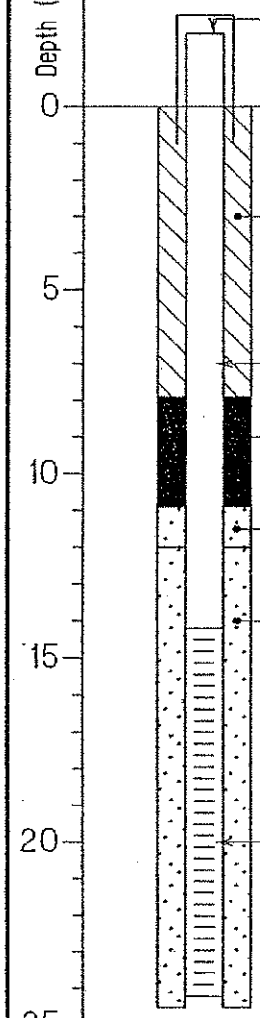
Method:
Duration:
Gals. Purged:
Slug Test: (cm/sec)

SURVEY DATA DATUM:

Grade:
TWC: *165.2*
TPC:
North: *686049.27*
East: *593751.85*

Geophysical Log: ☐ yes ☒ no
Comments:

WELL CONSTRUCTION



SAMPLE DATA (soil / rock)

Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.) / Rec. (ft.)	USCS	RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
S-1	5-6-7-10	0.4'			0	Slightly moist Medium brown Silty CLAY, some roots present	
S-2	5-6-5-7	1.1'			0		
S-3	3-4-5-8	1.2'			0	Moist Brown Silty CLAY with brown mottling	
S-4	8-11-14-15	0.8'			0	Wet Brown Silty CLAY with brown mottling	
S-5	5-5-6-8	2.0'			0	Reddish-brown Silty CLAY with thin lenses of Gray SILT	
S-6	3-3-3-2	1.2'			0	Wet Gray to Greenish-gray Silty CLAY	
S-7	3-4-4-4	1.7'			0		
S-8	2-2-2-1	1.0'			0	Gray with lens of orange Silty CLAY	
S-9	3-2-1-3	2.0'			0	Saturated Gray and Reddish-Gray Silty CLAY	
S-10	WOR-WOR-WOH-WOH	2.0'			0	Saturated Gray Silty CLAY	
S-11	WOR-WOH 1-1	2.0'			0		
S-12	1-1-2-1	2.0'			0		
						End of Boring at 24.0 feet.	

ECKENFELDER INC.

Subsurface Boring Log

Well Name/Location: **MW-22R**

Project: *RFI*
Client: *DYNO Nobel, Port Ewen, NY*
Project No.: *0192.02*
Start Date: *09/22/97*
Finish Date: *09/22/97*

DRILLING DATA

Inspector: *E.R.Limbrick*
Contractor: *Maxim Technologies, Inc., C.Dinovo*
Equipment: *Acker Soil Max*
Method: *6 1/4" HAS/5 7/8 Roller Bit/NX Core*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*Split Spoon/NX Core Barrel*	*NA*	*NX*
Diameter:	*2 inch*	*NA*	*3 inch*
Other:	*140 lb/30 inch*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*black steel*	*NA*
Diameter (ID):	*4 inch ID*	*2 1/8*
Coupling:	*NPT*	

WELL DEVELOPMENT

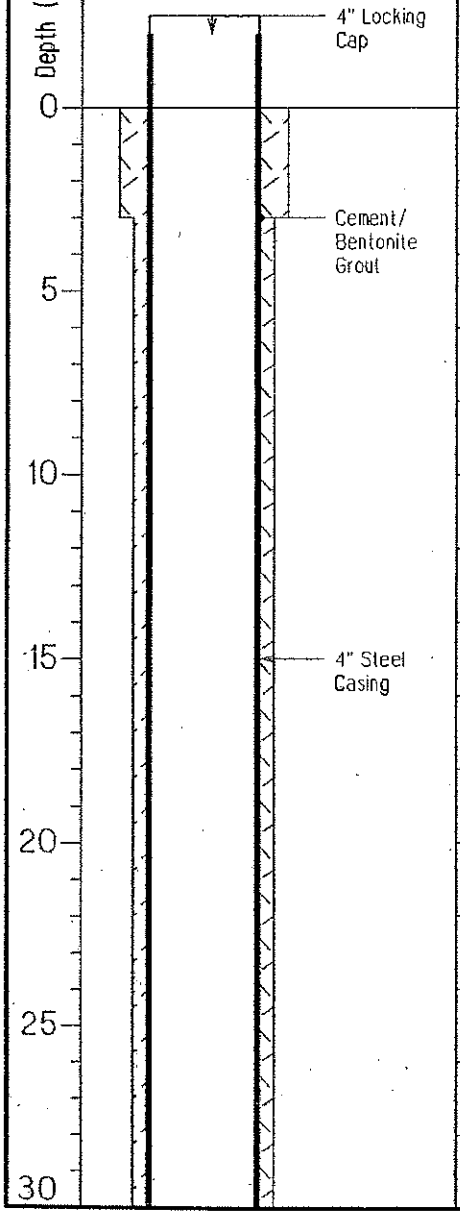
Method:
Duration:
Gals. Purged:
Slug Test: (cm/sec)

SURVEY DATA DATUM:

Grade:
TWC: *151.6*
TPC:
North: *685413.44*
East: *594645.86*

Geophysical Log: ☐ yes ☒ no
Comments:

WELL CONSTRUCTION



SAMPLE DATA

Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.) / Rec. (ft.)	USCS	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
S-1	2-1-2-3	1.5'			OVERBURDEN/LACUSTRINE DEPOSITS Brown SILT/ SILT and CLAY, trace roots.	
S-2	6-7-11-13	1.2'			Brown SILT and CLAY, mottled.	
S-3	6-9-9-10	1.7'				
S-4	7-8-8-8	0.0				
S-5	4-2-3-2	1.5'			Brown Silty CLAY	
S-6	2-3-3-4	0.0'				
S-7	3-2-3-3	1.7'			@ 12.7' change to gray Silty CLAY. Saturated	Saturated @ 12.7 feet.
S-8	woh-woh 2-2	1.2'				
S-9	3-2-2-2	1.0'				
S-10	woh-woh woh-1	1.3'				
S-11	1-1-2-1	1.2'				
S-12	1-1-2-1	1.4'				
S-13	WOH-WOH 1-1	2.0'			Gray cmf SAND and gray Silty CLAY, some mf Gravel grading to cmf SAND.	
S-14	10-19 22-12	2.0'			@ 28.5 brown Silty CLAY and c GRAVEL, some silty clay.	
S-15	9-7-8-8	2.0'				

ECKENFELDER INC.	Subsurface Boring Log	Well Name/Location: MW-22R
Project: *RFI*	Project No.: *0192.02*	Start Date: *09/22/97*
Client: *DYNO Nobel, Port Ewen, NY*		Finish Date: *09/22/97*

Depth (feet)	WELL CONSTRUCTION	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.)	USCS / RQD	HNU (ppm)	(CONTINUATION) VISUAL CLASSIFICATION	REMARKS
30			S-16	13-32 15-10	0.6'			Gray cmf GRAVEL (weathered rock), some cmf Sand, some silty clay.	
			S-17	58-100/4	1.1'			33 BEDROCK-GRAY SHALE	
35			S-18	100/4	0.1'				
						NA			
40									
						55%			
45									
						74%			
50	NX Core hole								
						33%			
55									
60									
65									
70									

ECKENFELDER INC.

Subsurface Boring Log

Well Name/Location: MW-21R

Project: RFI | Project No.: 0192.02 | Start Date: 09/04/97 | Finish Date: 09/08/97

Client: DYNO Nobel, Port Ewen, NY

DRILLING DATA

Inspector: E.R.Limbrick
Contractor: Maxim Technologies, Inc., C.Dinova
Equipment: Acker Soil Max
Method: 6 1/4" HAS/5 7/8 Roller Bit/NX Core

SAMPLING METHODS

	Sampler	Tube	Core
Type:	Split Spoon/NX Core	Barrel/NA	NX
Diameter:	2 inch	NA	3 inch
Other:	140 lb/30 inch	NA	NA

WELL CONSTRUCTION

	Riser	Screen
Material:	black steel	NA
Diameter (ID):	4 inch ID	2 1/8
Coupling:	NPT	

WELL DEVELOPMENT

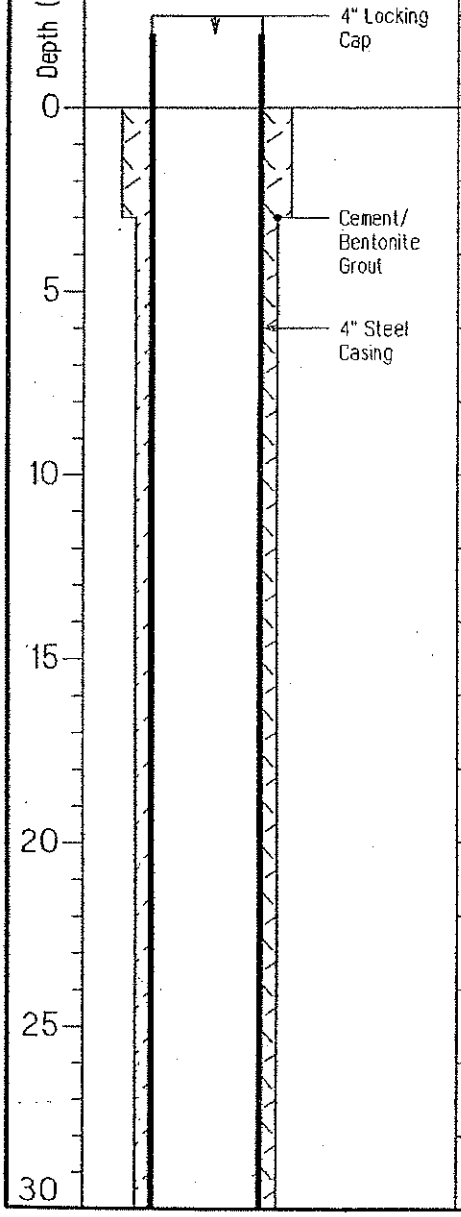
Method:
Duration:
Gals. Purged:
Slug Test: (cm/sec)

SURVEY DATA DATUM:

Grade:
TWC: 162.80
TPC:
North: 685496.17
East: 594352.10

Geophysical Log: ☐ yes ☒ no
Comments:

WELL CONSTRUCTION



SAMPLE DATA

Samp. No. (soil) / Run No. (rock)	Blows/ 6 in.	Rec. (ft.)	USCS	HNU (ppm)	Hydraul. Cond. cm/sec	Rec. (ft.)	RQD
S-1	7-7-9-13	1.7'					
S-2	14-23-21-23	1.6'					
S-3	4-10-11-18	1.5'					
S-4	10-11-11-12	1.2'					
S-5	4-5-8-9	1.5'					
S-6	4-4-8-8	1.4'					
S-7	9-8-11-11	1.5'					
S-8	3-5-5-8	1.7'					
S-9	6-8-6-5	2.0'					
S-10	1-1-1-3	1.3'					
S-11	1-1-3-4	1.2'					
S-12	4-4-5-5	0.0'					
S-13	WOH-WOH-3-4	1.2'					
S-14	3-4-4-5	2.0'					
S-15	WOH-1-1-2	0.8'					

VISUAL CLASSIFICATION

OVERBURDEN/LACUSTRINE DEPOSITS

Brown SILT, little f Sand
Slightly moist Brown SILT & CLAY

Moist Brown SILT & CLAY, some gray mottling, trace Gravel

@ 9.6' becoming more moist, Moist Brown SILT & CLAY, some gray mottling

Moist Brown to Reddish-brown CLAY & SILT

Moist Brown to Reddish-brown CLAY & SILT, few lens of f SAND

@ 18.5 Saturated
Wet, Gray CLAY & SILT to Silty CLAY with brown mottling
Gray Silty Clay

REMARKS

Saturated @ 18.5 feet.

ECKENFELDER INC.

Subsurface Boring Log

Well Name/Location: MW-21R

Project: *RFI*

Client: *DYNO Nobel, Port Ewen, NY*

Project No.: *0192.02*

Start Date: *09/04/97*

Finish Date: *09/08/97*

(CONTINUATION)

Depth (feet)	WELL CONSTRUCTION	soil / rock	Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.)	USCS / RQD	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
30			S-16	2-3-2-2	0.9'				
			S-17	WOR-WOR-WOH-2	1.6'				
35			S-18	WOH-2-2-3	1.4'				
			S-19	WOH-2-2-3	2.0'				
			S-20	2-1-3-2	1.8'				
40			S-21	WOR-1-3-4	2.0'			Gray Silty Clay, trace (-) f Sand	
			S-22	3-4-3-4	2.0'				
45			S-23	WOR-WOR-2-3	2.0'			Gray Silty Clay	
			S-24	WOH-1-2-3	2.0'			Gray Silty Clay, little (-) f Sand	
			S-25	1-4-9-6	2.0'			48.75 SAND & GRAVEL	
50			S-26	4-5-7-8	0.8'			c SAND, and Silty CLAY, little Gravel	
			S-27	4-4-7-7	1.3'			cmf GRAVEL (chips of weathered Shale), some c Sand, some Silty Clay	
55			S-28	7-8-17-24	1.6'			Gray f SAND, trace (+) Gravel (chips of weathered Shale)	
			S-29	8-18 15-18	2.0'			Gray to black cmf Gravel (chips of weathered Shale), little c Sand, little silty Clay, grading to all c Gravel	
			S-30	18-14-24-56	1.4'				
60						100%		59.8 BEDROCK- GRAY SHALE *No core collected from 60.0' to 66.0'.*	No core collected from 60.0' to 66.0'
65	NX Core hole		R-1		5.0'	83%		Gray Shale, few small fractures with no staining, dipping at a steep angle, from 67.3' to 69.5'.	
70									

ECKENFELDER INC.	Subsurface Boring Log	Well Name/Location: MW-21R
Project: *RFI*	Project No.: *0192.02*	Start Date: *09/04/97*
Client: *DYNO Nobel, Port Ewen, NY*		Finish Date: *09/08/97*

Depth (feet)	WELL CONSTRUCTION	soil / rock	SAMPLE DATA					(CONTINUATION)	
		Samp. No.	Blows/ 6 in.	Rec. (ft.)	USCS	HNU (ppm)			
		Run No.	Hydraul. Cond. cm/sec	Rec. (ft.)	RQD			VISUAL CLASSIFICATION	REMARKS
70		R-1		5.0'				Gray Shale, few small fractures, some with calcite and brown staining, dipping at steep angle	
		R-2		5.0'	83%			Steep angle Calcite vein from 73.4' to 73.6' Smaller Calcite veins from at 75.5' and 75.8'	
75		R-3		5.0'	87%			Large fracture, steep angle, some calcite mineralization Horizontal fracture, in-filled with some clay Fractures from 77.3' to 79.5' no staining Small veins of Calcite from 79.0' to 81.6'	
80		R-4		5.0'				Badly fractured zone, little mineralization	
85					96%			Slightly angled fractues at 85.2' and 85.5' no staining 86 End of Boring at 86.0 feet.	
90									
95									
100									
105									
110									

ECKENFELDER INC.

Subsurface Boring Log

Well Name/Location: **MW-20R**

Project: *RFI*
Client: *DYNO Nobel, Port Ewen, NY*
Project No.: *0192.02*
Start Date: *09/09/97*
Finish Date: *09/12/97*

DRILLING DATA

Inspector: *E.R.Limbrick*
Contractor: *Maxim Technologies, Inc., C.Dinovo*
Equipment: *Acker Soil Max*
Method: *6 1/4" HAS/5 7/8 Roller Bit/NX Core*

SAMPLING METHODS

	Sampler	Tube	Core
Type:	*S.S./NX Core Barrel*	*NA*	*NX*
Diameter:	*2 inch*	*NA*	*3 inch*
Other:	*140 lb/30 inch*	*NA*	*NA*

WELL CONSTRUCTION

	Riser	Screen
Material:	*black steel*	*NA*
Diameter (ID):	*4 inch ID*	*2 1/8*
Coupling:	*NPT*	

WELL DEVELOPMENT

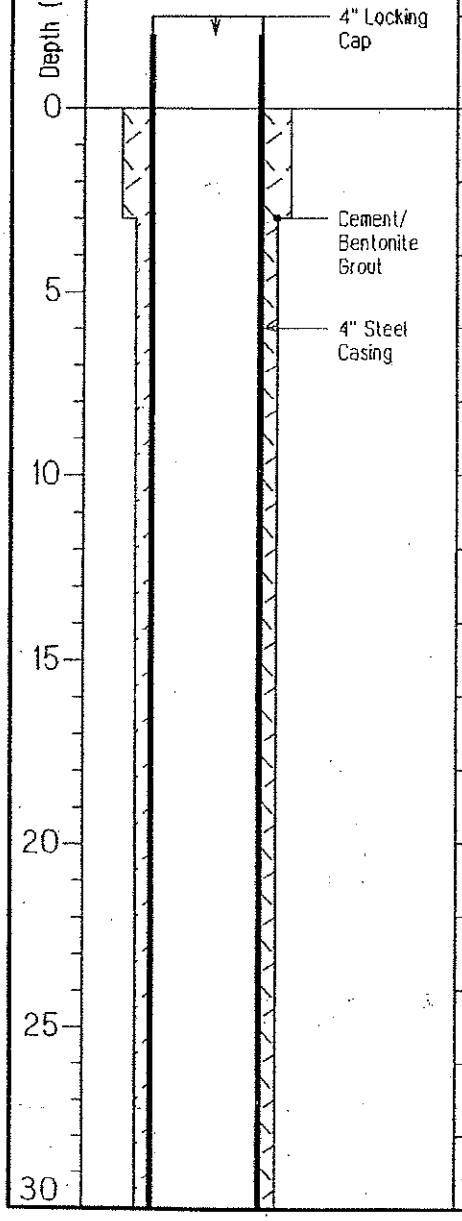
Method:
Duration:
Gals. Purged:
Slug Test: (cm/sec)

SURVEY DATA DATUM:

Grade:
TWC: *161.00*
TPC:
North: *685362.95*
East: *594182.84*

Geophysical Log: ☐ yes ☒ no
Comments:

WELL CONSTRUCTION

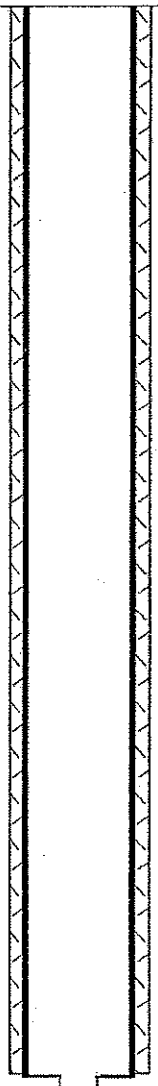


SAMPLE DATA

soil / rock Samp. No. / Run No.	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.)	USCS	HNU (ppm)	VISUAL CLASSIFICATION	REMARKS
S-1	5-7-9-10	1.7'				
S-2	11-11-12-13	1.5'				
S-3	7-11-12-13	2.0'			Slightly moist Brown SILT to Brown SILT & CLAY, few thin lens of c Sand, some red staining	
S-4	11-12-12-16	2.0'			Moist Brown Clayey SILT, some red mottling @ 7.6' very moist dark Gray c SAND	
S-5	7-7-8-11	2.0'			Mottled Brown SILT & CLAY, lens of f Gray SAND, some dark staining	
S-6	3-5-6-8	1.6'			Reddish-brown with Gray mottling, SILT & CLAY , seams of f Gray Sand	
S-7	8-8-9-8	1.7'				
S-8	3-3-4-4	1.4'				
S-9	5-5-5-6	1.8'			@ 16.4 change to Gray Silty CLAY	
S-10	1-1-2-3	1.1'			@ 18.3 Saturated Wet, Gray Silty CLAY with brown mottling	Saturated @ 18.3 feet.
S-11	WOR-WOH-2-2	0.6'				
S-12	2-2-2-2	1.6'				
S-13	WOH-2-1-2	1.1'				
S-14	2-2-3-2	2.0'			Gray Silty Clay	
S-15	WOR-WOH-1-2	1.2'				

ECKENFELDER INC.	Subsurface Boring Log	Well Name/Location: MW-20R	Page 2 of 3
Project: *RFI*	Project No.: *0192.02*	Start Date: *09/09/97*	
Client: *DYNO Nobel, Port Ewen, NY*		Finish Date: *09/12/97*	

WELL CONSTRUCTION



Depth (feet)	Samp. No. (soil) / Run No. (rock)	Blows/ 6 in. / Hydraul. Cond. cm/sec	Rec. (ft.)	USCS / RQD	HNU (ppm)	(CONTINUATION) VISUAL CLASSIFICATION	REMARKS
30	S-16	WOR-WOH-1-3	1.0'				
	S-17	2-3-1-4	2.0'				
35	S-18	WOR-WOR-WOR-WOR	1.9'			Gray Silty CLAY and Orange-brown SILT	
	S-19	WOH-2-2-3	2.0'			Gray Silty CLAY	
	S-20	1-2-2-3	2.0'				
40	S-21	WOR-WOH-WOH-2	2.0'				
	S-22	1-2-2-4	2.0'			Gray with Orange and Olive streaking and mottling, Silty CLAY	
45	S-23	2-58-24-43	1.4'			SAND & GRAVEL c GRAVEL and Gray with olive mottling Silty CLAY, little cmf Sand	
	S-24	13-15 25-28	1.6'			Orange-brown f SAND and CLAY & SILT	
	S-25	79-64-32-51	2.0'			Olive-gray c GRAVEL, some silty CLAY, little cmf SAND	
50	S-26	13-15-24-26	2.0'			c GRAVEL,little c to cmf Sand, little gading to trace (+) Silty Clay	
	S-27	10-13-27-28	1.6'			54.0	
55	S-28	50/0"	0.0'			BEDROCK - GRAY SHALE *No core collected from 54.0' to 59.1'.*	No core collected from 54.0' to 59.1'
60	R-1		1.8'	78%		Gray Shale, some fractures with no staining, dipping from vertical, to steep, to horizontal from 60.0' to 61.3'.	
	R-2		4.8'	56%		Badly fractured from 61.1' to 61.3' d=61.7 Few fractures from 61.7' to 62.4', no staining Few horizontal fractures some clay in-filling, and some calcite mineralization Large horizontal fracture @ 64.7', heay calcite mineralization	Formation taking a lot of water from 62.5' to 66.5'
65	R-3		4.8'	63%		Several small fractures from 64.9' to 65.8', trace to no staining Fractures @ 67.5' and 67.6', some calcite mineralization Badly fractured zone from 68.7' to 71.2', some calcite	
70							

ECKENFELDER INC.	Subsurface Boring Log	Well Name/Location: MW-20R
Project: *RFI*	Project No.: *0192.02*	Start Date: *09/09/97*
Client: *DYNO Nobel, Port Ewen, NY*		Finish Date: *09/12/97*

Depth (feet)	WELL CONSTRUCTION	soil / rock	SAMPLE DATA					(CONTINUATION)	
		Samp. No.	Blows/ 6 in.	Rec. (ft.)	USCS	HNU (ppm)			
		Run No.	Hydraul. Cond. cm/sec	Rec. (ft.)	RQD			VISUAL CLASSIFICATION	REMARKS
70		R-3		4.8'	63%				
75		R-4		4.5'	79%				
								End of Boring at 77.0 feet.	
80									
85									
90									
95									
100									
105									
110									