PERCHLORATE SITE CHARACTERIZATION SUMMARY REPORT

SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY

Shieldalloy Metallurgical Corporation

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June 2011

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June 30, 2011

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Re: Perchlorate Site Characterization
Summary Report
Shieldalloy Metallurgical Corporation Facility - Newfield, NJ
TRC Project No. 177208-000005-000000

Dear Ms. Henry:

As requested, TRC is pleased to submit two hard copies and one electronic copy (CD ROM) in PDF format of the Perchlorate Site Characterization Summary Report (SCSR) for Shieldalloy Metallurgical Corporation (SMC) Superfund Site in Newfield, New Jersey. This report has been prepared in accordance with the requirements of the New Jersey Department of Environmental Protection (NJDEP) Administrative Consent Order (ACO, dated February 1, 2006) and was also conducted in accordance with the requirements of the subsequent April 28, 2010 Shieldalloy Administrative Settlement Agreement And Order On Consent For Remedial Investigation/Feasibility Study (SMC-AOC) between SMC, TRC and the United States Environmental Protection Agency (USEPA). These requirements include, specifically, the Operable Unit 3 (OU3) portions of the SMC-AOC and the Scope of Work (SOW) contained therein relating to the RI and Feasibility Study (FS) for perchlorate contamination.

If you have any questions regarding this report, please do not hesitate to contact me at (215) 246-3449.

Very truly yours,

TRC

Patrick J. Hansen, PE
Senior Manager

Attachment
cc: D. Gaffigan, NJDEP (2 hard copies, 1 CD ROM)
B. Flowers, SMC (1 hard copy)
L. Butlien, TRC (1 hard copy)

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LIST OF ACRONYMS

AOCs	Areas of Environmental Concern
ACO	Administrative Consent Order
ASTM	American Society for Testing and Materials
bgs	below ground surface
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CLP	Contract Laboratory Program
COCs	Constituents of Concern
C-O-C	Chain-of-Custody
CSM	Conceptual Site Model
DO	Dissolved Oxygen
EDD	Electronic Data Deliverable
EQuIS	Environmental Quality Information System
FDA	U.S. Food and Drug Administration
FS	Feasibility Study
ft	feet
ftbgs	feet below ground surface
gpm	gallons per minute
GPS	Global Positioning System
GWQS	Groundwater Quality Standards
ITRC	Interstate Technology Regulatory Council
MCL	Maximum Contaminant Level
MDL	Method Detection Limit
ND	Non-Detect
NJAC	New Jersey Administrative Code
NJDEP	New Jersey Department of Environmental Protection
NJOC	New Jersey One Call
NJPDES	New Jersey Pollutant Discharge Elimination System
NRC	Nuclear Regulatory Commission
NTU	Nephelometric Turbidity Units
NWS	National Weather Service
OD	Outer Diameter
ORP	Oxidation-Reduction Potential
OU3	Operable Unit 3
PCB	Polychlorinated Biphenyl
ppb	parts per billion
PRG	Preliminary Remediation Goal
QA/QC	Quality Assurance/Quality Control
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RIWP	Remedial Investigation Work Plan
RL	Reporting Limit
ROD	Record of Decision
ROW	Right-of-Way
RPD	Relative Percent Difference
RSL	Regional Screening Level

LIST OF ACRONYMS
(Continued)

SAT	Screened Auger Tool
SCSR	Site Characterization Summary Report
SDWA	Safe Drinking Water Act
SMC	Shieldalloy Metallurgical Corporation
SMC-AOC	SMC Administrative Order on Consent
SOW	Scope of Work
SVOCs	Semi-Volatile Organic Compounds
TCE	Trichloroethene
TRC	TRC Environmental Corporation
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
USACE	U.S. Army Corp. of Engineers
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compound

1.0 INTRODUCTION

On behalf of Shieldalloy Metallurgical Corporation (SMC), TRC Environmental Corporation (TRC) conducted the initial phase of a perchlorate Remedial Investigation (RI) at the SMC facility (the "Site") located in Newfield, New Jersey between October 12, 2009 and December 7, 2009. A second round of groundwater sampling was completed between September 8 and 9, 2010 and the installation of one additional monitoring well was conducted between April 4 and 5, 2011, followed by subsequent groundwater sampling on April 29, 2011. The RI was conducted in accordance with the requirements of the New Jersey Department of Environmental Protection (NJDEP) Administrative Consent Order (ACO, dated February 1, 2006), which, in part, required SMC to remediate perchlorate-contaminated groundwater at the Site to an action level of 5 micrograms per liter (µg/L) or parts per billion (ppb) or to a higher concentration limit if so adopted by that regulatory agency (NJDEP, March 2006).The RI was also conducted in accordance with the requirements of the subsequent April 28, 2010 Shieldalloy Administrative Settlement Agreement And Order On Consent For Remedial Investigation/Feasibility Study (SMC-AOC) among SMC, TRC and the United States Environmental Protection Agency (USEPA). These requirements include, specifically, the Operable Unit 3(OU3) portions of the SMC-AOC and the Scope of Work (SOW) contained therein relating to the RI and Feasibility Study (FS) for perchlorate contamination.

1.1 Purpose

The purpose of the perchlorate RI was to delineate the horizontal and vertical extent of perchlorate in select media on-site (soil, groundwater, surface water, and sediment) and emanating from the Site (as evident in groundwater, surface water, and sediment). As part of the perchlorate RI, TRC investigated soil quality in known or potential areas of environmental concern (AOCs), assessed general hydrogeological conditions on-site and off-site, and further characterized the extent of perchlorate in soil, groundwater, sediment, and surface water. This Perchlorate Site Characterization Summary Report (SCSR) details the approach, procedures and protocols employed during the perchlorate RI.

1.2 Overview of Conceptual Site Model/Triad Approach

The foundation of the perchlorate RI was a comprehensive site investigation, which evaluated areas where perchlorate may have been utilized at the Site and potentially released to soil, groundwater, or other media. The investigation was conducted in the context of a Conceptual Site Model (CSM), which identified each potential release area, along with the potential migration pathways followed by perchlorate, and the ultimate receptors (USEPA, 1988).

An environmental site investigation that fully characterizes the nature and extent of contamination is typically iterative in nature. In order to streamline the perchlorate RI, TRC incorporated principles of the Triad approach, which consist of systematic planning, dynamic work strategies, and real-time measurement technologies (NJDEP, 2005). In addition, all the field sampling procedures utilized as part of the perchlorate RI followed the guidance outlined in the NJDEP Field Sampling Procedures Manual (ibid.).The perchlorate investigation presented herein evaluated soil quality with respect to perchlorate in the potential AOCs, assessed hydrogeological conditions at and near the Site to determine the extent of perchlorate in groundwater, and assessed the surface water and sediment quality in abutting and nearby water bodies with respect to perchlorate concentrations.

1.3 Scope of Work

The Perchlorate Remedial Investigation Work Plan (RIWP) (TRC, 2008) was reviewed by NJDEP and the USEPA and was approved for implementation on June 10, 2009. The RIWP proposed to collect soil, sediment, surface water and additional groundwater data to fully delineate the extent and magnitude of the observed groundwater concentrations of perchlorate and investigate if it is present in other media at the Site. In accordance with the RIWP, TRC conducted the following activities during the initial phase of the RI, conducted between October 12, 2009 and December 7, 2009:

- Reviewed historical aerial photographs of the SMC site, focusing on areas of reported perchlorate storage, perchlorate use, and general waste management practices, including any areas characterized by drum storage, stressed vegetation, and/or ground staining/discoloration.

- Advanced 24 soil borings onsite using a track-mounted, direct-push unit (Geoprobe®) to evaluate soil conditions in three potential perchlorate AOCs across the Site including:

  1. AOC-1, Former Chemical Storage Building (seven borings);
  2. AOC-2, Footprint of Former Furnace Building (four borings);
  3. AOC-3, Former Unlined/Lined Lagoons (twelve borings); and
  4. Background Location (one boring);

- Obtained access from both the City of Vineland and Cumberland County to drill within the county or municipal roadside right-of-ways (ROWs);

- Supervised the drilling of five supplemental vertical groundwater profiles at key locations hydraulically downgradient of previous vertical groundwater profiles drilled as part of a supplemental off-site investigation conducted by TRC in late 2006/early 2007;

- Supervised the installation of two monitoring wells adjacent to two of the vertical profiling boreholes;

- Determined groundwater conditions by collecting groundwater samples from 67 monitoring wells and extraction wells (including the two newly installed wells). The existing monitoring wells and extraction wells include wells located on SMC's 67-acre property and the hydraulically downgradient "Farm Parcel", a downgradient sentinel monitoring well, and an upgradient U.S. Geological Survey (USGS) observation well. Wells are screened across the shallow portion of the Cohansey aquifer (approximately 0 to 45 feet below ground surface (ftbgs)), the intermediate portion of the Cohansey aquifer (approximately 45 to 90 ftbgs), and the deep portion of the Cohansey aquifer (approximately 90 to 152 ftbgs);

- Evaluated sediment and surface water quality, including ten samples from downstream and upstream (upgradient) locations along the Hudson Branch, Burnt Mill Pond (including downstream of the pond outfall) and Burnt Mill Branch; and

- Tabulated and assessed the analytical data collected.

Following completion of the initial RI activities detailed in the RIWP, TRC and SMC evaluated the results of the first round of groundwater sampling for perchlorate and other data described above. Based on 1) the detection of perchlorate in groundwater at several monitoring well locations and 2) the indication from USEPA at the June 9, 2010 project kickoff meeting that they would require at least two rounds of groundwater sampling in order to adequately review the OU3 groundwater perchlorate RI results, TRC recommended a second round of groundwater sampling incorporating a sub-set of the monitoring wells sampled as part of the initial phase of

the RI. Specifically, on behalf of SMC, TRC notified USEPA – Region II in a letter dated August 15, 2010 (Appendix K) that a second round of groundwater sampling was being conducted as part of the perchlorate RI. Ms. Sherrel Henry of USEPA – Region II indicated the proposed groundwater sampling plan was acceptable via e-mail dated August 27, 2010 (Appendix K). In accordance with the Groundwater Monitoring Event Notification for the perchlorate RI, TRC conducted the following activities between September 8 and 9, 2010:

- Determined groundwater conditions by collecting groundwater samples from 35 monitoring wells and extraction wells (13 shallow zone wells, 6 intermediate zone wells, and 16 deep zone wells). The selected monitoring wells and extraction wells included wells located on SMC's 67-acre property, the hydraulically downgradient "Farm Parcel", and downgradient sentinel monitoring wells; and

- Tabulated and assessed the analytical data collected.

Based on the results of the perchlorate RI work described above, a data gap was identified in the northern limit of the perchlorate groundwater plume in the deep aquifer zone, where full delineation of the plume relative to the NJDEP ACO-defined action level of 5 ppb could not be confirmed. This portion of the plume was thought to be potentially related to a regional perchlorate issue unrelated to the historical/industrial operations at the Site. Therefore, TRC recommended the installation and sampling of one additional deep monitoring well along Salem Avenue at a location approximately 1,000 feet northeast of monitoring well SC36D and approximately 2,000 feet west of the property line of the former SMC manufacturing facility. In a letter dated January 31, 2011 (Appendix K), TRC recommended to the USEPA that the proposed monitoring well would be installed and sampled using the approved methods and procedures utilized for the other two monitoring wells installed and sampled as part of the perchlorate RI (i.e., SC35D and SC36D). It was also recommended that the proposed monitoring well be installed and sampled under the existing USEPA- and NJDEP-approved Perchlorate RIWP. Conducting this proposed work under the existing RIWP would avoid unnecessarily delaying completion of the OU-3 Perchlorate RI and would be consistent with the perchlorate RI work performed to date. In accordance with the Additional Monitoring Well Installation/Sampling Notification letter submitted to the USEPA, TRC conducted the following activities between April 4 and 5 and on April 25, 2011:

- Supervised the installation of one monitoring well (SC40D) approximately 1,000 feet northeast of monitoring well SC36D;

- Determined groundwater conditions by collecting groundwater samples from the newly installed monitoring well SC40D, which is screened within the deep portion of the Cohansey aquifer (approximately 120 to 130ftbgs); and

- Tabulated and assessed the analytical data collected.

1.4 Site Characterization Summary Report Organization

This Perchlorate SCSR is organized with tables, figures, and appendices supporting the text as follows:

- Section 2.0 (Background) – Presents background information on perchlorate, the Site history, physical attributes of the property, findings from previous groundwater studies, known areas of environmental concern; and a review of historical reference documents and aerial photographs.

- Section 3.0 (Remedial Investigation Methods) – Describes the rationale for the proposed sampling locations and remedial investigation field methods for soil, groundwater, sediment and surface water sampling;

- Section 4.0 (Utility Clearance) –Describes the steps for locating subsurface utilities prior to commencing field tasks;

- Section 5.0 (Sample Collection and Handling) – Describes the field sampling procedures for collecting and handling soil, groundwater, sediment, and surface water samples;

- Section 6.0 (Documentation) – Describes the field sampling procedures for maintaining proper documentation during collection, possession, and handling of samples;

- Section 7.0 (Analytical Procedures) – Specifies the field analytical equipment and laboratory methods selected for this study;

- Section 8.0 (Quality Assurance/Quality Control) – Describes the measures taken to assure the quality of data collected during sampling events;

- Section 9.0 (Analytical Results) – Presents the analytical results for all samples collected during the remedial investigation;

- Section 10.0 (Data Interpretation) – Describes the analytical results relative to the applicable screening criteria for perchlorate and discusses remaining data gaps;

- Section 11.0 (Conclusions and Recommendations) –Presents conclusions drawn from the RI results; and

- Section 12.0 (References) – Lists the materials referenced in this SCSR.

2.0 BACKGROUND

This section provides background information on perchlorate, information on the Site and its history, a summary of historical perchlorate studies at the Site and the identification of potential AOCs based on available historical information.

2.1 Background Information on Perchlorate

2.1.1 Regulatory Screening Levels

Perchlorate is a contaminant for which there currently are no promulgated standards (e.g., no federal or New Jersey state drinking water standard, final groundwater quality standard, or soil, sediment or surface water standards). The concentration at which perchlorate in drinking water poses a human health risk is currently the subject of much debate.

In January 2006, the USEPA issued assessment guidance for perchlorate that included a preliminary remediation goal (PRG) of 24.5 ppb perchlorate in drinking water for Comprehensive Environmental Response Compensation and Liability Act (CERCLA) sites (USEPA, 2006). The USEPA requires monitoring of perchlorate by public water systems under the Safe Drinking Water Act's (SDWA's) Unregulated Contaminant Monitoring Rule. On February 1, 2006, SMC entered into an ACO with NJDEP requiring SMC to remediate perchlorate-contaminated groundwater at the Site to an action level of 5 ppb or to a higher concentration limit if a different regulatory standard is adopted (NJDEP, March 2006). In March 2007, New Jersey published an interim groundwater quality criterion of 5 ppb, per the provisions of the New Jersey Administrative Code (NJAC) 7:9C-1.7(c)2. NJDEP generally establishes new groundwater quality criteria through amendments to or re-adoption of the Groundwater Quality Standards (GWQS) rules. However, the GWQS rules at NJAC 7:9C-1.7(c) allow the Department to establish new groundwater quality criteria on an interim basis prior to rulemaking. New Jersey has not, to date, adopted a final groundwater quality standard for perchlorate. In December 2008, the USEPA issued an Interim Drinking Water Health Advisory for perchlorate (which was reviewed and approved by the National Research Council) that includes an Interim Health Advisory level of 15 ppb. USEPA currently recommends that the 15 ppb screening level be used as a PRG for perchlorate in drinking water (EPA, 2008a). On March 16, 2009, New Jersey proposed to amend the New Jersey Safe Drinking Water Act at NJAC 7:10 to establish a perchlorate maximum contaminant level (MCL) of 5 ppb for drinking water purposes. However,

on March 16, 2010, the NJDEP decided not to promulgate the proposed standard pending receipt of more reliable scientific data on the risks associated with perchlorate ingestion by sensitive population groups. Thus, the proposed MCL for perchlorate was never adopted in New Jersey.

In soils, the only available screening criteria are the USEPA Regional Screening Levels (RSLs) for perchlorate in residential soil (55,000 micrograms/kilogram (µg/kg) or ppb) and industrial soil (720,000 ppb). New Jersey has not developed soil remediation standards for perchlorate. Similarly, no federal or state standards or screening levels have been identified for perchlorate in surface water or sediment.

In the absence of currently controlling standards, for the purposes of this SCSR, groundwater action levels of 5 ppb, 15 ppb, and 24.5 ppb are used to evaluate groundwater perchlorate levels and the analytical methods used for all sample media were selected to achieve the lowest possible laboratory reporting limits. The USEPA RSLs are used as screening levels for perchlorate in soil.

2.1.2 Perchlorate Nature and General Use

The majority of perchlorate compounds are manufactured for use in defense activities and the aerospace industry. Ammonium and potassium perchlorate are oxidizing agents used for solid propellant rockets and missiles. Perchlorate has also been identified as a component of certain Chilean-mined fertilizers used on crops. Prior to the 1960s, a majority of the fertilizer used in the United States was mined from Chilean-derived nitrate deposits meaning, therefore, that perchlorate unassociated with specific industrial or manufacturing operations can be expected to be found in agricultural or formerly agricultural soils and other media rather ubiquitously throughout the United States. Currently, however, only a small percentage of these deposits are applied to cropland in the United States (ITRC, 2005).Perchlorate has been detected in crops in the general vicinity of the Site, including lettuce grown in Newfield, New Jersey and spinach grown in Vineland, New Jersey (USFDA, 2009). The lettuce sample collected from Newfield exhibited perchlorate at 14.2 ppb, which was slightly higher than the average lettuce sample concentration for a range of locations across the United States of 11.75 ppb. The spinach sample collected from Vineland exhibited perchlorate at 40.9 ppb, which was less than the average spinach sample concentration of 115 ppb. Fireworks, safety flares and blasting explosives are also potential sources of perchlorate in the environment. Finally, perchlorate

seems to be a naturally occurring substance in some potash-bearing evaporite soils, and likely related water media, in specific arid locations around the country (e.g., some portions of New Mexico).

Perchlorate compounds used as oxidizing agents are salts, which dissolve rapidly in water, become mobile in groundwater, and persist for many decades under typical ground and surface water conditions. Perchlorate does not bind to soil particles and the movement of perchlorate in soil is largely a function of the amount of water present. If sufficient infiltration occurs, perchlorate will be completely leached from the soil. In dilute concentrations typically found in groundwater, perchlorate within the central mass of the plume generally moves at the same average velocity as the groundwater. However, dispersion will cause perchlorate at the leading edge of the plume to actually move faster than the average groundwater velocity. Perchlorate is kinetically very stable under environmental conditions and will not react or degrade in solution under ambient conditions. The combination of high solubility, low sorption, and lack of degradation tends to create plumes that are large and persistent.

2.2 Site Location

The SMC facility is located at 35 South West Boulevard, which is primarily within the Borough of Newfield, Gloucester County, New Jersey. The southwest corner of the manufacturing portion of the facility is located in the City of Vineland, Cumberland County, New Jersey. The manufacturing portion of the facility and associated support areas comprise approximately 67.7 acres. SMC owns 19.8 acres of farmland (Farm Parcel), located about 0.38 miles southwest of the main facility in Vineland. The Farm Parcel was never used for manufacturing or related activities. A site location map (Figure 2-1) illustrates the locations of these two parcels.

The remnants of an historical rail spur, woods, a closed municipal landfill, and farmland bound SMC's manufacturing parcel to the north, with railroad lines and South West Boulevard along the western boundary. Wooded vegetation, residences, and small businesses abut the Site to the east, along with the headwaters of the Hudson Branch. The Hudson Branch, associated wetlands, and an unnamed pond form the southern property boundary, with residences located along Weymouth Road, south of the Hudson Branch. The area surrounding the Farm Parcel

includes residences, wooded properties, and farmland, with North West Avenue forming the southwest boundary of the parcel.

The SMC manufacturing facility is secured with steel-wire fencing. The Farm Parcel is unsecured, with access from an unpaved road off of North West Avenue.

2.3 Site History

The Site has a lengthy manufacturing history, with Durand & Wilcox Glass Co. as its first occupant in the early 1900's, and Specialty Glass Corporation, manufacturer of doorknob tops, console bowls, and candle sticks, operating on the premise through about 1947 (TRC, 2005). In 1952, SMC first occupied the Site and operated a specialty metal plant producing chromium alloys, ferro-alloys, and other metallic products. Production activities included processing ores and degreasing operations to clean metal beginning circa 1965 (TRC, 1992). Historically, untreated wastewater was discharged to an unlined lagoon in the 1960s to 1971, until replaced with lined lagoons that received treated wastewater. Other operational by-products included slag and baghouse dust from metal alloy smelting. Additional historical AOCs include permanently closed-out diesel and gasoline underground storage tanks (USTs). Current and historical use of the Farm Parcel, southwest of the manufacturing facility, is agricultural.

Environmental investigations at SMC's facility began in the early 1970s, after the discovery of hexavalent chromium in a nearby municipal supply well triggered studies evaluating the potential environmental impacts associated with SMC's operations. In 1983, the facility was listed by the USEPA as a Superfund Site as a result of the discovery of the hexavalent chromium. Constituents of concern (COCs) in the various media at the Site were subsequently expanded to include metals (mainly chromium), volatile organic compounds (VOCs) (mainly trichloroethene [TCE]), and to a lesser extent, semi-volatile organic compounds (SVOCs), pesticides, and polychlorinated biphenyls (PCBs). Consequently, the Site has an extensive site characterization history, including soil, groundwater, sediment and surface water investigations and remedial activities, which are chronologically summarized below:

- SMC installed an 80 gallon per minute (gpm) groundwater pump and treat remediation system in 1979;
- SMC installed a 400 gpm groundwater pump and treat remediation system to control off-site migration of hexavalent chromium under an October 1988 NJDEP ACO;
- Remedial Investigation/Feasibility Study (RI/FS) Technical Report (TRC, 1992);

- Final Focused (Groundwater) Feasibility Study (TRC, 1994);
- Characterized, remediated, and closed nine wastewater treatment lagoons from 1994 to 1997 (TRC, 2000);
- Draft Final Feasibility Study Report (Soil, Surface Water and Sediment) (TRC, 1996);
- Record of Decision (ROD) in 1996 for the groundwater operable unit;
- Investigation of plume geometry through vertical profiling as part of the 2002 Off-Site Groundwater Investigation;
- Further investigation of plume geometry through vertical profiling and monitoring well installation as part of the 2006/2007 Supplemental Off-Site Groundwater Investigation (TRC, 2007); and
- Quarterly/Annual Groundwater Monitoring Reports.

The results of these characterization activities and an evaluation of remedial alternatives are presented in various prior environmental reports and feasibility studies, as listed above. In addition, low-level radioactive materials, mainly slag and baghouse dust, are stored at the facility under a Nuclear Regulatory Commission (NRC) license and are being addressed separately from the Site Superfund investigations.

TCE and chromium are COCs in groundwater and are being remediated by a pump-and-treat system in operation since 1979. Both plumes (TCE and chromium) have migrated to SMC's Farm Parcel. The main COCs in soil consist of chromium (at depth) and limited areas of potential SVOC, pesticide and PCB contamination. A soil Feasibility Study report was prepared by TRC in 1996 and submitted to NJDEP.

Sediment in the adjoining Hudson Branch is impacted by the presence of inorganics, although environmental impairment was not detected upon comparison to similar background locations. A sediment Feasibility Study was prepared by TRC in 1996 and supplemental characterization studies were conducted by TRC in 2009.

Surface water quality in the Hudson Branch and Burnt Mill Pond has been characterized in several previous studies supporting RI/FS activities (1990 and 1995) and the New Jersey Pollutant Discharge Elimination System (NJPDES) permitting at the SMC facility. The 1996 Feasibility Study report indicated that based on water quality, no further action was required relative to surface water.

2.4 Physical Setting of the Site

USGS Topographic Quadrangle

The referenced property is located within the Newfield, New Jersey 7.5' USGS Quadrangle (Figure 2-1).

Surficial Geology

Seaward-dipping unconsolidated sediments of the Atlantic Coastal Plain underlie the Site and range from Cretaceous to Holocene in age. Across southern New Jersey these materials thicken and dip toward the southeast. Observations in numerous soil borings completed at the SMC facility are consistent with regional surficial geology. The three surficial units of interest that underlie the Site include the Bridgeton Formation, the Cohansey Sand, and the Kirkwood Formation. At the site, the Bridgeton Formation consists of up to 28 feet of brown sand and overlies the Cohansey Sand, which is comprised of coarse sands and little silt in the upper 40 feet, with generally finer sand and some clay and silt lenses in the lower 60 to 80 feet. Discontinuous silt and clay up to 6 feet in thickness were encountered within the lower Cohansey Sand formation. The Kirkwood Formation, predominantly a gray silt and clay layer, was encountered between 121 and 153 ftbgs and underlies the Cohansey Sand.

The Middle to Lower Cretaceous sediments are continental deposits consisting of alternating layers of clay, silt, sand, and gravel. The Upper Cretaceous and most Tertiary sediments were deposited within marine beach and shelf facies environments and reflect various fluctuations in sea level. A coarsening-upward depositional sequence reflects a regressive sea, while fining-upward unit represents a transgressive sea. These stratigraphic units are illustrated in boring logs SC1D, SC21D, SC28D, SC29D and SC32D, which are presented in Appendix A.

Bedrock Geology

Bedrock beneath the Site consists of banded, micaceous schists or gneiss within the Wissahickon Formation of Precambrian age. The Wissahickon Formation contains mica, quartz, feldspar, and chlorite with numerous fractures, joints, and folding of individual layers. Bedrock was not observed at or encountered in the subsurface studies conducted across the Site. The formation outcrops northwest of Gloucester County. Based on the average degree of dip for

overburden in the Newfield area, it is estimated that the depth to bedrock beneath the Site is approximately 2,000 ftbgs.

Local Drainage

The SMC facility is located within the Upper Maurice River portion of the Maurice River watershed (FGCW, 2005). The Hudson Branch flows westward through portions of SMC's facility and along the southern property boundary of the manufacturing parcel (Figure 2-2). An unnamed pond exists along the Hudson Branch, south of SMC's former thermal cooling pond (Figure 2-2). The Hudson Branch drains into Burnt Mill Pond approximately 1.2 miles southwest of the Site. Burnt Mill Pond exists at the confluence of the Hudson Branch and Burnt Mill Branch (Figure 2-3).

The Hudson Branch and Burnt Mill Branch are not "listed streams" within the Delaware River Drainage Basin (NJAC 7:9B) and therefore assume the classification of the water body into which they flow (i.e., the Maurice River), which is classified as FW2–NT (non–trout). Designated uses of FW2–NT surface waters include the following:

- Maintenance, migration, and propagation of the natural and established biota;
- Primary and secondary contact recreation;
- Industrial and agricultural water supply;
- Public potable water supply after conventional filtration, treatment, and disinfection; and
- Any other reasonable uses.

Surface water runoff from the Site is toward the Hudson Branch. Drainage from developed portions of SMC's facility is via the storm drain system and overland flow, which is directed toward the retention pond along the southwestern fence line of the facility. The discharge from the retention pond flows into the Hudson Branch. Drainage from the western employee parking lot discharges to a ditch along the western boundary of the facility and drainage within the Storage Yard (eastern portion of Site) is contained by perimeter berms. Within the eastern undeveloped area of the facility, drainage is generally via sheet flow. Other local discharges to the Hudson Branch include the discharge of treated groundwater to the on-site retention basin and the discharge of stormwater from a portion of the Borough of Newfield located north of the SMC facility. This off-site stormwater flows through a 36-inch diameter stormwater pipe that enters the SMC facility at the northern property line, crosses the SMC

facility and discharges into the Hudson Branch at an outfall located just west of the former thermal cooling pond.

Wetlands

Wetlands along the Hudson Branch in the vicinity of the SMC facility were delineated and surveyed as part of several historical studies (Dan Raviv, 1990 and TRC, 1996).

Local Hydrogeology

The principal aquifer in the vicinity of the SMC site is the Cohansey Sand, which is approximately 130 feet thick. The Cohansey Sand is underlain by the Kirkwood Formation. The upper portion of the Kirkwood Formation is composed of silt and clay, which functions as a confining unit in the vicinity of the SMC facility, restricting the downward flow of groundwater from the Cohansey Sand. Depths to groundwater across the Site range from surface grade at the Hudson Branch to approximately 17 ftbgs in the northwest quadrant of the Site. Based on off-site investigations, groundwater is typically identified at depths ranging between 4 ftbgs and 32 ftbgs. Seasonal fluctuations in the water table elevations are on the order of a few feet. Groundwater flow direction in both the upper and lower Cohansey Sand is southwest toward the Hudson Branch, which closely matches general Site topography. On-site groundwater movement in the lower Cohansey Sand is influenced by the treatment system's pumping wells. Other anthropogenic factors including sewer systems and other buried utilities may also control local groundwater movement. The average linear on-site groundwater flow velocity in the shallow portion of the aquifer is about 2.9 ft/day (TRC, 1994). A downward hydraulic gradient has been observed in most on-site well clusters, which is consistent with groundwater pumping conditions at and downgradient of the Site.

An electrochemical treatment system is used for the removal of chromium and an air-stripping process is used for the removal of TCE from groundwater prior to discharge into the Hudson Branch. Five extraction wells, two onsite in the southwest corner of the manufacturing portion of the facility (i.e., W9 and Layne) and three offsite (i.e., RW6S, RW6D and RIW2), withdraw groundwater at a maximum rate of 400 gpm and hydraulically control migration of the chromium plume.

Not including the three wells installed as part of these investigations, 65 groundwater monitoring wells and extraction wells are located on and off site and are utilized for on-going chromium and VOC groundwater monitoring (i.e., semi-annual and annual sampling).

Local Water Use

The New Jersey GWQS (NJAC 7:9C) classify groundwater quality at the Site as Class II-A. The primary designated uses for Class II-A groundwater are potable water and conversion to potable water through conventional water supply treatment, mixing, or other similar techniques. Secondary uses include agricultural and industrial water. Groundwater is the primary source of domestic, agricultural, community, and municipal water supplies in the general area of the SMC facility. The depths of nearby public supply wells range from 150 to 200 ftbgs and are typically screened within the Kirkwood-Cohansey Formation. Depths of private wells vary greatly across the area.

Potable water is provided locally by the Newfield Water Department and the Vineland Water and Sewer Utility. Both utilities rely solely on groundwater sources for their potable water. Due to chromium and TCE contamination, the City of Vineland has designated an area of the city downgradient from the SMC facility as a well restriction area requiring mandatory connection to the public water systems. The nearest municipal supply well to the SMC facility is Newfield Well #3, located approximately 1,600 feet north and sidegradient of the SMC facility. The nearest municipal supply well to the Farm Parcel area is Vineland Well #10, located along Delsea Drive, northwest of Burnt Mill Pond, approximately 4,000 feet west of the Farm Parcel. This well reportedly has not been used since October 2004. The Vineland Water Company currently uses Well #14, which is located several thousand feet to the northwest of Well #10. Both wells cannot operate at the same time due to pumping and system capacity limitations (City of Vineland, personal communication, 2008).

2.5 Historical Perchlorate Monitoring Results

At the request of NJDEP, SMC agreed to sample and analyze the groundwater at the Site for perchlorate in July 2004. Groundwater samples were collected from on-site wells IWC-1 through IWC-5. Subsequent sampling events were conducted in September and October 2004. Historical perchlorate results are summarized in Table 2-1 and are compared to the 5 ppb and 15

ppb screening levels. Perchlorate was detected at concentrations greater than 5 ppb and 15 ppb in both shallow and deep wells along the southwest corner of the 67-acre manufacturing portion of the Site and in off-site Farm Parcel wells in 2004. During February 2006, additional groundwater samples were collected from three deep monitoring wells (SC1D, SC3D(R) and SC24D) and four shallow/intermediate wells (SC1S, SC3S, RIW2 and SC24S) on the Farm Parcel. Perchlorate in groundwater ranged from 0.21 to 23.0 ppb in the shallow/intermediate aquifer and from non–detect (ND) to 76.0 ppb in the deep aquifer during the 2004 and 2006 sampling events (Table 2-1). The highest concentration of perchlorate (76.0 ppb) in groundwater was identified in monitoring well SC1D, a hydraulically downgradient location on the Farm Parcel, during the October 2004 sampling event.

An assessment of the downgradient extent (downgradient of the Farm Parcel) of the groundwater perchlorate plume was conducted by TRC in late 2006/early 2007, concurrent with a supplemental off-site groundwater investigation associated with the chromium/TCE plumes. This scope included the drilling of five vertical groundwater profiles (VP-1, VP-2, VP-3, VP-4, and VP-10) to a maximum depth of approximately 135 ftbgs downgradient and sidegradient of the Farm Parcel (Figure 2-3). Groundwater samples were collected via screened hollow-stem augers from five discrete depth intervals at each location, with the results indicating the presence of perchlorate concentrations greater than 5 ppb extending approximately 5,500 feet downgradient (southwest) of the Farm Parcel. The highest concentrations of perchlorate (up to 49.9 ppb) were found mainly in the deeper portion of the aquifer. The analytical results of the late 2006 off-site groundwater perchlorate sampling are summarized in Table 2-2. Based on these data, it was determined that the lateral and vertical extents of the off-site perchlorate plume had not been adequately delineated at that time.

2.6 Areas of Environmental Concern

To identify potential sources of perchlorate at the SMC facility, a review of historical documents, an interview with SMC employees, and a review of historical aerial photographs were conducted.

2.6.1 Perchlorate Usage and Storage

According to information provided by SMC staff generally familiar with past operational practices, potassium perchlorate was used as an oxidizer in the on-site furnace to increase temperature and enhance furnace performance. The perchlorate was destroyed in the process by reacting with aluminum metal, according to the following chemical reaction, and generating simple chloride salts as the product:

$$3\ KClO_4 + 8\ Al = 3\ KCl + 4\ Al_2O_3$$

The furnace was located within the footprint of former Building D102(A), attached to but isolated from Building D112. Both buildings have since been demolished (see Figure 9-1). Building D102(A) was characterized by an earthen floor (although the area surrounding the building is paved). According to historical purchase order records, SMC purchased approximately 400,000 pounds of potassium perchlorate from 1974 to 1992 for this operational activity. A summary of the available purchase orders is included in Appendix B.

Potassium perchlorate was typically packaged and shipped to the Site in 110-, 250-, and 350-pound, plastic-lined steel drums. This product was reportedly stored onsite in a former small metal outbuilding, east of former Building D102(A) and near the unpaved road forming the northwest boundary of the slag piles, prior to being used in the furnace. This Former Chemical Storage Building was characterized by a concrete interior floor and berm around the building's perimeter. The small Former Chemical Storage Building and adjacent unpaved road are identified as an area of concern (AOC-1) with respect to historical perchlorate storage practices. Furthermore, since the product was used in former Building D102(A), the general footprint of this building has been identified as AOC-2 relative to historical perchlorate usage. It is believed that the storage and usage of perchlorate onsite were limited to these areas. The locations of AOC-1 and AOC-2 are shown on Figure 9-1.

Since perchlorate was completely destroyed in the heating process by reacting with aluminum to form chlorides, there was no general release from this process. Only incidentally spilled material or small amounts of incompletely reacted material would potentially be released into the environment. One possible disposition for the incompletely reacted/residual perchlorate was release to the area of the lined and unlined lagoons and this possible discharge point of the

historical liquid wastes has therefore been identified as AOC-3. The location of AOC-3 is shown on Figure 9-1.

2.6.2 Review of Historical Aerial Photographs

TRC reviewed historical aerial photographs for the SMC site from the years 1974, 1977, and 1986 (as appended to SMC's RI Work Plan [ENSR, 1989]), which spans the known period of perchlorate usage at the Site. The photographic review focused on the aforementioned AOCs and perchlorate storage, use, and disposal practices, including any areas within the AOCs characterized by drum storage, stressed vegetation, and/or ground staining/discoloration. Areas of material storage were observed to the northwest of the small Former Chemical Storage Building (AOC-1) and adjacent to the northeast corner of the former Building D102(A) (AOC-2). Following the review of the historical aerial photographs, two of the seven soil boring locations proposed in the perchlorate RIWP were relocated to the northwest side of the unpaved road adjacent to AOC-1, to further investigate the material storage area that was identified.

3.0 REMEDIAL INVESTIGATION METHODS

The perchlorate RI included the collection of soil, groundwater, surface water and sediment samples at the Site and in the immediate vicinity of the Site. Sampling procedures and methods were conducted pursuant to the requirements in NJAC 7:26E-4(NJDEP Technical Requirements for Site Remediation – Remedial Investigations) and the "Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA" (OSWER Directive #9355.3-01, October 1988). Quality assurance/quality control (QA/QC) requirements were implemented pursuant to the requirements of NJAC 7:26E-2 (NJDEP Technical Requirements for Site Remediation – Quality Assurance for Sampling and Laboratory Analysis), USEPA's "Data Quality Objectives Process for Hazardous Waste Site Investigations" (EPA AQ/G-4HW, January 2000), and USEPA's "Guidance for Data Usability in Risk Assessment" (OSWER Directive #9285.7-05, October 1990).

A summary of the soil, groundwater, surface water and sediment samples collected as part of the perchlorate RI is provided in the subsections below. Sample location rationale and sample collection methodologies and procedures are also described.

3.1 Sampling Locations

Soil

The soil RI was conducted to investigate soil for evidence of perchlorate releases in the identified potential AOCs. Soil samples were collected between October 26 and 28, 2009. Since historical releases of perchlorate may have been continuous or intermittent, both near-surface samples and soil samples at depth were collected. The determination of potential AOCs is detailed in Section 2.6, with boring placement within each AOC as follows (Figure 9-1):

1. AOC-1, Former Chemical Storage Building (seven borings) - three test borings (SS-02, SS-03 and SS-04) were located near the Former Chemical Storage Building and four borings (SS-05, SS-06, SS-07 and SS-08) were located along the unpaved road adjacent to the building. Soil borings SS-07 and SS-08 were located along the northwest side of the unpaved road to investigate material storage areas identified in historical aerial photographs;

2. AOC-2, Former Footprint of Furnace Building (four borings) - all four test borings(SS-21 to SS-24) were located within the footprint of the former furnace building;

3. AOC-3, Former Unlined/Lined Lagoons (twelve borings) - six test borings(SS-09 to SS-14) were located on an approximate 150-foot grid system within the footprint of the former lagoons and six test borings (SS-15 to SS-20) were located immediately to the south of the former lagoons (including one along the edge of a drainage swale); and

4. Background, one boring location in the northwest corner of the manufacturing parcel (SS-01).

Groundwater

The groundwater RI was conducted to further define the lateral and vertical extent of perchlorate contamination in the groundwater, building upon the results of previous groundwater investigations (see Section 2.5). Vertical groundwater profiling samples were previously collected concurrent with a supplemental off-site groundwater investigation in late 2006/early 2007 to address the presence of elevated concentrations of perchlorate in the most downgradient wells on the Farm Parcel. Based on the presence of perchlorate at each of the five vertical profiling locations (VP-1, VP-2, VP-3, VP-4, and VP-10), supplemental vertical profiling of groundwater was conducted between October 12 and 23, 2009 in five vertical profiling borings located downgradient and sidegradient to the previously drilled vertical profiles as follows (Figure 2-3):

1. Vertical Profile-13 (VP-13) located approximately 900 feet northwest of the northwest corner of the Farm Parcel, within the West Weymouth ROW;

2. Vertical Profile-13A (VP-13A) located approximately 1,800 feet northwest of the northwest corner of the Farm Parcel within the Salem Avenue ROW;

3. Vertical Profile-14 (VP-14) located approximately 3,500 feet southwest of the southwest corner of the Farm Parcel within the West Forest Grove Road ROW;

4. Vertical Profile-15 (VP-15) located approximately 6,800 feet southwest of the southwest corner of the Farm Parcel within the Freddy Lane ROW; and

5. Vertical Profile-15A (VP-15A) located approximately 9,000 feet southwest of the southwest corner of the Farm Parcel within the West Garden Road ROW.

Based on the presence of perchlorate in vertical profile locations VP-13 and VP-15, additional vertical profile locations VP-13A and VP-15A were drilled. Then, based on the presence of perchlorate in vertical profile locations VP-13A and VP-15A, supplemental monitoring wells were installed and sampled at each of those two locations. A total of 27 groundwater samples were collected from the vertical profiles during this RI, including two

duplicate samples for QA/QC purposes. Monitoring well installation and sampling details are presented in Section 3.3.

Groundwater conditions in the upper, middle, and lower portions of the aquifer were assessed from the existing array of 65 monitoring and extraction wells and the two newly installed monitoring wells (SC35D, and SC36D) during sampling events conducted between October 20 and 22, 2009, on November 19, 2009, on December 7, 2009, and on January 21, 2010. The wells included in these investigations are shown on Figure 2-2 and Figure 2-3 and are listed below:

Manufacturing Facility Monitoring/Extraction Wells (Screened Interval)

A (114-124')	MWH-4 (119-129')	SC20S (7-22')
B (36-46')	SC9S (15-30’)	SC20D (129-139')
IWC-1 (15-20')	SC11S(R) (9-24')	SC22S (3-18')
IWC-2 (35-40')	SC12S (15-25')	SC23S (9-24’)
IWC-3 (55-60')	SC12D (126-136')	SC25S (7-22')
IWC-4 (75-80')	SC13S(R) (14.7-24.7')	SC27S (7-22')
IWC-5 (95-100')	SC13D (127-137')	W2(R) (2-17')
K (36-46')	SC14S (12-27')	W3D (88-108’)
L (42-52')	SC15S (12.5-27.5')	W4 (55-75')
Layne (42-47')	SC16S (12-27')	W9 (110-130')

Farm Parcel and Off-Site Monitoring/Extraction Wells (Screened Interval)

IW1 (32-62')	SC5S (5-20')	SC19S (2-17')
IW2 (40-70')	SC5D (90-120')	SC19D (120-130')
RIW2 (30-55')	SC6S (45-75')	SC21S (3-18')
RW6D (90-125')	SC6D (110-120')	SC21D (125-135')
RW6S (55-75')	SC10S (35-55')	SC24S (5-20')
SC1S (35-55')	SC10D (105-125')	SC24D (105-115')
SC1D (85-95'/100-115')	SC17S (19-28')	SC26D (127-137')
SC3S (35-55')	SC17D (143-153')	SC28D (133-153')
SC3D(R) (102-112')	SC18S (4-19')	SC2D(R) (106-116')
SC4S (35-45')	SC18D (119-129')	SC30D (147-157')

SC31D (120-130')	SC34D (130-140’)	SC40D (120-130’)
SC32D (92-102’)	SC35D (89.5-99.5’)	OBS-2A (129-149’)
SC33D (82.5-92.5’)	SC36D (107-117’)	

In order to confirm an elevated perchlorate concentration detected in the shallow monitoring well K when it was sampled on October 22, 2009, it was re-sampled on January 21, 2010 (see Section 9.2.1 for discussion of analytical results).

A second round of groundwater sampling incorporating a sub-set of the 67 monitoring wells listed above was completed on September 8 and 9, 2010. Groundwater conditions in the upper, middle, and lower portions of the aquifer were assessed from 35 monitoring and extraction wells, which are shown on Figure 2-2 and Figure 2-3 and are listed below:

Manufacturing Facility Monitoring/Extraction Wells (Screened Interval)

IWC-4 (75-80')	SC14S (12-27')	W2(R) (2-17')
K (36-46')	SC16S (12-27')	W3D (88-108’)
Layne (42-47')	SC20D (129-139')	W4 (55-75')
SC11S(R) (9-24')	SC22S (3-18')	
SC12D (126-136')	SC25S (7-22')	

Farm Parcel and Off-Site Monitoring/Extraction Wells (Screened Interval)

SC1S (35-55')	SC17D (143-153')	SC30D (147-157')
SC1D (85-95'/100-115')	SC18S (4-19')	SC32D (92-102’)
SC3S (35-55')	SC21S (3-18')	SC33D (82.5-92.5’)
SC3D(R) (102-112')	SC21D (125-135')	SC34D (130-140’)
SC6S (45-75')	SC24S (5-20')	SC35D (89.5-99.5’)
SC10S (35-55')	SC26D (127-137')	SC36D (107-117’)
SC10D (105-125')	SC28D (133-153')	
SC17S (19-28')	SC2D(R) (106-116')	

Following the installation of monitoring well SC40D between April 4 and 5, 2011, groundwater was sampled at that location on April 29, 2011 (see Section 9.2.1 for discussion of analytical results).

Sediment and Surface Water

The objective of surface water and sediment sampling was to determine whether perchlorate has discharged to surface water bodies in close proximity to the Site via stormwater runoff or groundwater discharge to the Hudson Branch. Initial vertical groundwater profiling results, collected in late 2006/early 2007, indicated that elevated perchlorate concentrations were not present in the shallow aquifer. Therefore, it is unlikely that groundwater is acting as an active source of perchlorate to the surface water. Between October 28 and 29, 2009, TRC collected co-located surface water and sediment samples from the following ten locations (Figure 9-3):

1. Burnt Mill Pond Outfall (SW-1A and SED-1A). This sampling point represented the most downstream and downgradient surface water and sediment sampling location, at the outfall of Burnt Mill Pond near Delsea Drive;

2. Burnt Mill Pond (SW-1 and SED-1);

3. Utility ROW south of the Hudson Branch (SW-2 and SED-2);

4. Hudson Branch as it intersects North West Avenue (SW-3 and SED-3);

5. Hudson Branch as it bisects the middle of the Farm Parcel (SW-4 and SED-4);

6. Hudson Branch near the northern drainage culvert as it intersects Weymouth Road (SW-5 and SED-5);

7. Hudson Branch near the eastern drainage culvert as it intersects West Boulevard. This location was the most downgradient relative to SMC's manufacturing facility (SW-6 and SED-6);

8. Downgradient end of the unnamed pond, south of the former thermal cooling pond (SW-7 and SED-7);

9. Hudson Branch closest to the Site's eastern property boundary. This represented the most upstream and upgradient surface water and sediment sampling location to the SMC site within the Hudson Branch RI (SED-8). No surface water was present at the time of sampling and therefore no surface water sample was collected from this location; and

10. Burnt Mill Branch at Weymouth Road. This was a location in a different drainage basin than the SMC site and represents a background location, upgradient of Burnt Mill Pond (SW-9 and SED-9).

Sediment sampling locations were selected in the field to correspond with points within the stream channel that represent areas of active deposition (sedimentation). Despite the lack of water at sample location SED-8, the same sediment sampling rationale was used and the sample was collected from a location estimated to be within an area of sediment deposition during times of actual stream flow.

A Global Positioning System (GPS) unit was used to obtain precise latitude/longitude readings at each sampling location. Each location was marked in the field with a stake and/or pin flag. Digital photographs were taken showing sampling locations with respect to easily discernable landmarks and nearby land uses.

3.2 Soil RI

TRC investigated soil conditions and obtained soil samples at the Site using Direct Push technology. TRC contracted with and supervised Uni-Tech Drilling Co., Inc. (Uni-Tech) of Franklinville, New Jersey, a drilling contractor licensed with the State of New Jersey, to advance soil borings and collect soil samples in the specified AOCs using a track–mounted, direct-push unit (Geoprobe®). The soil borings were advanced with a "direct-push" method using a vibratory hammer.

Uni-Tech utilized both the DT22 soil sampling system and Macro-Core® tooling. The DT22 system used Geoprobe® 2.25-inchouter diameter (OD) probe rods as an outer casing and Geoprobe® center rods for the inner rod string. A DT22 cutting shoe was threaded into the leading end of the outer casing, which sheared and collected a 1.125-inch OD soil core into a clear acetate liner. The center rods held the liner in place as it collected the soil core and also provided a means of retrieving the liner once the sample was collected. The 2.25-inch probe rods provided a cased hole through which to sample.

A 48-inch long, 2.25-inch OD Macro-Core® sampling tool was utilized at several boring locations. Soil samples were retrieved from acetate liners placed within the Macro-Core® sampling tool. At all soil sample locations, Uni-Tech drove the soil sampling tools continuously to depths corresponding to the approximate water table interface. Boring depths ranged between 8 to 20 ftbgs.For each soil boring, TRC kept a geologic boring log and recorded field observations of soils (Appendix C).

TRC collected two soil samples per borehole, which were submitted to Accutest Laboratories (Accutest) of Dayton, New Jersey, a New Jersey-certified laboratory, for analysis.

At each soil boring location, one sample was collected from immediately above the water table (i.e., within the vadose zone/water table interface). The RIWP proposed collecting the second sample from any zone with evidence of contamination (i.e., discoloration of soils, as perchlorate is a white crystalline powder). However, no evidence of perchlorate contamination was discerned in the field. Grain size observations (fine-grained materials (silt/clay) may have a higher affinity for perchlorate adsorption) were also used to select the second sample interval. Therefore, the second shallow soil sample collected from each soil boring was collected from a two-foot interval located between zero and eight ftbgs.

TRC researched the possibility of using colorimetric field screening methods under development by the U.S. Army Corps of Engineers (U.S. Army Corps of Engineers, 2004); however, no field screening test kit for perchlorate was commercially available at the time of the soil RI (TRC, 2006).

3.3 Groundwater RI

To expand upon the results of the previous vertical groundwater profiling (as previously discussed in Section 2.5), TRC conducted supplemental vertical groundwater profiling using a screened auger tool (SAT) in conjunction with hollow stem auger drilling equipment. The SAT vertically profiled groundwater quality down to about 135 ftbgs, as practical, and did not penetrate the clay forming the basal confining layer of the aquifer.

The SAT consisted of a 5-foot, 4¼-inch inside diameter, hollow stem auger constructed of stainless steel. Large oval-shaped openings were cut out of the hollow stem auger between the auger flights. Wire mesh with a slot size of approximately 0.007–inch lined the inside of the hollow stem auger, allowing groundwater to enter the auger while minimizing the passage of fine soil particles. The SAT was equipped with a plastic, water-tight, knock-out plug at the cutting head, which prevented soil from entering the bottom of the auger. The SAT was the lead auger and was attached to standard 5-foot hollow stem auger flights as the boring was advanced deeper below grade.

The SAT was equipped with an inflatable packer and submersible pump assembly, which allowed the isolation of the groundwater within the auger to the SAT and the auger length immediately above the SAT. By utilizing this setup, the potential for cross-contamination was significantly reduced and the volume of purge water was minimized. Decontamination of the SAT and sampling equipment is discussed in Section 8.4. The packer was inflated with nitrogen

gas. Prior to sample collection, at least three to five volumes of standing water below the inflatable packer (approximately 21 to 35 gallons) were purged to ensure that the formation water was moving into the SAT. The purge rate was reduced using an in-line ball valve. Purge water was pumped through an in-line, flow-through cell equipped with a multi-parameter meter (YSI® 6820) to monitor pH, specific conductivity, turbidity, dissolved oxygen (DO), temperature and oxidation-reduction potential (ORP) of the groundwater. Readings were recorded approximately every three to five minutes on groundwater sampling log sheets (Appendix D). Purging of the SAT was continued at a reduced discharge rate until groundwater parameters stabilized and turbidity readings were less than 50 nephelometric turbidity units (NTUs). Turbidity readings less than 50 NTUs were not achieved at five sample intervals [VP-13(25-30'), VP-14(35-40'), VP-14(130-135'), VP-15(114-119'), VP-15A(77-82')]. In addition, the multi-parameter meter was not functioning properly at the time of purging/sampling VP-14 (80-85') and VP-14 (105-110'). No groundwater parameters were measured during purging/sampling of those two intervals and samples were only collected after the required volume of groundwater was purged and the water appeared clear.

After the purging of an appropriate amount of water and stabilization of groundwater parameters, a sample port was opened prior to the flow-through cell using a ball valve. Groundwater samples were collected as described in Section 5.3 and any groundwater not captured in the containers was captured in a 5-gallon bucket. All purge water was containerized in a polyethylene tank and transported to the SMC water treatment plant for treatment.

TRC targeted five depth intervals for vertical groundwater profiling at each of the five off-site locations. These depth intervals ranged from 15 to 20 feet (VP-15A) to 130 to 135 feet (VP-14). The specific sample depth intervals for each of the profiling locations are noted on Table 2-2. TRC guided the driller to advance the SAT to each of these targeted depths for groundwater sample collection. At each location, drilling ceased if the underlying clay confining layer was encountered or the estimated depth of the clay layer (based on previous drilling data) was reached, to avoid compromising the integrity of the confining layer.

Since groundwater samples were collected at depths well below the water table, the augers were equipped with a water tight seal (O-ring) at the auger connections. This further prevented the potential for cross-contamination of samples due to formation water leaking through the auger connections and into the augers from other depths.

All excess soil cuttings generated during the vertical profiling were containerized in 55-gallon steel drums and returned to the SMC facility pending proper management and/or disposal. All drums were immediately removed from the boring location and stored within Warehouse G at SMC prior to proper disposal. Representative samples of the drill cuttings were collected for waste characterization. After characterization, the drums of drill cuttings were transported off-site on July 7, 2010 via a non-hazardous waste manifest by TIER of Gap, Pennsylvania and properly disposed of at the American Landfill in Waynesburg, Ohio. The drill cuttings were characterized as "Non-Regulated Material, Non-RCRA/Non DOT".

After the last sample was collected at each borehole location, the borehole was properly sealed and abandoned by tremie grouting to the ground surface in accordance with NJDEP regulations (NJAC 7:9D). First, decontaminated drill rods were used to knock out the bottom plug inside the SAT. A tremie pipe was then used to pump bentonite slurry inside the augers while the augers were slowly retracted from the ground. The entire borehole was filled with grout to grade. As necessary, the boreholes were sealed at the surface using Type II Portland Cement to prevent settling. All boreholes were re–graded with topsoil to return the site to pre-drilling conditions with the exception of VP-15, which was advanced through asphalt and was surfaced with asphalt cold patch.

Based on analytical results from the vertical profile groundwater samples, two monitoring wells were installed adjacent to the vertical profile locations VP-13A and VP-15A (SC36D and SC35D, respectively). In addition, a third deep monitoring well (SC40D) was later installed to investigate a data gap in the northern limit of the perchlorate groundwater plume in the deep aquifer zone. The monitoring wells were installed using mud-rotary techniques. Soil samples were collected using a split-spoon device at a frequency of every 10 feet. The soils were geologically logged in the field notebook with a general soil description (e.g., grain size distribution, color, moisture, staining and odors). The monitoring wells were installed using two–inch diameter Schedule 40 PVC riser pipe and screen. Ten feet of 0.010-inch slot screen was used with flush-threaded riser pipe to the ground surface. A gravel pack of FilPro#0 or #1 sand was placed in the annular space to 3.5 to 5 feet above the top of the screen. A 2-foot thick layer of Ricci Bros. #00 sand was used as a seal above the gravel pack. To ensure a proper gravel pack and seal, the #0/#1 and #00 sands were placed in the annular space via the tremie method. Once the gravel pack and seal were completed, a Portland cement/bentonite grout mixture was tremied into the remaining annular space. The monitoring wells were completed by

a locking, flush-mounted curb-box. As previously mentioned, all soil cuttings and drilling mud generated during monitoring well installation was containerized and returned to the SMC facility pending proper disposal. Monitoring well construction details are presented in Appendix E. Decontamination of drilling and soil sampling equipment is discussed in Section 8.4.

The monitoring wells were developed using a surge-and-pump technique. The wells were developed for 1.5 to 2 hours with a goal of providing turbidity-free water. A turbidity meter was used to measure NTUs. Monitoring well SC35D (VP-15A) was pumped for 2 hours 5 minutes, generated approximately 170 gallons of purge water, and the final turbidity reading was 20.1 NTU. Monitoring well SC36D (VP-13A) was pumped for 1 hour 30 minutes, generated approximately 115 gallons of purge water, and the final turbidity reading was 4.0 NTU. Monitoring well SC40D was pumped for approximately 1 hour and generated approximately 220 gallons of purge water. The turbidity of the purge water from SC40D was not monitored with a turbidity meter and was pumped until visually clear. All development water was containerized in a truck-mounted polyethylene tank (700 gallon capacity) and transported to and treated at the SMC on–site groundwater treatment plant facility.

3.4 Surface Water and Sediment RI

Surface water and sediment were investigated from the most downstream location to the most upstream location so that disturbance related to sampling did not affect sample quality. To the extent practicable, surface water and sediment samples were co-located spatially and temporally. Sample locations were “biased” to points within the stream course that represent areas of active deposition (sedimentation). Sample collection details are provided in Section 5.4.

4.0 UTILITY CLEARANCE

On-site test boring locations were marked with pin flags set into the ground prior to beginning any subsurface tasks. Uni-Tech contacted "New Jersey One Call" (NJOC), which marked the locations of buried conduits on public property immediately adjoining the Site. TRC requested from SMC any information concerning the locations of buried utilities at the Site. No utilities were identified near the proposed on-site soil boring locations according to the available records provided by SMC. In addition, Underground Services, Inc. of West Chester, Pennsylvania, a contractor specializing in locating underground utilities, evaluated the potential presence of buried utilities near the proposed boring locations. No utilities were identified near the proposed boring locations, with the exception of a suspected buried line along the unpaved roadway near AOC-1. The suspected buried line bisected two proposed soil boring locations (SS-7 and SS-8) along the northwest side of the unpaved roadway. However, the proposed boring locations were greater than 5 feet away from the suspected buried line; therefore, no adjustments were necessary.

For the off-site drilling locations, municipal and/or county officials and available mapping were initially consulted to determine the horizontal extent of roadway ROWs and the presence of utilities in the planned drilling locations. The proposed drilling locations were then marked within the ROW using white paint and Uni-Tech subsequently notified NJOC. Furthermore, TRC obtained "road-opening" permits for each proposed boring location from the municipal and/or county authority prior to the start of the off-site drilling activities (Appendix F).

5.0 SAMPLE COLLECTION AND HANDLING

5.1 General

Sampling of all media was performed by a field scientist experienced in environmental sampling. Sampling was completed as described in the approved RIWP. During periods of rain, every effort was made to prevent precipitation from coming into contact with the sample, sample bottle, and sampling equipment.

Sample Containers

Containers used for retaining the various samples were provided by Accutest in custody-sealed coolers. The custody seals were inspected upon receipt to verify whether or not the sample containers were tampered with. All coolers were received with custody seals intact.

Following sampling activities, all sample containers were inspected to ensure they were tightly capped and properly labeled. Labels were secured on the containers using clear packing tape. Following sample collection, each container was placed into a cooler and kept on ice to maintain a cooler temperature of approximately 4 degrees Centigrade (4ºC). Prior to shipment to Accutest, care was taken to avoid contamination of the sample containers. When under chain-of-custody, sample bottles were secured in locked vehicles, custody-sealed in coolers, or in the presence of authorized personnel. Sample coolers and containers were stored and transported in clean environments. Sample containers and equipment were not stored near solvents, gasoline, vehicle exhaust or other equipment that could be a potential source of contamination.

Sample Shipment

Typically, sample coolers were submitted to Accutest under chain-of-custody via hand-delivery or courier pickup each day samples were collected. Samples were never held by the field sampling team more than 24 hours after collection.

5.2 Soil Sampling Procedures

Sample Equipment

As discussed in Section 3.2, soil samples were retrieved within 4-foot long acetate liners. The liner was opened and TRC's field scientist logged the soil descriptions on soil boring log sheets (Appendix C). TRC removed the top several inches of soil from each liner to minimize

possible cross-contamination of the sample from fall-in of material from the upper portions of the boring. In general, retrieved soil within the 4-foot long acetate liner was separated into 2-foot sub-samples for the purpose of collecting a sample aliquot for laboratory analysis. Soil from the two-foot interval selected for laboratory analysis was then removed from the sleeve and placed directly into a stainless-steel mixing bowl. The soil was homogenized and then placed into the laboratory-supplied bottles.

5.3 Groundwater Sampling Procedures

5.3.1 Existing Monitoring Wells

Well Security

Any monitoring well fitted with a steel protective outer casing and lock was unlocked immediately prior to the initiation of sampling activities and locked when sampling was completed or at any time the field team left the immediate area.

Water Level Measurements

Water level measurements were collected with an electronic water level indicator to the nearest one-hundredth of a foot. All water level measurements were made prior to the purging of any wells, which could influence groundwater elevations in the area of investigation. In order to assure accuracy, the depth to water was measured in each well from marked survey points. The water level indicator was properly decontaminated between wells, as discussed in Section 8.4.

Well Purging

All of the wells were purged using the volume-averaged purging technique outlined in the NJDEP Field Sampling Procedures Manual (NJDEP, 2005) and the approved RIWP.

This groundwater sampling procedure has been used historically at SMC and will continue to be used for consistency purposes (i.e., to support the comparisons of historic groundwater results to current and future results). In accordance with the purging technique, approximately three to five well volumes were purged from each well. During evacuation, care was taken to avoid over-pumping or pumping the well to dryness. The volume of water in each well was calculated using the known well diameter, the known well depth and the measured depth to water. One well volume was calculated by subtracting the depth to water from the total

well depth (from the measuring point) and multiplying this amount (water column height) by a well diameter conversion factor (i.e., 2-inch well - 0.163; 4-inch well - 0.653; 6-inch well - 1.469) to obtain one well volume in gallons. Also, the flow rate of the pump was calculated at each well using a stopwatch and a calibrated 5-gallon bucket. The pumping time at each well was calculated by dividing four well volumes by the pump flow rate at each well. Samples were collected immediately following well evacuation. At locations where pairs of nested monitoring well screens are present (e.g., IWC-2 and IWC-5, and SC22S and MWH-4), the well screened in the shallow portion of the aquifer (i.e., IWC-2 and SC22S) was purged and sampled first, followed by the deeper-screened well.

Purge Equipment

Each well was purged with a gas-powered centrifugal pump positioned near the monitoring well and polyethylene hose 0.5- to 0.75-inch in diameter. A separate length of polyethylene hose was dedicated to each well. A check valve was installed between the pump and the hose at the pump head to prevent backflow of water from the pump housing into the well. Following well evacuation and prior to turning off the pump, the polyethylene hose was lifted out of the water column until all water was from the hose to further prevent backflow of purge water into the well.

Storage of Evacuation Materials

In general, polyethylene hose used to purge the wells remained in each well after purging. If necessary, the hose was attached to the top of the well with a stainless-steel leader line to prevent it from falling into the well. Conditions within several wells do not allow for the storage of the hose within the well. At those locations, the hose was rolled up, placed into a plastic bag, labeled and stored in a secure area. The current storage area for well hose is the TRC field office (i.e., a private, locked staging area in Building D201) and the W9 extraction well house. Hose that is stored outside of a well was wiped down with a clean cloth and distilled water prior to re-use in the well. Dedicated hose removed from a well for any purpose was also wiped down in the same fashion prior to re-use in the well.

Sampling Equipment

Groundwater samples were obtained after the evacuation procedures described above. Samples were collected using a dedicated, bottom-loading, laboratory-decontaminated Teflon® bailer. Decontamination of bailers is discussed in Section 8.4.

Clean polyethylene chord was attached to a PTFE-coated stainless-steel leader used to lower the bailer into the well. New nitrile gloves were used at each sample location to prevent cross-contamination. Clean sampling equipment and any other objects entering the well were not allowed to contact the ground or any other potentially contaminated surfaces (e.g. gasoline-powered pumps).

During sampling, the bailer was lowered gently into the well to minimize agitation of the water column within the well. An aliquot of water was field-tested with a LaMotte 2020 turbidity meter. The remaining water was retained for laboratory analysis. Additional field parameters, including pH, temperature, DO, ORP, and specific conductance, were measured in-situ using a multi-parameter probe (YSI 600 XLM). Measurements were recorded both prior to purging and after sampling. Decontamination of field parameter probes is discussed in Section 8.4.

Although the analytical method for perchlorate (Method 314.0, USEPA, 1999) does not require chemical preservation, there is anecdotal evidence of the potential for microbial degradation (ITRC, 2005). According to the USEPA, new sampling requirements will be added to updated or new perchlorate methods (USEPA, 2005; USEPA, 2008b; ITRC, 2005) to address this potential issue. TRC incorporated two of these requirements, the first of which is to ultra-filter the sample in the field through a sterile 0.2-micron filter into a 125 ml, pre–sterilized nalgene bottle. TRC also incorporated a second requirement, collecting the sample with significant headspace (i.e., at a minimum, the top third of the sample bottle was left empty). TRC poured the water from the bailer into a laboratory-supplied bottle (standard unpreserved 200 ml polyethylene bottle) in a manner that minimized splashing and agitation. The water was then transferred through the filtering device, via a dedicated sterile syringe, into the sterile nalgene sample bottle. The filtering device was a 0.2-micron pore-diameter filter fitted to the syringe, supplied by the laboratory. All filters and syringes were sterile and dedicated to each sample location.

5.3.2 Vertical Profile Samples

Groundwater samples collected via the SAT were obtained using the evacuation procedures described in Section 3.3. At each groundwater sampling interval, samples were collected directly from a sample port and ball valve installed in-line along the submersible pump discharge tubing. The sample container and means of filtering the sample were identical to those used for sampling the existing monitoring wells, as described in Section 5.3.1.

5.4 Surface Water and Sediment Sampling Procedures

At each surface water/sediment sample location, surface water physical/chemical field parameters were measured using a YSI® 6820multi-parameter meter and a measuring rod (depth). Measured parameters included water depth, temperature, DO, pH, specific conductivity and ORP.

Aqueous samples were collected first. Facing upstream and beginning at the most downgradient sampling location, TRC immersed the sample bottle by hand into the surface water and allowed water to run slowly into the bottle until full. Care was taken to not disturb the sediment. Immediately following the collection of the surface water sample at each discrete location, the co-located sediment sample was collected. A decontaminated stainless-steel spoon was used to collect the sediment sample from 0 to 6 inches below the water body bottom (biotic zone). Water elevations were approximately 1 to 2 feet above normal flow conditions at the time of sampling. At locations where the water level was elevated at the time of sampling, the stainless-steel spoon was attached with zip-ties to a polyethylene-coated rod to collect the sediment samples. TRC took care to minimize disturbance and sample washing as the sample was retrieved through the overlying liquid column. The sediment sample was then placed in a decontaminated stainless-steel mixing bowl and homogenized in the bowl using the stainless-steel spoon. While placing the sample into the laboratory-cleaned sample bottle, care was taken to avoid decanting off excess liquid, as decantation promotes the loss of water-soluble compounds present in the sediment.

6.0 DOCUMENTATION

6.1 Introduction

Proper documentation was maintained to track the possession and handling of samples from time of collection through sample analysis and disposition. Documentation relative to sampling procedures included sample labels, field logbooks, and chain-of-custody records. The details of all site activities were recorded in a bound, consecutively page-numbered field logbook.

6.2 Field Logbook

The field team leader maintained a field logbook that documented all pertinent information regarding site activities and sampling procedures. Information recorded in the logbook generally included the following:

- Name and location of project site
- Date and time of arrival and departure
- Affiliation of persons contacted
- Name of person keeping log
- Weather conditions
- Names of all individuals onsite and engaged in sampling activities
- Purpose of visit
- Field instrument calibration
- information
- Static water level depths
- Identification of well/sample
- identification numbers
- Name of collector
- Description of samples
- Date and time of sample collection
- Time well purged
- Volume of water purged from well
- Field analysis data
- Laboratory analysis parameters
- Field observations
- Preservation
- Quality assurance information,
- including field blanks and duplicates
- Factors that may affect sample quality
- Changes in work plan field sampling locations and/or procedures

6.3 Sample Collection Paperwork

Sample Labels

Sample labels were affixed to each sample container. The sample containers were pre-labeled before sample collection and the labels were protected from the sample matrix with a clear tape covering. Sample labels included the site name, sample number, parameter to be analyzed, date and time of collection, sampler's initials, and preservative (4º C).

Chain-of-Custody

The Chain of Custody (C-O-C) forms used serve as a legal record of possession of the samples. Each sample selected for submission to Accutest was listed on a C-O-C form. The field team leader prepared and signed the C-O-C forms prior to sample shipment to the laboratory. The completed and signed C-O-C forms were relinquished with the sample cooler(s) to the courier or directly to the laboratory via hand delivery. The C-O-C forms included the following information:

- Company name and address
- Site/project name and address
- Contact information
- Sample identification
- Date and time of sample collection
- Sample matrix
- Number of containers
- Preservative
- Parameters requested for analysis
- Signature of collector
- Signature of person(s) involved in the chain of possession
- Custody seal number (if used)
- Requested turnaround time
- Data deliverables
- Special instructions

All C-O-Cs are included with their respective laboratory reports in Appendix G.

7.0 ANALYTICAL PROCEDURES

7.1 Field Procedures

The temperature, DO, specific conductance, ORP and pH of each surface water and groundwater sample collected was measured in the field with a YSI® 6820 or YSI 600 XLM multi-parameter probe, as described in Sections5.3 and 5.4. Turbidity was also measured in groundwater samples using a Lamotte 2020 turbidity meter. Prior to use, the multi-parameter probe was calibrated in accordance with the manufacturer's instructions. Field parameters and results of probe calibration were recorded in either the field notebook or on specific log sheets.

7.2 Laboratory Procedures

All soil, groundwater, sediment, and surface water samples collected as part of this RI were submitted to Accutest of Dayton, New Jersey, a New Jersey-certified laboratory that is accredited to perform perchlorate analysis for drinking water. The aqueous samples were analyzed for perchlorate by USEPA Method 314.0, the method specified in the March 2, 2000 Federal Register (42 FR 11371) for the analysis of perchlorate in public water supply systems.

The non-aqueous samples were analyzed for perchlorate using a modified Method 314.0. The Method Detection Limits (MDLs) achieved for perchlorate were 0.58 to 7.4 ppb in groundwater samples, 0.92 ppb in surface water samples, 1.7 to 1.9 ppb in soil samples, and 2.0 to 8.7 ppb in sediment samples. Laboratory reporting limits (RLs) for these methods were 3.0 to 24 ppb in groundwater samples, 3.0 ppb in surface water samples, 9.3 to 10 ppb in soil samples, and 11 to 47 ppb in sediment samples. Instances where RLs were elevated were due to dilution of the sample during laboratory analysis. Laboratory detection and reporting limits are further discussed in Section 9 below.

8.0 QUALITY ASSURANCE/QUALITY CONTROL

Several quality assurance measures were associated with each sampling and analysis event to assure that samples delivered to the laboratory for analysis were representative of site conditions.

8.1 Field Blanks

Field blanks were collected to assess sample equipment and its related handling, preparation, storage and shipment. Field blanks were collected, stored, and traveled with the other samples at all times. Field blanks consisted of one set of bottles identical to the set used to collect media samples, filled with demonstrated analyte free water provided by Accutest.

Field blank water traveled with the sample containers and arrived onsite within one day of preparation in the laboratory. Blanks and their associated samples were held onsite for no longer than two calendar days and arrived back in the laboratory within one day of shipment from the field.

8.1.1 Aqueous Matrix

During sampling of groundwater from existing monitoring wells, field blanks were collected during each day of sampling. Each field blank was collected by pouring laboratory-supplied analyte-free water through a clean, decontaminated bailer and into an empty set of laboratory-supplied bottles. The water was then transferred through a 0.2-micron pore-diameter filter fitted to a dedicated sterile syringe into a sterile nalgene sample bottle for analysis. All filters and syringes were sterile and dedicated to each sample location.

Field blanks were also collected during the vertical groundwater profiling task. The field blank was collected by pouring the laboratory-supplied analyte-free water over a decontaminated submersible pump and into an empty set of bottles for analysis.

The field blanks were preserved in the same manner as the samples being submitted for laboratory analysis and were analyzed by the laboratory for perchlorate.

Surface water field blanks were not collected, as the surface water samples were collected directly into the sample container from the surface water source.

8.1.2 Non-Aqueous Matrix

Field blanks were also collected during the non-aqueous soil and sediment sampling tasks. During soil sampling, analyte-free water was poured through a clean, unused acetate liner, into a clean, stainless-steel mixing bowl, and then into the laboratory-supplied sample bottle. For sediment samples, the field blank water was poured over a stainless-steel spoon, into a clean mixing bowl, and then in the sample bottle.

The non-aqueous field blanks were collected at a frequency of at least one per day and 10% of the total number of samples collected during the sampling event. As such, five field blanks were collected during the collection of 48 soil samples and two field blanks were collected during the collection of nine sediment samples.

8.2 Duplicates

Field duplicates were collected for perchlorate at a rate of 5% (i.e., one for every 20 samples collected) of the total number of samples collected per media sampled and were submitted to the laboratory as "blind" samples. Duplicates were obtained by alternately filling sample containers from the sampling device, stainless-steel bowl, or, in the case of groundwater samples, from the filtering device and syringe. "Blind" samples were labeled by the sampler with a fictional sample identification number and sample collection time. A summary table of field duplicates and their associated sample identification numbers is presented in the table below:

Original Sample	Duplicate Sample	Date Collected	Media
SS-07 (6-8)	SS-27 (6-8)	10/26/09	Soil
SS-12 (5-7)	SS-32 (5-7)	10/27/09	Soil
SS-23 (2-4)	SS-33 (2-4)	10/28/09	Soil
VP-14 (105-110)	VP-24 (105-110)	10/19/09	Groundwater
VP-15A (99-104)	VP-25A (99-104)	10/21/09	Groundwater
SC3D(R)	SC34D	10/21/09	Groundwater
SC32D	SC35D	10/22/09	Groundwater
IWC-5	IWC-6	10/21/09	Groundwater
SC9S	SC33S	10/21/09	Groundwater
SC34D	SC37D	11/19/09	Groundwater
SC36D	SC37D	9/8/10	Groundwater
K	J	9/9/10	Groundwater
SC40D	SC-49D	4/29/11	Groundwater
SW-4	SW-10	10/28/09	Surface Water
SED-4	SED-10	10/28/09	Sediment

Also note that monitoring well K was resampled on January 21, 2010 to confirm analytical results from the previous sampling event on October 22, 2009. Therefore, the January results appear as duplicate results in the results summary table (Table 2-1).

8.3 Background Samples

A background soil sample was collected from the northwest corner of SMC's manufacturing parcel (Figure 9-1), an area in which there were no historical industrial activities. Also, this location was approximately 1,300 feet upwind of the on-site furnace smokestack, indicating there would be a minimal impact in the event there were any potential air emissions of perchlorate.

Background groundwater samples were collected from wells SC11S(R), SC12S, SC12D, SC13S(R), SC13D, SC14S, SC15S, SC16S, SC25S, OBS–2A, W2R and W3D, which are located hydraulically upgradient of the former wastewater lagoons and Former Chemical Storage Building, to compare Site conditions to the surrounding environment. These wells were generally sampled before any other on–site wells.

Background surface water and sediment samples were collected from SW-8 (Hudson Branch head waters, sediment only due to lack of surface water) and SW-9 (Burnt Mill Branch).

8.4 Decontamination of Sampling Equipment

Bailers used for ongoing monthly groundwater sampling at SMC were also utilized for groundwater sampling during the RI. These bailers are dedicated to a well for a total of two consecutive sampling events. Between sampling events each bailer is stored inside its dedicated monitoring well. After completion of two consecutive sampling events, the bailer is removed from the well, decontaminated by the laboratory, and a new laboratory-decontaminated bailer is used during the subsequent two groundwater sampling events. The bailers removed from the wells are submitted to a laboratory for decontamination using the Eight-Step Decontamination Procedure based on the American Society for Testing and Materials (ASTM)*Practice for Decontamination of Field Equipment Used at Nonradioactive Waste Sites*, number D 5088-90 (NJDEP, 2005)as follows:

- Laboratory grade glassware detergent plus tap water wash;
- Generous tap water rinse;
- Distilled and deionized (ASTM Type II) water rinse;

- 10% nitric acid rinse (trace metal or higher grade HNO3 diluted with distilled and deionized (ASTM Type II) water;
- Distilled and deionized (ASTM Type II) water rinse;
- Acetone (pesticide grade) rinse;
- Total air dry or pure nitrogen blow out; and
- Distilled and deionized (ASTM Type II) water rinse.

Stainless-steel spoons and bowls used for soil and sediment sampling were also decontaminated by a laboratory prior to first use in the field and then by field personnel, as needed, during field work, using the same eight-step decontamination procedure listed above.

Decontamination of the field parameter probes and electronic water level indicator was accomplished prior to the sampling of each well or each vertical profile depth using a distilled water rinse per the manufacturer's directions. Probes were not placed in containers storing samples for laboratory analysis.

Prior to commencing any drilling and prior to drilling each vertical groundwater profiling borehole, the SAT, standard augers, and the packer and submersible pump assembly were properly decontaminated by steam cleaning. The packer and submersible pump assembly was also decontaminated both before and after sampling each interval by scrubbing the outside of the assembly with a laboratory-grade soap (Alconox) and water mixture and pumping the mixture through the pump. The entire assembly was then rinsed with tap water, which was also pumped through the pump.

Prior to drilling each monitoring well borehole, all drilling and sampling equipment (i.e., drill rods, split spoons, etc.) were properly decontaminated by steam cleaning. The split spoons were also decontaminated between each sampling interval by scrubbing them with a laboratory-grade soap (Alconox) and water mixture and then rinsing with tap water.

8.5 Laboratory Data Quality Objectives

The analytical laboratory used for sample analysis incorporated quality control parameters, procedures and corrective actions to fulfill data quality objectives. All procedures used for test methods incorporated quality control parameters to monitor elements that are critical to method performance. Data obtained for these parameters were evaluated and compared to the method criteria in use. If the criteria were not achieved, the procedures specified corrective action and conformation of control before proceeding with sample analysis.

Quality control parameters, procedures and corrective actions were documented within the standard operating procedures for each method.

Following laboratory analysis, additional steps (e.g., internal laboratory procedures and data validation) were taken to achieve data quality objectives. Quality assurance monitoring was conducted on data packages and included a review of quality control data for compliance and trends indicative of systematic difficulties. Multiple levels of data package review were conducted to assure that reported data satisfied all quality control criteria, and that client specifications and requirements were met.

A data validator familiar with USEPA Region II data validation procedures and perchlorate methods (there currently are no approved perchlorate data validation procedures) reviewed approximately 40% of the aqueous and non-aqueous data packages to ensure data quality objectives were met. Full validation, using the *Region II Evaluation of Metals Data for the Contract Laboratory Program (CLP)*, Revision 13, SOP HW-2, September 2006, was performed on the data for 48 groundwater samples, 21 soil samples, six sediment samples, and six surface water samples. In general, data are valid as reported with several exceptions. Any data revisions following data validation have been incorporated into the summary data tables (Table 2-1, Table 2-2, Table 9-1, and Table 9-4). Copies of the data validation reports are included in Appendix H.

8.6 Laboratory Deliverables

Electronic data and hard copies of the laboratory data reports were provided by the laboratory upon completion of analyses. The hard copy data deliverable package includes a summary of analytical results, copies of C–O–Cs (including internal C–O–Cs), sample tracking chronicles/method references, and support data for each analytical method, including quality control data summaries and raw data. The data package also includes a sample summary and a case narrative/conformance summary.

In accordance with the NJDEP's Technical Requirements for Site Remediation (NJAC 7:26E), electronic files containing the laboratory analytical results and sample information were also supplied by the laboratory. The data conform to the HAZSITE format, and are attached as Appendix I for submittal to the NJDEP Site Remediation and Waste Management Division. Furthermore, USEPA Region II-formatted Environmental Quality Information System (EQuIS)

electronic data deliverables (EDDs) for the laboratory analytical results and sample information from 2009, 2010, and 2011 have also been attached as Appendix I for submittal to USEPA.

9.0 ANALYTICAL RESULTS

The analytical results of the perchlorate RI are presented in the following sections.

9.1 Soil Samples

At each of 24 on-site soil boring locations (Figure 9-1), two soil samples were collected from select depth intervals for laboratory analysis. A total of 51 soil samples, including three duplicate samples for QA/QC purposes, were collected. The soil samples were analyzed for perchlorate using a modified USEPA Method 314.0. The laboratory analytical results for all of the soil samples are presented in Table 9-1 and on Figure 9-1. Field quality control sample (i.e., field blank and blind duplicate) analytical results are presented in Table 9-2.

Perchlorate concentrations ranged between ND and 58.3 ppb. Perchlorate was detected at concentrations above the laboratory's detection limit (1.7 ppb to 1.9 ppb) in 18 of the 51 samples. Of these 18 samples, perchlorate was detected at concentrations above the laboratory's reporting limit (9.3 ppb to 10 ppb) in 7 of the 18 samples, as summarized below.

Location	Depth (feet)	Perchlorate Concentration (ppb)
SS-05	5-7	58.3
SS-05	13-15	18.3
SS-21	1-3	11.0
SS-21	5-7	10.7
SS-22	6-8	12.0
SS-24	1-3	26.5
SS-24	4-6	28.8

In general, the highest perchlorate concentrations were detected in soil samples collected from within AOC-1 (Former Chemical Storage Building and adjacent unpaved road) and AOC-2 (former Building D102(A)). All concentrations of perchlorate detected in on-site soil were at least three orders of magnitude lower than the USEPA's RSL for perchlorate in residential soil (55,000 ppb). Although perhaps indicative that perchlorate was used in these areas, the levels are low and not indicative of significant releases of the material. Because of the 1,000 fold difference between the highest observed concentration and the USEPA RSL, no further soil investigation is warranted.

9.2 Groundwater Samples

9.2.1 Monitoring Wells

2009 Groundwater Sampling Event

During the first round of groundwater sampling (October 20-22, 2009), groundwater samples were collected from a total of 67 monitoring and extraction wells (Figure 2-2 and Figure 2-3). Groundwater samples were collected at a time of high water table/piezometric surface conditions (Table 9-3) as the year-to-date precipitation total for the closest National Weather Service (NWS) station to the Site (Atlantic City International Airport) was about 11 inches (33%) above normal through October 22, 2009. A total of 73 groundwater samples were submitted to Accutest for analysis, including five blind duplicate samples for QA/QC purposes and one duplicate sample that was collected to verify the results of an initial sample analysis, as described below. The groundwater samples were analyzed for perchlorate using USEPA Method 314.0. The laboratory analytical results for all of the groundwater samples are presented in Table 2-1. Field quality control sample (i.e., field blank and blind duplicate) analytical results are presented in Table 9-2.

Perchlorate concentrations ranged between ND and 152 ppb. Perchlorate was detected at concentrations above the laboratory's detection limit (0.58 ppb to 7.4 ppb) in 52 of the 73 samples and at concentrations above the laboratory's reporting limit (3 ppb to 24 ppb) in 37 of the 52 samples in which it was detected. In addition, perchlorate was detected at concentrations above USEPA's Preliminary Remediation Goal of 24.5 ppb in 10 of the 73 samples, above USEPA's Interim Health Advisory level of 15 ppb in 11 of the 73 samples (including three duplicate samples), and above the New Jersey AOC action level of 5 ppb in 30 of the 73 samples (including five duplicate samples). See Figure 9-2 for a presentation of the number of perchlorate detections versus the relative concentrations.

The highest perchlorate concentrations were detected in the deep, off-site monitoring well SC34D (150 ppb and 152 ppb in the duplicate sample) located immediately southeast of the Farm Parcel; the deep, off-site monitoring well SC3D(R) (141 ppb and 136 ppb in the duplicate sample) located on the Farm Parcel; and the shallow, on-site monitoring well K (90.5 ppb) located near the southwest corner of the SMC property. As discussed in Section 3.1, the shallow monitoring well K was re-sampled on January 21, 2010 and perchlorate was detected at 78.1 ppb.

2010 Groundwater Sampling Event

During the second round of groundwater sampling (September 8 and 9, 2010), groundwater samples were collected from a total of 35 monitoring and extraction wells (Figure 2-2 and Figure 2-3). Groundwater samples were collected at a time of relatively low water table/piezometric surface conditions (Table 9-3) as the year-to-date precipitation total for the Atlantic City International Airport NWS station was about 0.66 inches (2%) below normal through September 9, 2010. A total of 37 groundwater samples were submitted to Accutest for analysis, including two blind duplicate samples for QA/QC purposes. The groundwater samples were analyzed for perchlorate using USEPA Method 314.0. The laboratory analytical results for all of the groundwater samples are presented in Table 2-1. Field quality control sample (i.e., field blank and blind duplicate) analytical results are presented in Table 9-2.

Perchlorate concentrations ranged between ND and 158 ppb. Perchlorate was detected at concentrations above the laboratory's detection limit (0.58 ppb) in 27 of the 37 samples and at concentrations above the laboratory's reporting limit (3.0 ppb for all samples except SC3D(R), which had a reporting limit of 18 ppb) in 18 of the 27 samples in which it was detected. In addition, perchlorate was detected at concentrations above USEPA's Preliminary Remediation Goal of 24.5 ppb in 5 of the 37 samples, above USEPA's Interim Health Advisory level of 15 ppb in 7 of the 37 samples and above the New Jersey AOC action level of 5 ppb in 16 of the 37 samples (including one duplicate sample). See Figure 9-2 for a presentation of the number of perchlorate detections versus the relative concentrations.

The highest perchlorate concentrations were detected in the deep, off-site monitoring well SC34D (158 ppb) located immediately southeast of the Farm Parcel and the deep, off-site monitoring well SC3D(R) (143 ppb) located on the Farm Parcel. This data is comparable with the 2009 deep aquifer zone groundwater results.

2011 Groundwater Sampling Event

During the third and final round of groundwater sampling (April 29, 2011), a groundwater sample was collected from one new monitoring well, SC40D (Figure 2-2 and Figure 2-3). The groundwater sample was collected at a time of relatively average water table/piezometric surface conditions as the year-to-date precipitation total for the Atlantic City International Airport NWS station was about 0.24 inches (1%) above normal through April 29,

2011. A total of two groundwater samples were submitted to Accutest for analysis, including one blind duplicate sample for QA/QC purposes. The groundwater samples were analyzed for perchlorate using USEPA Method 314.0. The laboratory analytical results for the groundwater samples are presented in Table 2-1. Field quality control sample (i.e., field blank and blind duplicate) analytical results are presented in Table 9-2.

Perchlorate was detected in the groundwater sample from SC40D, and in its duplicate, labeled as SC49D. The detected concentrations, 4.0 ppb and 3.9 ppb, respectively, were less than the applicable screening levels. The laboratory detection limit was 0.73 ppb and the reporting limit was 3.0 ppb for these samples.

9.2.2 Vertical Profiles

At each of the five vertical groundwater profiling locations, groundwater samples were collected in October 2009 from five depth intervals for laboratory analysis. Therefore, a total of 27 groundwater samples, including two duplicate samples for QA/QC purposes, were collected. These groundwater samples were analyzed for perchlorate using USEPA Method 314.0. The laboratory analytical results for the vertical groundwater profiling samples are presented in Table 2-2. Field quality control sample (i.e., field blank and blind duplicate) analytical results are presented in Table 9-2.

Perchlorate concentrations ranged between ND and 12.5 ppb. Perchlorate was detected at concentrations above the laboratory's detection limit (0.58 ppb to 7.4 ppb) in 15 of the 27 samples and above the laboratory's reporting limit (3 ppb to 24 ppb) in 10 of the 15 samples in which it was detected. Concentrations did not exceed USEPA's Preliminary Remediation Goal of 24.5 ppb or USEPA's Interim Health Advisory level of 15 ppb, but exceeded the New Jersey AOC action level of 5 ppb in six samples (including one duplicate sample), as summarized below.

Location	Depth (feet)	Perchlorate Concentration (ppb)
VP-13	100-105	10.6
VP-13	125-130	5.7
VP-13A	111-116	6.0
VP-14 + Duplicate VP-24	105-110	6.2 / 5.9
VP-14	130-135	12.5

In general, the highest perchlorate concentrations were detected in groundwater samples collected from the bottom three depth intervals of the five depth intervals sampled at each location.

9.3 Surface Water and Sediment Samples

At each of the 10 selected sampling locations along the Hudson Branch, Burnt Mill Pond, and Burnt Mill Branch, co-located surface water and sediment samples were collected (Figure 9-3), with the exception of the furthest upstream sample location along the Hudson Branch (SED-8), because the location was dry at the time of sampling. Therefore, a total of 10 surface water samples and 11 sediment samples, including one duplicate sample from each media for QA/QC purposes, were collected. The surface water and sediment samples were analyzed for perchlorate using USEPA Method 314.0 and a modified Method 314.0, respectively. The laboratory analytical results for the surface water and sediment samples are presented in Table 9-4 and on Figure 9-3. Field quality control sample (i.e., field blank and blind duplicate) analytical results are presented in Table 9-2.

Perchlorate was detected at a concentration above the laboratory's detection limit (0.92 ppb) in only one of the ten surface water samples (SW-1A at 1.8ppb (estimated)) and in only one of the eleven sediment samples (SED-4 at 10.9 ppb (estimated)). Note that detected concentrations were reported as "estimated" by the laboratory because the perchlorate detections were above the laboratory minimum detection limit but below the laboratory reporting limit. The detection limit for surface water was 0.92 ppb and the reporting limit was 3 ppb. The laboratory detection limit and reporting limit for sediment ranged between 2 ppb and 8.7 ppb and 11 ppb and 47 ppb, respectively.

9.4 Field Parameters

Following purging the SAT of three to five volumes of water, but prior to sample collection, field parameters including pH, specific conductivity, turbidity, DO, temperature, and ORP were measured using a YSI 6820 multi-parameter probe and in-line flow-through cell along the discharge tubing. All parameters were monitored for approximately 25 minutes, with field recordings every three to five minutes, to determine to what degree the purge water had

stabilized prior to sample collection. The water quality parameters tended to stabilize fairly well prior to sample collection, with the only exception being that ORP tended to increase during purging. The final recorded water quality parameters for each sample are presented in Table 9-5.

9.5 Quality Assurance/Quality Control Samples

None of the field blanks submitted for laboratory analysis throughout the investigation exhibited concentrations of perchlorate above the laboratory's report limit. Additionally, field blind duplicate samples exhibited a high level of field and laboratory precision with calculated relative percent difference (RPD) between the environmental sample and the duplicate sample less than 15 percent for all samples where concentrations were greater than the laboratory reporting limit. The analytical results for the field blank and blind duplicate samples are presented in Table 9-2.

10.0 DATA INTERPRETATION

The major objective of the perchlorate remedial investigation, under the existing NJDEP ACO, was to further define the nature and extent of the previously identified perchlorate plume. The investigation focused on 1) investigating soils within identified areas of concern, 2) collecting groundwater samples from existing monitoring wells, newly installed monitoring wells, and vertical profiling borings, and 3) collecting surface water and sediment samples from nearby surface water bodies at locations upstream of the SMC property, adjacent to the SMC property, and downstream of the SMC property.

10.1 Soil Investigation

For comparison purposes, the analytical results for the perchlorate soil investigation were compared to the USEPA RSLs for perchlorate in residential soil (55,000 ppb) and industrial soil (720,000 ppb). All concentrations of perchlorate detected in on-site soil were at least three orders of magnitude lower than the USEPA RSL for perchlorate in residential soil and greater than four orders of magnitude lower than the USEPA RSL for perchlorate in industrial soil. The maximum perchlorate concentration detected in soil was 58.3 ppb.

The Former Chemical Storage Building and adjacent unpaved road (AOC-1) were investigated with the advancement and sampling of seven soil borings (SS-02 through SS-08). Only very low concentrations of perchlorate, ranging between ND and 8.6 ppb, were detected in soil borings near the Former Chemical Storage Building. The highest perchlorate concentrations detected in on-site soil (SS-05 (5-7') at 58.3 ppb and SS-05 (13-15') at 18.3 ppb) were detected in a boring located along the unpaved road near the northeast corner of the Former Chemical Storage Building. Detected perchlorate concentrations in the remaining three soil borings located along the unpaved road were very low and ranged between ND and 3.0 ppb. The detection of very low levels of perchlorate in soil near the Former Chemical Storage Building is not indicative of significant spills or releases of perchlorate to shallow soil within AOC-1 and is probably indicative of the known storage of material in these areas. The observed perchlorate levels are extremely low compared to the residential RSL (by three orders of magnitude), which indicates that AOC-1 is not a potential source of perchlorate in the environment.

The footprint of the former furnace building (AOC-2) was investigated with the sampling of four soil borings. Perchlorate was detected at various concentrations in three out of the four

soil borings at concentrations ranging between ND and 28.8 ppb. The highest concentrations detected within AOC-2 were in soil boring SS-24, which was advanced near the western edge of the former furnace building footprint. The shallow soil sample (1-3') exhibited 26.5 ppb perchlorate and the deeper soil sample (4-6') exhibited 28.8 ppb perchlorate. The detection of perchlorate in soil within the former furnace building footprint is again indicative of the known use of perchlorate in this area. However, the low levels are not indicative of significant spills or releases to shallow soil within AOC-2. The observed perchlorate levels are extremely low compared to the residential and industrial RSLs (by three orders of magnitude), which indicates that AOC-2 is not a potential source of perchlorate in the environment.

The former unlined/lined lagoons (AOC-3) were investigated with the advancement and sampling of twelve soil borings (SS-09 through SS-20). Perchlorate was detected above the laboratory's minimum detection limit in only five of the 25 soil samples, which included one duplicate soil sample. Detected concentrations were extremely low and ranged between 2.0 and 2.9 ppb. The extremely low perchlorate concentrations detected within AOC-3 indicate that the former unlined/lined lagoons are not a potential source of perchlorate in the environment.

One boring (SS-01) was advanced in the northwest corner of the manufacturing parcel to assess background soil conditions. Perchlorate was not detected in the two soil samples collected at SS–01.

A soil mass flux and groundwater mass balance calculation was performed to determine if the residual perchlorate contamination in the soil could impact the underlying groundwater with perchlorate concentrations of ≥5 µg/Lover a long-term period (Appendix J). The calculation used a very conservative assumption that the entire soil vadose zone depth (approximately 15 feet) was impacted by the highest soil perchlorate concentration of 58.3 ppb, even though that concentration was only detected within a two-foot interval (i.e., 5-7 ftbgs) at soil boring SS-05. The concentration of perchlorate in the soil below this depth interval was 18.3 ppb (i.e., 13-15 ftbgs). The area of impact was assumed to be a circular 1,000 ft^2 area (distance between soil borings in the SS-05 area along the unpaved road). Using the partitioning coefficient for potassium perchlorate (Log K_{oc} = 1.687), the resulting groundwater perchlorate concentration in the mixing zone directly beneath the impacted soil zone would not exceed 5 µg/L. Furthermore, given the fact that perchlorate does not bind well to soil particles and the movement of perchlorate in soil is largely a function of the amount of water present, the

concentration of perchlorate in the soil will continue to decrease over time. Based on these results, there is no indication that the residual perchlorate remaining in the on-site soils could be acting as a continuing source of perchlorate contamination to the groundwater.

10.2 Groundwater Investigation

As part of the perchlorate remedial investigation, groundwater samples were collected from 67 monitoring wells/extraction wells and five vertical profiling locations during the 2009 sampling event, with samples collected from five discrete sample depths at each vertical profile location (25 total vertical profile samples and 92 total groundwater samples, not counting duplicates). Furthermore, groundwater samples were collected from 35 monitoring wells/extraction wells during the 2010 sampling event. Finally, groundwater samples were collected from one newly installed monitoring well during the April 2011 sampling event. For evaluation purposes, the unconfined aquifer (Cohansey Sand) between the water table and the underlying clay layer (Kirkwood Formation) was separated into three zones (i.e., shallow, intermediate, and deep). At each well and vertical profiling location, the saturated thickness was calculated as the zone between the water table and the clay layer. The saturated thickness was separated into three equal zones, referred to by the relative aquifer depth (i.e., shallow, intermediate, and deep). The relative aquifer depth was determined for each monitoring well and vertical profiling sample depth by evaluating the depth of the midpoint of the screened interval relative to these zones. Relative aquifer depths for each groundwater monitoring/extraction well sample location are listed in Table 2-1 and Table 2-2 for the vertical profile sample locations. Groundwater perchlorate isopleth maps were developed based on the comprehensive 2009 vertical profiling and monitoring/extraction well sampling data, and supplemented with historic (2006/2007) data from vertical profile locations VP-1, VP-2, VP-3, VP-4 and VP-10 and the 2011 data from the newly installed well SC40D. The groundwater perchlorate isopleth maps are presented as Figures 10-1A, 10-1B, 10-2A, 10-2B, 10-3A and 10-3B.

2009 Groundwater Sampling Event

Perchlorate was not prevalent in the groundwater samples collected from the shallow aquifer zone. Perchlorate was only detected in 8 of the 40 (20%) shallow groundwater samples (monitoring/extraction wells and vertical profiles, including duplicate QA/QC samples) at

concentrations above the laboratory's reporting limit. The highest concentrations of perchlorate in the shallow aquifer and the only concentrations that exceeded the USEPA Interim Health Advisory level of 15 ppb were detected in monitoring well K (90.5 ppb) and extraction well Layne (67.4 ppb). Excluding those two wells (K and Layne), perchlorate concentrations ranged between ND and 8.2 ppb. Monitoring well K and extraction well Layne are located near the southwest corner of the SMC property. Concentrations of perchlorate in the shallow aquifer zone that exceeded the New Jersey AOC action level of 5 ppb were only detected in on-site monitoring/extraction wells (K, Layne, SC9S, IWC-2, and IWC-1). Perchlorate concentration isopleths in the shallow aquifer zone are presented in Figure 10-1A for the immediate vicinity of the SMC site and Farm Parcel area and in Figure 10-1B for the regional study area.

Perchlorate was more prevalent in the groundwater samples collected from the intermediate aquifer zone than in the shallow aquifer zone. Perchlorate was detected in 6 of the 15 (40%) intermediate zone groundwater samples (monitoring/extraction wells and vertical profiles) at concentrations above the laboratory's reporting limit. Perchlorate concentrations ranged between ND and 12.9 ppb, with none of the samples exhibiting perchlorate above the USEPA Interim Health Advisory level of 15 ppb. The highest concentration of perchlorate in the intermediate aquifer zone was detected in extraction well RW6S (12.9 ppb). A concentration of perchlorate that marginally exceeded the New Jersey AOC action level of 5 ppb was also detected in monitoring well SC6S (6.4 ppb). Extraction well RW6S and monitoring well SC6S are located offsite, near the southwest corner of the SMC property. When compared to the locations of the highest concentrations identified in the shallow aquifer zone, the locations of the highest perchlorate concentrations identified in the intermediate aquifer are generally further downgradient from the SMC property relative to groundwater flow direction. Perchlorate concentration isopleths in the intermediate aquifer zone in the immediate vicinity of the SMC site and Farm Parcel are presented in Figure 10-2A and in Figure 10-2B for the regional study area.

Perchlorate was more prevalent in the groundwater samples collected from the deep aquifer zone, when compared to the shallow and intermediate aquifers zones. Perchlorate was detected in 33 of 45 (approximately 73%) groundwater samples (monitoring/extraction wells and vertical profiles, including duplicate QA/QC samples) at concentrations above the laboratory's reporting limit. Perchlorate concentrations ranged between ND and 152 ppb. The highest

concentration of perchlorate in the deep aquifer zone was detected in monitoring well SC34D (150 ppb and 152 ppb in the blind duplicate sample), with the next highest concentrations being detected in monitoring wells SC3D(R) (141 ppb and 136 ppb in the blind duplicate sample), SC28D (49.0 ppb), and SC1D (46.3 ppb). Monitoring well SC34D is located immediately southeast of the Farm Parcel, monitoring wells SC3D(R) and SC1D are located within the Farm Parcel, and monitoring well SC28D is located south of the SMC facility along the west side of South West Boulevard. Other deep wells exhibiting perchlorate above the USEPA Interim Health Advisory level of 15 ppb include off-site wells SC10D and SC21D, while wells/vertical profile intervals exhibiting perchlorate above the New Jersey AOC action level of 5 ppb include on-site wells IWC-5, SC20D, W3D, and W9; off-site wells SC-6D, SC-17D, SC19D, SC26D, SC36D, SC2D(R), SC31D and RW6D; and vertical profile intervals VP-13 (100-105), VP-13 (125-130), VP-13A (111-116), VP-14 (105-110) (and its duplicate), and VP-14 (130-135). When compared to the locations of the highest concentrations identified in the intermediate aquifer zone, the locations of the highest perchlorate concentrations identified in the deep aquifer zone are generally further downgradient from the SMC property. Perchlorate concentration isopleths in the deep aquifer zone in the immediate vicinity of the SMC site and Farm Parcel are presented in Figure 10-3A and in Figure 10-3B for the regional study area.

As is evident by comparing the isopleths in Figures 10-1A, 10-1B, 10-2A, 10-2B,10-3A, and 10-3B, the locations of the highest perchlorate concentrations in each of the shallow, intermediate, and deep aquifer zones are progressively further downgradient from the SMC site, which could be consistent with an historical source in the vicinity of the SMC site undergoing advective transport within the southwesterly flowing groundwater, subject to a downward vertical gradient created by pumping wells (e.g., irrigation, extraction, etc.) screened in the deep aquifer zone. This process is further evident by the evaluation of geologic cross sections for the study area. Figures 10-4 and 10-5 represent cross sections in the northeast – southwest direction (parallel to groundwater flow) and the northwest – southeast direction (perpendicular to groundwater flow), respectively (see Figure 2-3 for cross section locations). The wells and vertical profiles (and associated screened intervals and perchlorate concentrations) located along the cross-section lines, the interpreted perchlorate isoconcentration lines, and the top of the clay confining unit (Kirkwood Formation) are illustrated on the cross sections. It is apparent from the

cross sections that perchlorate concentrations generally increase with depth and distance from the Site.

It should also be noted that there is evidence of a regional perchlorate issue, with moderate perchlorate concentrations in the deep aquifer zone. This is represented by the presence of perchlorate in wells screened in the deep aquifer zone that are located upgradient of the Site's potential perchlorate source areas. Specifically, perchlorate was detected in deep zone upgradient wells W3D and OBS-2A at concentrations of 8.6 ppb and 4.8 ppb, respectively, which exceed or are close to the New Jersey AOC action level of 5 ppb. The perchlorate in groundwater has been delineated to the USEPA's PRG 24.5 ppb level (Figures 10-1 through 10-3). Using this limit, the groundwater plume at or above this level has an area of approximately 9 acres in the shallow aquifer, no acreage in the intermediate aquifer, and approximately 367 acres in the deep aquifer. Additionally the perchlorate in groundwater has been delineated to the USEPA interim health advisory level of 15 ppb (Figures 10-1 through 10-3). Using this limit, the groundwater plume at or above this level has an area of approximately 13 acres in the shallow aquifer, no acreage in the intermediate aquifer, and 462 acres in the deep aquifer. It may not be possible to delineate the perchlorate to the NJDEP AOC level of 5ppb because of the apparent ubiquitous presence of background perchlorate in groundwater within the study area. Groundwater samples collected from background (i.e., upgradient) and/or far downgradient locations identified perchlorate concentrations close to or above the 5 ppb level.

2010 Groundwater Sampling Event

Similar to the 2009 sampling event, perchlorate was not prevalent in the groundwater samples collected from the shallow aquifer zone. Perchlorate was only detected in 2 of the 14 (14%) shallow groundwater samples (including duplicate QA/QC samples) at concentrations above the laboratory's reporting limit. The highest concentration of perchlorate in the shallow aquifer and the only concentration that exceeded both the New Jersey AOC action level of 5 ppb and the USEPA Interim Health Advisory level of 15 ppb was detected in extraction well Layne (36.6 ppb). Excluding extraction well Layne, perchlorate concentrations ranged between ND and 3.0 ppb. Shallow on site well K exhibited a significant decrease in the perchlorate concentration (1.9 ppb and 3.0 ppb in the blind duplicate sample) compared to the 2009 results (90.5 ppb).

Perchlorate was more prevalent in the groundwater samples collected from the intermediate aquifer zone than in the shallow aquifer zone. Perchlorate was detected in 3 of the 6 (50%) groundwater samples (monitoring wells) at concentrations above the laboratory's reporting limit. The highest concentrations of perchlorate in the intermediate aquifer were detected in monitoring wells SC6S (19.6 ppb) and SC3S (13.0 ppb). Excluding monitoring wells SC6S and SC3S, perchlorate concentrations ranged between ND and 4.4 ppb. Consistent with the findings of the 2009 groundwater monitoring event, the locations of the highest perchlorate concentrations identified in the intermediate aquifer are generally further downgradient from the SMC property relative to groundwater flow direction when compared to the locations of the highest concentrations identified in the shallow aquifer zone.

Perchlorate was more prevalent in the groundwater samples collected from the deep aquifer zone, when compared to the shallow and intermediate aquifers zones. Perchlorate was detected in 14 of 17 (82%) groundwater samples (monitoring wells, including duplicate QA/QC samples) at concentrations above the laboratory's reporting limit. Perchlorate concentrations ranged between ND and 158 ppb. The highest concentration of perchlorate in the deep aquifer zone was detected in monitoring well SC34D (158 ppb), with the next highest concentrations being detected in monitoring wells SC3D(R) (143 ppb), SC1D (44.5 ppb), SC21D (32.8 ppb), and SC28D (16.8 ppb). Other wells exhibiting perchlorate concentrations above the New Jersey AOC action level of 5 ppb include on-site wells SC20D and W3D; and off-site wells SC-10D, SC-17D, SC26D, SC36D, and SC2D(R). Consistent with the findings of the 2009 groundwater monitoring event, the locations of the highest perchlorate concentrations identified in the deep aquifer are generally further downgradient from the SMC property relative to groundwater flow direction when compared to the locations of the highest concentrations identified in the shallow and intermediate aquifer zones.

2011 Groundwater Sampling Event

Groundwater samples were collected from one newly-installed well, SC40D, during this sampling event (see Figure 2-3). This well was installed to address a data gap that existed west of the Site and in a cross-gradient orientation to the Site relative to the groundwater flow direction. SC40D is screened to the deep portion of the Cohansey aquifer. Perchlorate was detected in the groundwater samples (including a duplicate QA/QC sample) at concentrations

above the laboratory's reporting limit, at 4.0 ppb and 3.9 ppb. These results, coupled with the location of well SC40D relative to the Site (i.e., in a cross-gradient orientation), add further evidence that there is a regionally-present background concentration of perchlorate. Furthermore, the installation of this well and collection of groundwater samples from it closes the data gap that existed in that area.

10.3 Surface Water and Sediment

As part of the perchlorate remedial investigation, surface water and co-located sediment samples were collected from ten locations downstream and upstream (upgradient) along the Hudson Branch, Burnt Mill Pond (including downstream of the pond outfall) and Burnt Mill Branch. Perchlorate was detected at a concentration above the laboratory's detection limit in only one of the ten surface water samples (SW-1A at 1.8 ppb (estimated)) and in only one of the eleven sediment samples (SED-4 at 10.9 ppb (estimated)). While surface water levels were elevated approximately 1-2 feet above typical flow conditions at the time of sampling, the absence of perchlorate in the surface water and sediment samples indicates that neither contaminated groundwater nor the discharge of stormwater to surface water is adversely impacting surface water or sediment quality. As the highest concentrations of perchlorate in groundwater were typically identified within the deep aquifer zone, well beneath any potential interface with the surface water bodies, discharges of groundwater to surface water would not be expected to have a significant impact on surface water/sediment perchlorate levels.

10.4 Data Gap Analysis

The initial results of the perchlorate remedial investigation indicated that the main data gap was with respect to the delineation of the perchlorate groundwater plume relative to the New Jersey AOC action level of 5 ppb. The southern and southwestern edges of the perchlorate plume were well defined based on the absence of perchlorate at levels exceeding the New Jersey AOC action level of 5 ppb results in monitoring wells SC30D, SC32D, and SC35D and at vertical profiling location VP-15. However, the detections of 5.3 ppb perchlorate (October 20-22, 2009) and 6.4 / 5.6 ppb perchlorate (original and duplicate sample collected September 8-9, 2010) in deep monitoring well SC36D indicated that the northern limit of the perchlorate plume in the deep aquifer zone was not fully defined. Because of this, monitoring well SC40D was

installed in early April 2011 and sampled on April 29, 2011. The results of perchlorate analysis on the groundwater sample from SC40D (and a duplicate sample) indicate that this data gap has been closed, as perchlorate was not detected above the New Jersey AOC action level of 5 ppb, and that a regional background concentration of perchlorate is present, as the concentration of perchlorate in the new well (4.0 ppb) was very close to the action level.

With respect to soil, while perchlorate was detected in the soil at AOC-1 and AOC-2 at levels that were slightly elevated relative to the background sample and samples collected within AOC-3, the concentrations of perchlorate were at least three orders of magnitude lower than the USEPA RSL for perchlorate in residential soil (55,000 ppb). There is no indication from the studies that large quantities of perchlorate remain in the on-site soils that could be acting as a continuing source of perchlorate contamination to the groundwater. Therefore no data gaps were identified relative to the soil investigation.

With respect to surface water and sediment, perchlorate was only detected at estimated concentrations (i.e., greater than the laboratory minimum detection limit but less than the laboratory reporting limit) in one of the ten surface water samples and in one of the eleven sediment samples. While the surface water levels and flow conditions were above normal at the time of sampling, the general lack of detection of perchlorate in the samples indicates that surface water and sediment quality have not been adversely impacted by perchlorate, either discharging directly via groundwater discharge or as a result of stormwater discharge to the Hudson Branch. Therefore, no data gaps were identified relative to the surface water and sediment investigation.

11.0 CONCLUSIONS

The RI soil investigation identified the presence of extremely low levels of perchlorate in the soils of AOC-1 and AOC-2, with all concentrations of perchlorate detected in on-site soil at least three orders of magnitude lower than the USEPA RSL for perchlorate in residential soil (55,000 ppb). The on-site soils are not considered a significant on-going source of perchlorate contamination. Given that 1) perchlorate is highly soluble in water; 2) the aquifer materials consist of the Cohansey Sand, which is comprised of coarse sands and little silt overlying generally finer sand and some clay and silt lenses; and 3) there is little to no organic matter within the Cohansey Sand to attenuate the movement of perchlorate through both the vadose and saturated zones, it is possible that a historical release or use of perchlorate in the vicinity of the Site has impacted the underlying groundwater. The extremely low levels of perchlorate observed in the soils are not indicative of a continuing source at the Site, nor do they confirm the existence of a historical release at the Site which could have resulted in the migration of perchlorate into the groundwater. Also, significant levels of perchlorate must be present elsewhere in Newfield in agricultural soils or irrigation waters, since a U.S. Food and Drug Administration study identified crops (lettuce and spinach) from Newfield that contained significant levels of perchlorate.

On-site and off-site monitoring wells and extraction wells have exhibited perchlorate groundwater concentrations as high as 158 ppb and perchlorate concentration isopleths created for the shallow, intermediate, and deep zones of the aquifer indicate a sinking perchlorate plume migrating in a southwesterly direction under the influence of advective groundwater transport and a downward hydraulic gradient. Using the New Jersey ACO action level of 5 ppb, the extent of the perchlorate plume was well defined by the completion of the perchlorate groundwater RI. The southeastern, southern, and southwestern edges of the perchlorate plume are well defined based on the absence of perchlorate above 5 ppb in monitoring wells SC30D, SC32D, and SC35D and vertical profiling location VP-15. The northern limit of the perchlorate plume is completely defined (using a criterion of 5 ppb), due to the detection of 5.3 ppb (2009) and 6.4/5.6 ppb (2010) perchlorate in deep monitoring wells SC36D and detections of 4.0 ppb and 3.9 ppb in a groundwater sample and it's duplicate from SC40D. Based on the delineation of perchlorate in groundwater to a concentration of 5 ppb, the characterization of perchlorate in groundwater surrounding the Site is now complete. Also, it appears that there may be a regional

deep aquifer zone perchlorate issue, with moderate concentrations of perchlorate identified in wells located upgradient or sidegradient of the Site including USGS well OBS-2A (4.8 ppb), on-site monitoring well W3D (8.6 ppb) and monitoring well SC40D (4.0 ppb). This regional issue may have resulted from the extensive agricultural land use within the area and the potential use of Chilean-mined fertilizers (of which perchlorate is a component) on the cultivated soils of the area farms. The documentation of the presence of perchlorate in lettuce crops in Newfield and spinach crops in Vineland and the historical use of irrigation wells in the area seem to provide evidence of a regional groundwater perchlorate issue.

As detailed in this report, the Site has been fully characterized in accordance with the RIWP and the SMC-AOC.

12.0 REFERENCES

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TABLE 2-1
Groundwater Perchlorate Results Summary
Perchlorate Remedial Investigation
Shieldalloy Metallurgical Corporation
Newfield, New Jersey

WELL IDENTIFIER	SCREENED INTERVAL (FTBGS)[1]	RELATIVE AQUIFER DEPTH	PERCHLORATE (µg/L) SAMPLING EVENT							
			JULY 27, 2004	SEPTEMBER 10, 2004	SEPTEMBER 30, 2004	OCTOBER 27, 2004	FEBRUARY 21, 2006	OCTOBER 20-22, 2009[2]	SEPTEMBER 8-9, 2010	APRIL 29, 2011
ON-SITE MONITORING WELLS										
IWC-1	15-20	Shallow	**9.9**	**10.0**	NA	NA	NA	**7.3**	NA	NA
IWC-2	35-40	Shallow	**10**	**9.4**	NA	NA	NA	**7.7**	NA	NA
IWC-3	55-60	Intermediate	4.0 / 4.1	4.0 / 4.0	NA	NA	NA	2.5 J [3]	NA	NA
IWC-4	75-80	Intermediate	**5.4**	**6.9**	NA	NA	NA	4.6	4.4	NA
IWC-5	95-100	Deep	**10.0**	**11.0**	NA	NA	NA	**11.7 / 10.7**[4]	NA	NA
A	114-124	Deep	NA	<0.18	NA	NA	NA	<3.0	NA	NA
B	36-46	Shallow	NA	**8.0**	NA	NA	NA	1.2 J [3]	NA	NA
K	36-46	Shallow	NA	NA	NA	NA	NA	**90.5 / 78.1**	1.9 J[6] / 3.0	NA
L	42-52	Shallow	NA	NA	NA	NA	NA	<3.0	NA	NA
SC9S	15-30	Shallow	NA	**8.0**	NA	NA	NA	**8.2 / 8.0**[5]	NA	NA
SC11S(R)	9-24	Shallow	NA	NA	NA	NA	NA	<3.0	<3.0	NA
SC12S	15-25	Shallow	NA	NA	NA	NA	NA	<3.0	NA	NA
SC12D	126-136	Deep	NA	NA	NA	NA	NA	<3.0	<3.0	NA
SC13S(R)	14.7-24.7	Shallow	NA	NA	NA	NA	NA	<3.0	NA	NA
SC13D	127-137	Deep	NA	NA	NA	NA	NA	2.2 J [6]	NA	NA
SC14S	12-27	Shallow	NA	0.21 J	NA	NA	NA	<3.0	<3.0	NA
SC15S	12.5-27.5	Shallow	NA	NA	NA	NA	NA	<3.0	NA	NA
SC16S	12-27	Shallow	NA	NA	NA	NA	NA	<3.0	<3.0	NA
SC20S	7-22	Shallow	NA	NA	NA	NA	NA	<3.0	NA	NA
SC20D	129-139	Deep	NA	NA	NA	NA	NA	**7.0**	**6.0**	NA
SC22S	3-18	Shallow	NA	NA	NA	NA	NA	<3.0	2.0 J[6]	NA
SC23S	9-24	Shallow	NA	NA	NA	NA	NA	<3.0	NA	NA
SC25S	7-22	Shallow	NA	NA	NA	NA	NA	<3.0	0.64 J[6]	NA
SC27S	7-22	Shallow	NA	NA	NA	NA	NA	<3.0	NA	NA
MWH-4	119-129	Deep	NA	NA	NA	NA	NA	<3.0	NA	NA
W2(R)	2-17	Shallow	NA	NA	NA	NA	NA	0.94 J [6]	<3.0	NA
W3D	88-108	Deep	NA	NA	NA	NA	NA	**8.6**	**7.4**	NA
W4	55-75	Intermediate	NA	NA	NA	NA	NA	1.2 J[6]	0.93 J[6]	NA

NOTES:

(1) - FTBGS, Feet Below Ground Surface
(2) - Monitoring wells SC33D & SC34D were sampled on 11/19/09, monitoring wells SC35D & SC36D were sampled on 12/7/09, monitoring well K was re-sampled on 1/21/10, & recovery wells Layne & W9 were sampled on 1/21/10
(3) - Data qualifier changed to "J" by data validation
(4) - "Blind" duplicate sample labeled as IWC-6
(5) - "Blind" duplicate sample labeled as SC33S
(6) - Data not validated, but qualifier changed to "J" consistent with data validation
(7) - Data validation corrected reporting limit
(8) - "Blind" duplicate sample labeled as SC35D
(9) - "Blind" duplicate sample labeled as SC37D
(10) - "Blind" duplicate sample labeled as SC34D

µg/L - micrograms per liter
NA - Not Analyzed
All samples were analyzed by EPA Method 314.0
BOLD - indicates that value is greater than the proposed New Jersey Ground Water Quality Criteria of 5 ug/L
Shaded - Indicates that value is greater than the U.S. EPA Interim Health Advisory Level of 15 ug/L
J - Indicates a result is less than the reporting limit and estimated by the laboratory
Results with slash (e.g., 13.0 / 12.9) indicate duplicate results

TABLE 2-1
Groundwater Perchlorate Results Summary
Perchlorate Remedial Investigation
Shieldalloy Metallurgical Corporation
Newfield, New Jersey

WELL IDENTIFIER	SCREENED INTERVAL (FTBGS)[1]	RELATIVE AQUIFER DEPTH	PERCHLORATE (µg/L) SAMPLING EVENT							
			JULY 27, 2004	SEPTEMBER 10, 2004	SEPTEMBER 30, 2004	OCTOBER 27, 2004	FEBRUARY 21, 2006	OCTOBER 20-22, 2009[2]	SEPTEMBER 8-9, 2010	APRIL 29, 2011
OFF-SITE MONITORING WELLS										
OBS-2A	129-149	Deep	NA	NA	NA	NA	NA	4.8 J [6]	NA	NA
IW1	32-62	Intermediate	NA	NA	NA	NA	NA	1.1 J [6]	NA	NA
SC4S	35-45	Shallow	NA	NA	1.1	NA	NA	<3.0	NA	NA
SC6S	45-75	Intermediate	NA	NA	1.6	NA	NA	**6.4**	**19.6**	NA
SC6D	110-120	Deep	NA	NA	3.5	NA	NA	**9.8**	NA	NA
SC10S	35-55	Shallow	NA	NA	NA	NA	NA	1.7 J [6]	<3.0	NA
SC10D	105-125	Deep	NA	NA	NA	NA	NA	**19.5**	**8.5**	NA
SC17S	19-28	Shallow	NA	NA	NA	NA	NA	<3.0	<3.0	NA
SC17D	143-153	Deep	NA	NA	NA	NA	NA	**6.3**	**5.6**	NA
SC18S	4-19	Shallow	NA	NA	NA	NA	NA	<15.0 [7]	<3.0	NA
SC18D	119-129	Deep	NA	NA	NA	NA	NA	3.8	NA	NA
SC19S	2-17	Shallow	NA	NA	NA	NA	NA	<3.0	NA	NA
SC19D	120-130	Deep	NA	NA	NA	NA	NA	**14.3**	NA	NA
SC21S	3-18	Shallow	NA	NA	NA	NA	NA	<3.0	<3.0	NA
SC21D	125-135	Deep	NA	NA	NA	NA	NA	**29.1**	**32.8**	NA
SC26D	127-137	Deep	NA	NA	NA	NA	NA	**11.0**	**6.8**	NA
SC28D	133-153	Deep	NA	NA	NA	**34.0**	NA	**49.0**	**16.8**	NA
SC30D	147-157	Deep	NA	NA	NA	1.9	NA	2.6 J [6]	2.8 J[6]	NA
SC32D	92-102	Deep	NA	NA	NA	NA	NA	3.2 / 3.3[8]	3.7	NA
SC33D	82.5-92.5	Intermediate	NA	NA	NA	NA	NA	<3.0	<3.0	NA
SC34D	130-140	Deep	NA	NA	NA	NA	NA	**150 / 152[9]**	**158**	NA
SC35D	89.5-99.5	Deep	NA	NA	NA	NA	NA	2.0 J [6]	2.7 J[6]	NA
SC36D	107-117	Deep	NA	NA	NA	NA	NA	**5.3**	**6.4 / 5.6[9]**	NA
SC40D	120-130	Deep	NA	NA	NA	NA	NA	NA	NA	4.0 / 3.9 [11]
ON-SITE EXTRACTION WELLS										
Layne	42-47	Shallow	NA	**23.0**	NA	NA	NA	**67.4**	**36.6**	NA
W9	110-130	Deep	NA	**10.0**	NA	NA	NA	**6.1**	NA	NA

NOTES:
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(7) - Data validation corrected reporting limit
(8) - "Blind" duplicate sample labeled as SC35D
(9) - "Blind" duplicate sample labeled as SC37D
(10) - "Blind" duplicate sample labeled as SC34D
(11) - "Blind" duplicate sample labeled as SC49D

µg/L - micrograms per liter
NA - Not Analyzed
All samples were analyzed by EPA Method 314.0
BOLD - indicates that value is greater than the proposed New Jersey Ground Water Quality Criteria of 5 ug/L
Shaded - Indicates that value is greater than the U.S. EPA Interim Health Advisory Level of 15 ug/L
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Results with slash (e.g., 13.0 / 12.9) indicate duplicate results

TABLE 2-1
Groundwater Perchlorate Results Summary
Perchlorate Remedial Investigation
Shieldalloy Metallurgical Corporation
Newfield, New Jersey

WELL IDENTIFIER	SCREENED INTERVAL (FTBGS)(1)	RELATIVE AQUIFER DEPTH	PERCHLORATE (µg/L) SAMPLING EVENT							
			JULY 27, 2004	SEPTEMBER 10, 2004	SEPTEMBER 30, 2004	OCTOBER 27, 2004	FEBRUARY 21, 2006	OCTOBER 20-22, 2009(2)	SEPTEMBER 8-9, 2010	APRIL 29, 2011
FARM PARCEL MONITORING WELLS										
IW2	40-70	Intermediate	NA	NA	NA	NA	NA	3.7	NA	NA
SC1S	35-55	Intermediate	NA	NA	NA	3.5	**8.8**	1.8 J (3)	0.69 J(3)	NA
SC1D	85-95/100-115	Deep	NA	NA	NA	**76.0 / 76.0**	**53.9**	**46.3**	**44.5**	NA
SD2D(R)	106-116	Deep	NA	NA	**9.2**	NA	NA	**7.0**	**6.6**	NA
SC3S	35-55	Intermediate	NA	NA	**13**	NA	**20.9**	1.8 J (3)	**13.0**	NA
SC3D(R)	102-112	Deep	NA	NA	**49**	NA	**62.1**	**141 / 136(10)**	**143**	NA
SC5S	5-20	Shallow	NA	NA	NA	NA	NA	1.4 J (6)	NA	NA
SC5D	90-120	Deep	NA	NA	NA	NA	NA	1.2 J (6)	NA	NA
SC24S	5-20	Shallow	NA	NA	NA	4.8	4.3	0.99 J (6)	2.1 J(3)	NA
SC24D	105-115	Deep	NA	NA	NA	**6**	3.0	3.0	NA	NA
SC31D	120-130	Deep	NA	NA	NA	NA	NA	**6.6**	NA	NA
OFFSITE EXTRACTION WELLS										
RIW2	30-55	Shallow	NA	NA	**14.0 / 15.1**	NA	**9.4**	4.1	NA	NA
RW6S	55-75	Intermediate	NA	NA	**8.0 / 8.01**	NA	NA	**12.9**	NA	NA
RW6D	90-125	Deep	NA	NA	**12.0 / 13.8**	NA	NA	**14.3**	NA	NA

NOTES:
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(8) - "Blind" duplicate sample labeled as SC35D
(9) - "Blind" duplicate sample labeled as SC37D
(10) - "Blind" duplicate sample labeled as SC34D

µg/L - micrograms per liter
NA - Not Analyzed / Not Applicable
All samples were analyzed by EPA Method 314.0
BOLD - indicates that value is greater that the proposed New Jersey Ground Water Quality Criteria of 5 ug/L
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TABLE 2-2
Current and Previous Off-Site Groundwater Vertical Profiling Perchlorate Results
Perchlorate Remedial Investigation
Shieldalloy Metallurgical Corporation
Newfield, New Jersey

Sample ID	Date Sampled	Approx. Ground Surface Elevation (ftmsl)	Sample Depth (ftbgs)	Approx. Sample Elevation (ftmsl)	Relative Aquifer Depth	Perchlorate (ug/L)
Vertical Profile Samples (2009 Investigation)						
VP-13 (25-30)	10/14/2009	102	25-30	77 to 72	Shallow	<3.0
VP-13 (50-55)	10/14/2009	102	50-55	52 to 47	Shallow	<3.0
VP-13 (75-80)	10/14/2009	102	75-80	27 to 22	Intermediate	3.9
VP-13 (100-105)	10/15/2009	102	100-105	2 to -3	Deep	**10.6**
VP-13 (125-130)	10/15/2009	102	125-130	-23 to -28	Deep	**5.7**
VP-13A (15-20)	10/22/2009	89	15-20	74 to 69	Shallow	<3.0
VP-13A (37-42)	10/22/2009	89	37-42	52 to 47	Shallow	<3.0
VP-13A (62-67)	10/22/2009	89	62-67	27 to 22	Intermediate	4.3
VP-13A (87-92)	10/23/2009	89	87-92	2 to -3	Deep	3.4
VP-13A (111-116)	10/23/2009	89	111-116	-22 to -27	Deep	**6.0**
VP-14 (35-40)	10/16/2009	100	35-40	65 to 60	Shallow	0.93 J (2)
VP-14 (55-60)	10/16/2009	100	55-60	45 to 40	Shallow	<3.0
VP-14 (80-85)	10/19/2009	100	80-85	20 to 15	Intermediate	1.6 J (1)
VP-14 (105-110)	10/19/2009	100	105-110	-5 to -10	Deep	**6.2**
VP-24 (105-110) Field Dup	10/19/2009	100	105-110	-5 to -10	Deep	**5.9**
VP-14 (130-135)	10/19/2009	100	130-135	-30 to -35	Deep	**12.5**
VP-15 (30-35)	10/12/2009	91	30-35	61 to 56	Shallow	<3.0
VP-15 (45-50)	10/12/2009	91	45-50	46 to 41	Shallow	<3.0
VP-15 (65-70)	10/13/2009	91	65-70	26 to 21	Intermediate	<3.0
VP-15 (88-93)	10/13/2009	91	88-93	3 to -2	Deep	4.9
VP-15 (114-119)	10/13/2009	91	114-119	-23 to -28	Deep	<3.0
VP-15A (15-20)	10/20/2009	76	15-20	61 to 56	Shallow	<3.0
VP-15A (38-43)	10/21/2009	76	38-43	38 to 33	Shallow	<3.0
VP-15A (55-60)	10/21/2009	76	55-60	21 to 16	Intermediate	<3.0
VP-15A (77-82)	10/21/2009	76	77-82	-1 to -6	Deep	1.6 J (2)
VP-15A (99-104)	10/21/2009	76	99-104	-23 to -28	Deep	2.5 J (2)
VP-25A (99-104) Field Dup	10/21/2009	76	99-104	-23 to -28	Deep	2.9 J (2)

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Shaded - Indicates that value is greater than the U.S. EPA Interim Health Advisory Level of 15 ug/L

micrograms per Liter (ug/L) is equivalent to parts per billion

ftmsl - feet above mean sea level (NAVD 27)

ftbgs - feet below ground surface

J - Indicates a result is less than the reporting limit and estimated by the laboratory

TABLE 2-2
Current and Previous Off-Site Groundwater Vertical Profiling Perchlorate Results
Perchlorate Remedial Investigation
Shieldalloy Metallurgical Corporation
Newfield, New Jersey

Sample ID	Date Sampled	Approx. Ground Surface Elevation (ftmsl)	Sample Depth (ftbgs)	Approx. Sample Elevation (ftmsl)	Relative Aquifer Depth	Perchlorate (ug/L)
Vertical Profile Samples (2006/2007 Investigation)						
VP-1 (15-20)	11/28/2006	85	15-20	70 to 65	Shallow	<0.3
VP-1 (35-40)	11/28/2006	85	35-40	50 to 45	Shallow	<0.3
VP-1 (60-65)	11/29/2006	85	60-65	25 to 20	Intermediate	<0.3
VP-1 (85-90)	11/29/2006	85	85-90	0 to -5	Deep	**5.6**
VP-1 (105-110)	11/29/2006	85	105-110	-20 to -25	Deep	3.0
VP-2 (15-20)	11/30/2006	85	15-20	70 to 65	Shallow	<0.3
VP-2 (35-40)	12/1/2006	85	35-40	50 to 45	Shallow	4.2
VP-2 (60-65)	12/1/2006	85	60-65	25 to 20	Intermediate	**9.6**
VP-2 (85-90)	12/1/2006	85	85-90	0 to -5	Deep	**49.9**
VP-2 (110-115)	12/1/2006	85	110-115	-25 to -30	Deep	**9.4**
VP-3 (25-30)	12/4/2006	95	25-30	70 to 65	Shallow	<0.3
VP-3 (45-50)	12/5/2006	95	45-50	50 to 45	Shallow	<0.3
VP-30 (45-50) Field Dup	12/5/2006	95	45-50	50 to 45	Shallow	<0.3
VP-3 (70-75)	12/6/2006	95	70-75	25 to 20	Intermediate	**7.9**
VP-3 (95-100)	12/6/2006	95	95-100	0 to -5	Deep	**34**
VP-3 (115-120)	12/6/2006	95	115-120	-20 to -25	Deep	**28.3**
VP-4 (30-35)	12/11/2006	100	30-35	70 to 65	Shallow	1.3
VP-4 (50-55)	12/11/2006	100	50-55	50 to 45	Intermediate	1.3
VP-4 (75-80)	12/11/2006	100	75-80	25 to 20	Intermediate	3.3
VP-4 (75-80) Field Dup	12/11/2006	100	75-80	25 to 20	Intermediate	3.1
VP-4 (100-105)	12/11/2006	100	100-105	0 to -5	Deep	<0.3
VP-4 (121-126)	12/11/2006	100	121-126	-21 to -26	Deep	**6.8**
VP-10 (20-25)	12/15/2006	85	20-25	65 to 60	Shallow	2.4
VP-10 (35-40)	12/15/2006	85	35-40	50 to 45	Shallow	<0.3
VP-10 (60-65)	12/18/2006	85	60-65	25 to 20	Intermediate	3.4
VP-100 (60-65) Field Dup	12/18/2006	85	60-65	25 to 20	Intermediate	3.4
VP-10 (85-90)	12/18/2006	85	85-90	0 to -5	Deep	**17.4**
VP-10 (109-114)	12/18/2006	85	109-114	-24 to -29	Deep	**6.7**

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Shaded - Indicates that value is greater than the U.S. EPA Interim Health Advisory Level of 15 ug/L

micrograms per Liter (ug/L) is equivalent to parts per billion

ftmsl - feet above mean sea level (NAVD 27)

ftbgs - feet below ground surface

J - Indicates a result is less than the reporting limit and estimated by the laboratory

TABLE 9-1
Soil Investigation Perchlorate Results
Perchlorate Remedial Investigation
Shieldalloy Metallurgical Corporation
Newfield, New Jersey

Sample ID	Date Sampled	Sample Depth (ftbgs)	Perchlorate (ug/kg)
Background Sample			
SS-01 (5-7')	10/26/2009	5-7	<9.6
SS-01 (12-14')	10/26/2009	12-14	<10
AOC-1 Former Chemical Storage Building			
SS-02 (1-3')	10/26/2009	1-3	2.1 J(1)
SS-02 (14-16')	10/26/2009	14-16	<9.7
SS-03 (0-2')	10/26/2009	0-2	<10
SS-03 (13-15')	10/26/2009	13-15	8.6 J(1)
SS-04 (2-4')	10/26/2009	2-4	7.9 J(1)
SS-04 (14-16')	10/26/2009	14-16	4.2 J(1)
SS-05 (5-7')	10/26/2009	5-7	58.3
SS-05 (13-15')	10/26/2009	13-15	18.3
SS-06 (1-3')	10/26/2009	1-3	<10
SS-06 (14-16')	10/26/2009	14-16	2.9 J(1)
SS-07 (6-8')	10/26/2009	6-8	<9.6
SS-27 (6-8') Field Dup	10/26/2009	6-8	<9.6
SS-07 (13-15')	10/26/2009	13-15	3.0 J(1)
SS-08 (3-4')	10/26/2009	3-4	<9.9
SS-08 (12-14')	10/26/2009	12-14	<9.6
AOC-2 Former Building D102(A)			
SS-21 (1-3')	10/28/2009	1-3	11.0
SS-21 (5-7')	10/28/2009	5-7	10.7
SS-22 (1-3')	10/28/2009	1-3	<9.8
SS-22 (6-8')	10/28/2009	6-8	12.0
SS-23 (2-4')	10/28/2009	2-4	<10
SS-33 (2-4') Field Dup	10/28/2009	2-4	<10
SS-23 (6-8')	10/28/2009	6-8	<9.7
SS-24 (1-3')	10/28/2009	1-3	26.5
SS-24 (4-6')	10/28/2009	4-6	28.8

Sample ID	Date Sampled	Sample Depth (ftbgs)	Perchlorate (ug/kg)
AOC-3 Former Lagoon Area			
SS-09 (6-8')	10/26/2009	6-8	<10
SS-09 (12-14')	10/26/2009	12-14	<10
SS-10 (2-4')	10/26/2009	2-4	<9.8
SS-10 (4-6')	10/26/2009	4-6	<9.4
SS-11 (1-3')	10/27/2009	1-3	<9.8
SS-11 (5-7')	10/27/2009	5-7	2.8 J(2)
SS-12 (2-4')	10/27/2009	2-4	<9.7
SS-12 (5-7')	10/27/2009	5-7	<9.6
SS-32 (5-7') Field Dup	10/27/2009	5-7	<9.6
SS-13 (1-3')	10/27/2009	1-3	2.0 J(2)
SS-13 (5-7')	10/27/2009	5-7	2.9 J(2)
SS-14 (1-3')	10/27/2009	1-3	<9.5
SS-14 (6-8')	10/27/2009	6-8	<9.6
SS-15 (2-4')	10/27/2009	2-4	<9.7
SS-15 (4-6')	10/27/2009	4-6	<9.9
SS-16 (1-3')	10/27/2009	1-3	<9.6
SS-16 (6-8')	10/27/2009	6-8	<9.9
SS-17 (1-3')	10/27/2009	1-3	<9.7
SS-17 (5-7')	10/27/2009	5-7	2.8 J(2)
SS-18 (1-3')	10/27/2009	1-3	<10
SS-18 (6-8')	10/27/2009	6-8	<9.3
SS-19 (1-3')	10/27/2009	1-3	<9.8
SS-19 (6-8')	10/27/2009	6-8	<9.6
SS-20 (1-3')	10/27/2009	1-3	2.3 J(2)
SS-20 (4-6')	10/27/2009	4-6	<10

NOTES:

(1) - Data qualifier changed to "J" by data validation

(2) - Data not validated, but qualifier changed to "J" consistent with data validation

EPA Regional Screening Level for perchlorate in residential soil is 55,000 ug/kg and 720,000 ug/kg in industrial soil.

Shaded results are in excess of the EPA Regional Screening Level for perchlorate.

micrograms per kilogram (ug/kg) is equivalent to parts per billion

ftbgs - feet below ground surface

J - Indicates a result is less than the reporting limit and estimated by the laboratory

TABLE 9-2
Soil Investigation, Monitoring/Extraction Well Sampling, Groundwater Vertical Profiling, and Surface Water and Sediment QA/QC Results
Perchlorate Remedial Investigation
Shieldalloy Metallurgical Corporation
Newfield, New Jersey

Sample ID	Date Sampled	Perchlorate (µg/L)
Soil / Sediment Investigation Field Blank Samples		
FB102609(1)	10/26/2009	<3.0
FB102609(2)	10/26/2009	<3.0
FB102709(1)	10/27/2009	<3.0
FB102709(2)	10/27/2009	<3.0
FB102809(for SS Samples)	10/28/2009	<3.0
FB102809(for SED Samples)	10/28/2009	<3.0
Monitoring/Extraction Well Sampling Field Blank Samples		
FB102009A	10/20/2009	<3.0
FB102109	10/21/2009	<3.0
FB102209	10/22/2009	<3.0
FB111909	11/19/2009	<3.0
FB090810	9/8/2010	<3.0
FB090910	9/9/2010	<3.0
FB042911	4/29/2011	<3.0
Groundwater Vertical Profiling Field Blank Samples		
FB101209	10/12/2009	<3.0
FB101309	10/13/2009	<3.0
FB101409	10/14/2009	<3.0
FB101509	10/15/2009	<3.0
FB101609	10/16/2009	<3.0
FB101909	10/19/2009	<3.0
FB102009	10/20/2009	<3.0
FB102109	10/21/2009	<3.0
FB102209	10/22/2009	<3.0
FB102309	10/23/2009	<3.0
Environmental Samples / "Blind" Duplicate Samples		
Monitoring Well Sampling		
IWC-5 / IWC-6	10/21/2009	11.7 / 10.7
SC9S / SC33S	10/21/2009	8.2 / 8.0
SC32D / SC35D	10/22/2009	3.2 / 3.3
SC3D(R) / SC34D	10/21/2009	141 / 136
SC34D / SC37D	11/19/2009	150 / 152
SC36D / SC37D	9/8/2010	6.4 / 5.6
SC40D / SC49D	4/29/2011	4.0 / 3.9
K / J	9/9/2010	1.9J / 3.0
Groundwater Vertical Profiling		
VP-14(105-110) / VP-24(105-110)	10/19/2009	6.2 / 5.9
VP-15A(99-104) / VP-25A(99-104)	10/21/2009	2.5J / 2.9J
Soil Investigation*		
SS-07(6-8') / SS-27(6-8')	10/26/2009	<9.6 / <9.6
SS-12(5-7') / SS-32(5-7')	10/27/2009	<9.6 / <9.6
SS-23(2-4') / SS-33(2-4')	10/28/2009	<10 / <10
Surface Water / Sediment Investigation		
SED-4 / SED-10*	10/28/2009	10.9J / <42
SW-4 / SW-10	10/28/2009	<3.0 / <3.0

NOTES:

Action Level for Perchlorate is 5 ug/L (per Administrative Consent Order signed February 1, 2006).

micrograms per Liter (ug/L) is equivalent to parts per billion

J - Indicates a result is less than the reporting limit and estimated by the laboratory

* - Soil and sediment perchlorate results are presented in micrograms per kilogram

TABLE 9-3
GROUNDWATER ELEVATIONS / WELL CONSTRUCTION SPECIFICATIONS
SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NJ
October 2009, September 2010, and April 2011

WELL #	PERMIT #	INSTALLATION DATE	CASING TYPE / DIAMETER	GROUND ELEVATION (msl) (1)	TOP OF INNER CASING ELEVATION (msl) (1)	TOTAL WELL DEPTH (ft) (2)	SCREENED INTERVAL (ft) (2)	SCREENED INTERVAL ELEVATION (msl) (1) (3)	DEPTH TO WATER (ft) (October 2009)	DEPTH TO WATER (ft) (September 2010)	DEPTH TO WATER (ft) (April 2011)	GROUNDWATER ELEVATION (msl) (1) (October 2009)	GROUNDWATER ELEVATION (msl) (1) (September 2010)	GROUNDWATER ELEVATION (msl) (1) (April 2011)
A	51-142	1970	STEEL/2"	-	94.82	124	114 to 124	-21.18 to -31.18	5.47	NM	5.50	89.35	NM	89.32
IWC3	51-222	1/74	STEEL/2"	-	97.83	60	55 to 60	40.83 to 35.83	7.41	NM	6.22	90.42	NM	91.61
IWC4	51-223	1/74	STEEL/2"	-	98.61	80	75 to 80	21.61 to 16.61	8.18	8.62	6.99	90.43	89.99	91.62
IWC5	51-224	1/74	STEEL/2"	-	98.03	100	95 to 100	1.03 to -3.97	7.64	NM	6.45	90.39	NM	91.58
W3D	31-25759	12/5/86	PVC/4"	-	108.37	108	88 to 108	18.37 to -1.63	15.94	16.24	14.53	92.43	92.13	93.84
W-4	51-219	5/8/74	PVC/4"	-	104.58	75	55 to 75	47.58 to 27.58	14.03	15.55	13.83	90.55	89.03	90.75
MWH-4	UNK	2/7/2002	PVC/6"	97.54	99.37	129	119 to 129	-21.46 to -31.46	9.06	NM	8.50	90.31	NM	90.87
SC-12D	31-35226-0	11/28/90	PVC/4"	102.16	103.19	140	126 to 136	-23.84 to -33.84	11.59	11.81	10.12	91.60	91.38	93.07
SC-13D	31-35227-8	11/29/90	PVC/4"	99.67	101.99	140.5	127 to 137	-27.33 to -37.33	10.66	NM	9.27	91.33	NM	92.72
SC-20D	31-38187	1/10/92	PVC/4"	101.55	104.53	139	129 to 139	-27.45 to -37.45	13.76	14.28	12.67	90.77	90.25	91.86
SC-22D	31-35222-7	11/21/90	PVC/4"	96.18	98.65	125	111 to 121	-14.82 to -24.82	8.29	NM	7.11	90.36	NM	91.54
SC-1D	31-21619-6	5/30/84	PVC/2"	88.00	90.90	115	85-95/100-115	3 to -7 / -12 to -27	8.27	9.02	6.73	82.63	81.88	84.17
SC-2D(r)	31-38194	1/3/92	PVC/4"	90.62	92.53	-	106 to 116	-15.38 to -25.38	7.84	8.44	6.37	84.69	84.09	86.16
SC-3D(r)	31-38195	1/7/92	PVC/4"	88.75	91.06	-	102 to 112	-13.25 to -23.25	7.11	7.73	5.56	83.95	83.33	85.50
SC-4D	31-21690-1	6/8/84	PVC/2"	-	92.64	120	110 to 120	-19.36 to -29.36	NM	NM	NM	NM	NM	NM
SC-5D	31-21876-8	6/12/84	PVC/2"	-	97.00	120	90 to 120	5.00 to -25.00	12.39	NM	10.83	84.61	NM	86.17
SC-6D	31-21878-4	6/26/84	PVC/2"	-	94.38	125	110 to 120	-17.62 to -27.62	6.55	NM	5.58	87.83	NM	88.80
SC-10D	31-23370	11/12/85	PVC/4"	-	95.72	125	105 to 125	-11.28 to -31.28	7.39	8.24	6.47	88.33	87.48	89.25
SC-17D	31-35223-5	11/27/90	PVC/4"	106.48	108.07	153	143 to 153	-36.52 to -46.52	19.05	19.92	18.06	89.02	88.15	90.01
SC-18D	31-35228-6	11/20/90	PVC/4"	93.56	96.01	130	119 to 129	-25.44 to -35.44	9.56	NM	8.47	86.45	NM	87.54
SC-19D	31-35221-9	11/26/90	PVC/4"	89.65	92.03	133	120 to 130	-30.35 to -40.35	5.31	NM	4.31	86.72	NM	87.72
SC-21D	31-35220-1	11/27/90	PVC/4"	90.44	91.65	140	125 to 135	-34.56 to -44.56	5.81	6.41	4.64	85.84	85.24	87.01
SC-24D	3142083	8/24/93	PVC/4"	-	93.52	115	105 to 115	-13.48 to -23.48	10.23	NM	8.69	83.29	NM	84.83
SC-26D	31-39500	7/9/1992	PVC/4"	100.68	100.45	143	127 to 137	-26.32 to -36.32	10.55	10.82	9.32	89.90	89.63	91.13
IW-2	31-23369	11/12/85	PVC/6"	-	92.05	70	40 to 70	50.05 to 20.05	7.91	NM	6.08	84.14	NM	85.97
SC-28D	31-47408	8/16/95	PVC/4"	107.41	106.87	153	133 to 153	-25.59 to -45.59	18.96	19.47	17.93	87.91	87.40	88.94
SC-29D	31-47409	2/20/97	PVC/4"	106.50	106.23	148	128 to 148	-21.50 to -41.50	NM	NM	NM	NM	NM	NM
SC-30D	31-63686	6/14/02	PVC/2"	114.59	115.58	157	147 to 157	-32.41 to -42.41	27.36	27.45	25.98	88.22	88.13	89.60
SC-31D	31-66758	6/25/02	PVC/2"	99.78	102.61	130	120 to 130	-20.22 to -30.22	19.05	NM	17.53	83.56	NM	85.08
SC-32D	35-27314	12/18/06	PVC/2"	-	91.62	102	92 to 102	-0.38 to -10.38	11.06	11.79	9.37	80.56	79.83	82.25
SC-33D	P200912475	10/22/09	PVC/2"	-	108.08	92.5	82.5 to 92.5	23.58 to 13.58	NM	21.21	19.53	NM	86.87	88.55
SC-34D	P200912473	10/22/09	PVC/2"	-	103.82	142	132 to 142	-30.18 to -40.18	NM	19.11	17.12	NM	84.71	86.70
SC-35D	P200913690	10/29/09	PVC/2"	-	81.24	99.5	89.5 to 99.5	-10.26 to -20.26	NM	17.08	14.20	NM	64.16	67.04
SC-36D	P200912476	11/4/09	PVC/2"	-	91.80	117	107 to 117	-17.20 to -27.20	NM	9.39	6.61	NM	82.41	85.19
SC-40D	E201104448	4/5/11	PVC/2"	-	98.12	130	120 to 130	-21.88 to -31.88	NI	NI	12.52	NI	NI	85.60
OBS-2A ^	31-06092	-	-	120.00	122.80	154	129 to 149	-8.20 to -28.20	NM	NM	NM	NM	NM	NM
B	51-143	1970	STEEL/2"	-	94.33	46	36 to 46	56.33 to 46.33	4.75	NM	4.00	89.58	NM	90.33
K	51-152	1971	STEEL/2"	-	99.18	46	36 to 46	61.18 to 51.18	9.69	10.54	8.87	89.49	88.64	90.31
L	51-153	1971	STEEL/2"	-	103.51	52	42 to 52	59.51 to 49.51	11.87	NM	10.76	91.64	NM	92.75
IWC1	51-220	1/74	STEEL/2"	-	98.13	20	15 to 20	81.13 to 76.13	7.70	NM	6.51	90.43	NM	91.62
IWC2	51-221	1/74	STEEL/2"	-	98.51	40	35 to 40	61.51 to 56.51	8.11	NM	6.91	90.40	NM	91.60
W2(r)	31-38189	12/20/91	PVC/4"	95.88	97.96	17	2 to 17	93.88 to 78.88	5.44	6.02	3.93	92.52	91.94	94.03
SC-9S	31-23368-6	8/1/85	PVC/4"	-	96.23	30	15 to 30	79.23 to 64.23	6.56	NM	5.76	89.67	NM	90.47
SC-11S(r)	31-39512	7/1/92	PVC/4"	106.91	108.12	24	9 to 24	97.91 to 82.91	15.67	15.81	14.88	92.45	92.31	93.24
SC-12S	31-29140-6	9/2/88	PVC/2"	-	104.76	25	15 to 25	87.76 to 77.76	12.63	NM	10.83	92.13	NM	93.93
SC-13SR@	31-00076422	6/25/2008	PVC/2"	-	101.10	25	15 to 25	83.60 to 73.60	8.69	NM	6.78	92.41	NM	94.32
SC-14S	31-35215-4	11/15/90	PVC/4"	105.83	108.38	27	12 to 27	93.83 to 78.83	16.07	16.44	14.32	92.31	91.94	94.06
SC-15S	31-35216-2	11/13/90	PVC/4"	106.06	108.32	27.5	12.5 to 27.5	93.56 to 78.56	14.83	NM	13.72	93.49	NM	94.60
SC-16S	31-35217-5	11/14/90	PVC/4"	105.32	108.05	27	12 to 27	93.32 to 78.32	18.05	18.69	16.97	90.00	89.36	91.08
SC-20S	31-35218-3	11/13/90	PVC/4"	101.74	104.45	22	7 to 22	94.74 to 79.74	NM	NM	12.24	NM	NM	92.21
SC-22S	31-35219-7	11/14/90	PVC/4"	96.17	99.65	18	3 to 18	93.17 to 78.17	8.83	9.32	7.51	90.82	90.33	92.14
SC-23S	31-35437-8	11/16/90	PVC/4"	102.83	102.21	24	9 to 24	93.83 to 78.83	11.46	NM	10.33	90.75	NM	91.88
SC-25S	31-38188	12/23/91	PVC/4"	-	102.27	21	6 to 21	94.27 to 79.27	9.76	9.57	8.05	92.51	92.70	94.22
SC-27S	31-41031	12/15/92	PVC/4"	-	100.54	22	7 to 22	91.54 to 76.54	9.11	NM	7.81	91.43	NM	92.73
SC-1S	31-28825-1	6/22/88	PVC/4"	-	87.26	55	35 to 55	50.26 to 30.26	3.73	4.46	2.26	83.53	82.80	85.00
SC-3S	31-28914-2	6/8/88	PVC/4"	-	90.32	55	35 to 55	53.32 to 33.32	6.32	6.97	4.85	84.00	83.35	85.47
SC-4S	31-21689-7	6/7/84	PVC/2"	-	93.65	45	35 to 45	56.65 to 46.65	6.77	NM	5.73	86.88	NM	87.92
SC-5S	31-35434-1	11/28/90	PVC/4"	94.18	96.55	20	5 to 20	89.18 to 74.18	11.85	NM	10.22	84.70	NM	86.33
SC-6S	31-21691-5	6/21/84	PVC/2"	-	94.62	75	45 to 75	47.62 to 17.62	5.55	8.29	4.79	89.07	86.33	89.83
SC-10S	31-23369	11/11/85	PVC/4"	-	95.38	55	35 to 55	58.38 to 38.38	7.08	7.88	6.29	88.30	87.50	89.09
SC-17S	31-35229-4	11/19/90	PVC/4"	106.53	109.26	28	13 to 28	93.53 to 78.53	20.19	20.92	19.27	89.07	88.34	89.99
SC-18S	31-35230-8	11/15/90	PVC/4"	93.43	95.72	19	4 to 19	89.43 to 74.43	9.26	9.98	8.24	86.46	85.74	87.48
SC-19S	31-35224-3	11/15/90	PVC/4"	90.14	92.98	17	2 to 17	88.14 to 73.14	5.99	NM	5.51	86.99	NM	87.47
SC-21S	31-35225-1	11/15/90	PVC/4"	90.57	92.64	18	3 to 18	87.57 to 72.57	6.41	7.12	5.47	86.23	85.52	87.17
SC-24S	31-35435-1	11/28/90	PVC/4"	91.57	93.57	20	5 to 20	86.57 to 71.57	9.90	10.74	8.18	83.67	82.83	85.39
IW-1	-	4/5/83	PVC/6"	89.06	90.33	62	32 to 62	57.06 to 27.06	5.23	NM	4.10	85.10	NM	86.23

Note:
(1) - All elevations based on vertical datum NGVD 1929
(2) - Feet Below Grade
(3) - Screened interval elevations for well locations without surveyed ground elevations calculated assuming a ground elevation of 2 feet below the surveyed well elevation (i.e., top of inner casing elevation).
^ - USGS observation well (NJ-WRD Well Number 15-0372) land surface is 120 feet above NGVD 1929, with the measuring point 2.80 ft above the land surface. The total well depth is 154 feet, with a screened interval of 129-149 feet below grade. (USGS Water Resources Data, New Jersey Water Year 2002 Vol. 2: Water Data Report NJ-02-2)
@ - Original monitoring well SC-13S destroyed; Well was reinstalled and named SC-13S(r).
msl - Feet Above Mean Sea Level
ft - Feet
NM - Not Measured
NI - Well not installed
UNK - Unkown

TABLE 9-4
Surface Water and Sediment Investigation Perchlorate Results
Perchlorate Remedial Investigation
Shieldalloy Metallurgical Corporation
Newfield, New Jersey

Sample ID	Date Sampled	Perchlorate	
		Surface Water (ug/l)	Sediment (ug/kg)
Surface Water / Sediment Sample Identifications			
SW-1A / SED-1A	10/28/2009	1.8 J (1)	<12
SW-1 / SED-1	10/28/2009	<3.0	<18
SW-2 / SED-2	10/28/2009	<3.0	<19 (2)
SW-3 / SED-3	10/28/2009	<3.0	<13
SW-4 / SED-4	10/28/2009	<3.0	10.9 J (1)
SW-10 / SED-10 Field Dup	10/28/2009	<3.0 (2)	<42
SW-5 / SED-5	10/28/2009	<3.0	<27
SW-6 / SED-6	10/28/2009	<3.0	<16
SW-7 / SED-7	10/29/2009	<3.0	<21
SED-8	10/29/2009	Dry	<11
SW-9 / SED-9	10/29/2009	<3.0	<47

NOTES:

(1) - Data qualifier changed to "J" by data validation

(2) - Data validation indicated analytical result should be reported as less than the laboratory reporting limit

There are no established guidance or criteria for perchlorate in surface water or sediment

micrograms per Liter (ug/L) is equivalent to parts per billion

ftmsl - feet above mean sea level (NAVD 27)

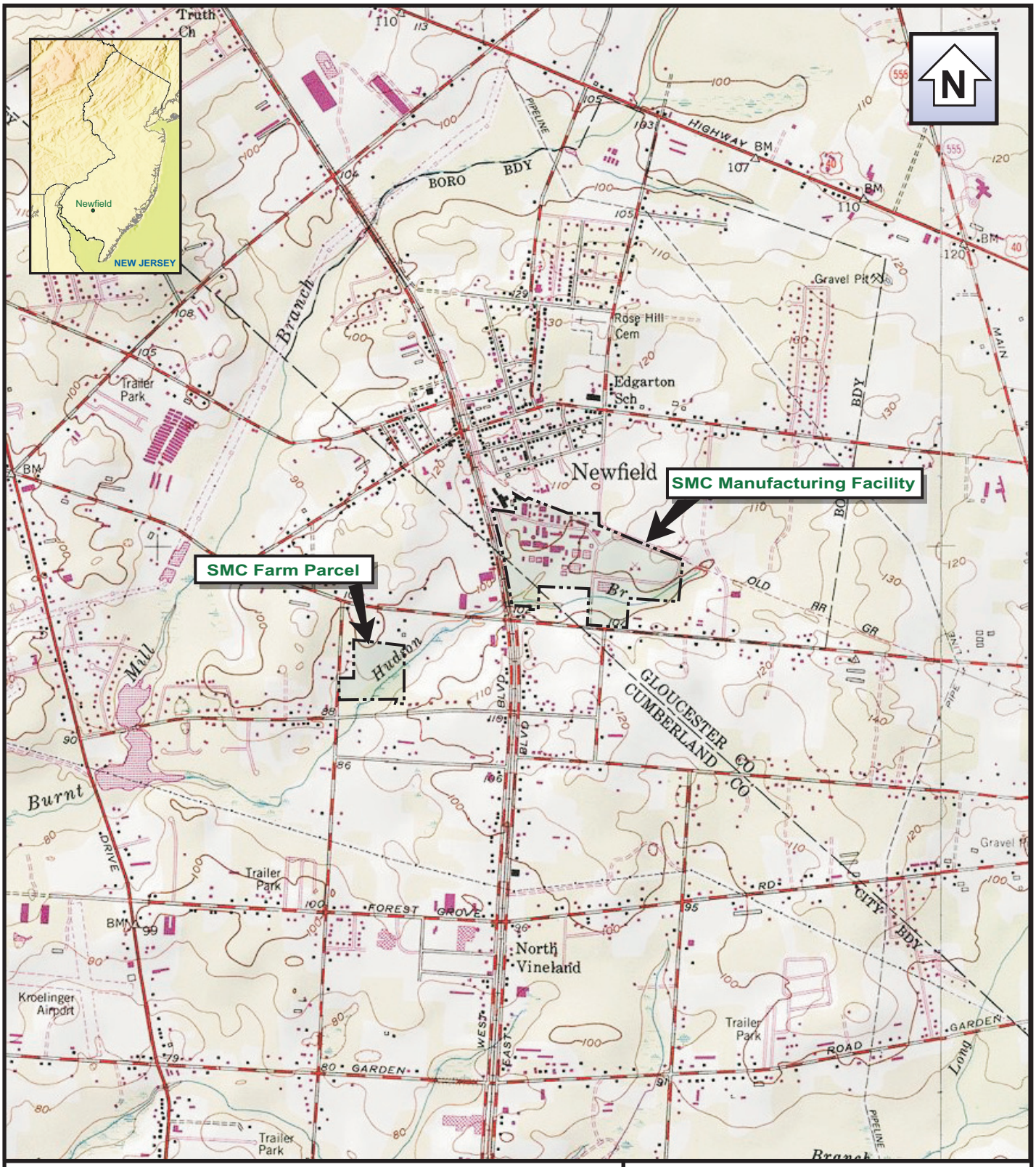
ftbgs - feet below ground surface

J - Indicates a result is less than the reporting limit and estimated by the laboratory

TABLE 9-5
VERTICAL GROUNDWATER PROFILING WATER QUALITY INDICATOR PARAMETERS
Perchlorate Remedial Investigation
Shieldalloy Metallurgical Corporation
Newfield, New Jersey

Sample ID	Date Analyzed	Sample Depth (ftbgs)	Temperature (°C)	pH	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (mV)	Alkalinity (mg/L)
VP-13 (25-30)	10/14/2009	25-30	12.82	4.31	0.153	8.59	57.3	302.3	50
VP-13 (50-55)	10/14/2009	50-55	13.44	4.65	0.175	2.17	46.9	277.6	10
VP-13 (75-80)	10/14/2009	75-80	14.16	4.41	0.125	7.50	8.2	287.0	10
VP-13 (100-105)	10/15/2009	100-105	13.99	4.68	0.113	8.20	35.4	252.4	10
VP-13 (125-130)	10/15/2009	125-130	14.16	5.05	0.033	8.44	15.1	235.6	10
VP-13A (15-20)	10/22/2009	15-20	19.17	4.73	0.462	0.43	44.2	205.2	10
VP-13A (37-42)	10/22/2009	37-42	14.50	4.42	0.182	0.23	32.8	213.9	10
VP-13A (62-67)	10/22/2009	62-67	16.44	4.80	0.148	0.29	3.7	174.7	15
VP-13A (87-92)	10/23/2009	87-92	14.19	4.55	0.100	6.60	26.3	201.2	5
VP-13A (111-116)	10/23/2009	111-116	14.49	4.88	0.037	7.70	15.1	200.7	5
VP-14 (35-40)	10/16/2009	35-40	14.94	4.76	0.252	2.87	180	177.5	5
VP-14 (55-60)	10/16/2009	55-60	14.59	4.60	0.085	8.01	36.4	260.9	5
VP-14 (80-85)	10/19/2009	80-85	YSI multi-parameter probe not functioning						10
VP-14 (105-110)	10/19/2009	105-110	YSI multi-parameter probe not functioning						5
VP-14 (130-135)	10/19/2009	130-135	14.32	4.60	0.061	3.67	55.0	251.6	10
VP-15 (30-35)	10/12/2009	30-35	17.94	4.94	0.119	8.53	48.7	254.2	5
VP-15 (45-50)	10/12/2009	45-50	17.10	4.83	0.071	2.79	33.3	256.7	5
VP-15 (65-70)	10/13/2009	65-70	16.38	4.72	0.072	4.87	9.6	246.3	5
VP-15 (88-93)	10/13/2009	88-93	15.35	4.61	0.059	5.64	42.4	281.1	5
VP-15 (114-119)	10/13/2009	114-119	16.83	4.15	0.036	0.32	65.2	107.7	5
VP-15A (15-20)	10/20/2009	15-20	17.28	5.56	0.518	5.77	34.1	131.0	30
VP-15A (38-43)	10/21/2009	38-43	14.53	4.75	0.084	4.01	44.6	214.3	5
VP-15A (55-60)	10/21/2009	55-60	14.44	4.52	0.049	4.20	43.0	268.5	5
VP-15A (77-82)	10/21/2009	77-82	14.83	4.39	0.046	5.72	90.0	261.1	5
VP-15A (99-104)	10/21/2009	99-104	14.37	3.67	0.054	6.60	9.2	271.6	5
Minimum			12.82	3.67	0.03	0.23	3.70	107.70	5.00
Maximum			19.17	5.56	0.52	8.59	180.00	302.30	50.00
Average			15.23	4.48	0.13	4.92	42.46	231.87	9.80
Standard Deviation			1.57	0.35	0.13	2.90	36.36	49.70	9.95

Notes:
-All vertical profiling samples collected via a screened auger tool equipped with a packer/submersible pump assembly.
-Temperature, pH, conductivity, DO, turbidity and ORP was determined with a YSI 6820 multi-parameter meter installed in a flow-through cell.
-Alkalinity was determined with a Hach Alkalinity Test Kit, Model AL-AP.
ORP - Oxidation-reduction potential
ftbgs - feet below ground surface
°C - Degrees Celsius
mS/cm - MilliSiemens per centimeter
mg/L - Milligrams per liter (parts per million)
NTU - nephelometric turbidity units
mV - Millivolts



0 2000
SCALE FEET

0 1
SCALE MILE

1:24000

BASE CREATED WITH TOPO™ © 1996 WILDFLOWERS PRODUCTIONS, www.topo.com
7.5' NEWFIELD, NJ USGS TOPOGRAPHIC MAP

pers/jwaleszczyk/haz/smc/171441.fh10

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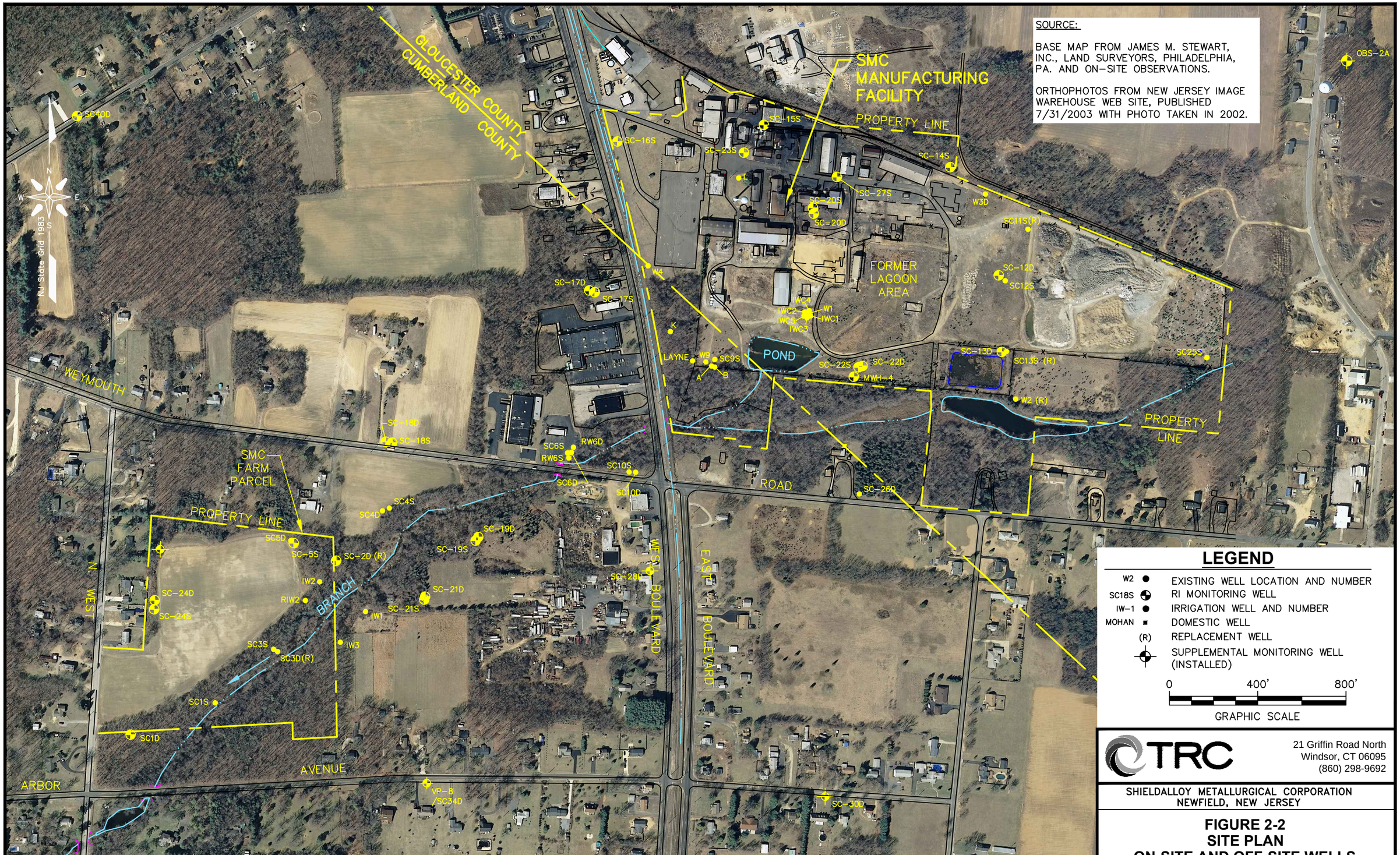
SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY

FIGURE 2-1
SITE LOCATION MAP

Date: 01/10 | **Project No.** 171441-000050-000000



LEGEND

W2 ●	EXISTING WELL LOCATION AND NUMBER
SC18S ◐	RI MONITORING WELL
IW-1 ●	IRRIGATION WELL AND NUMBER
MOHAN ■	DOMESTIC WELL
(R)	REPLACEMENT WELL
⊕	SUPPLEMENTAL MONITORING WELL (INSTALLED)

0 400' 800'

GRAPHIC SCALE

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FIGURE 2-2
SITE PLAN
ON-SITE AND OFF-SITE WELLS

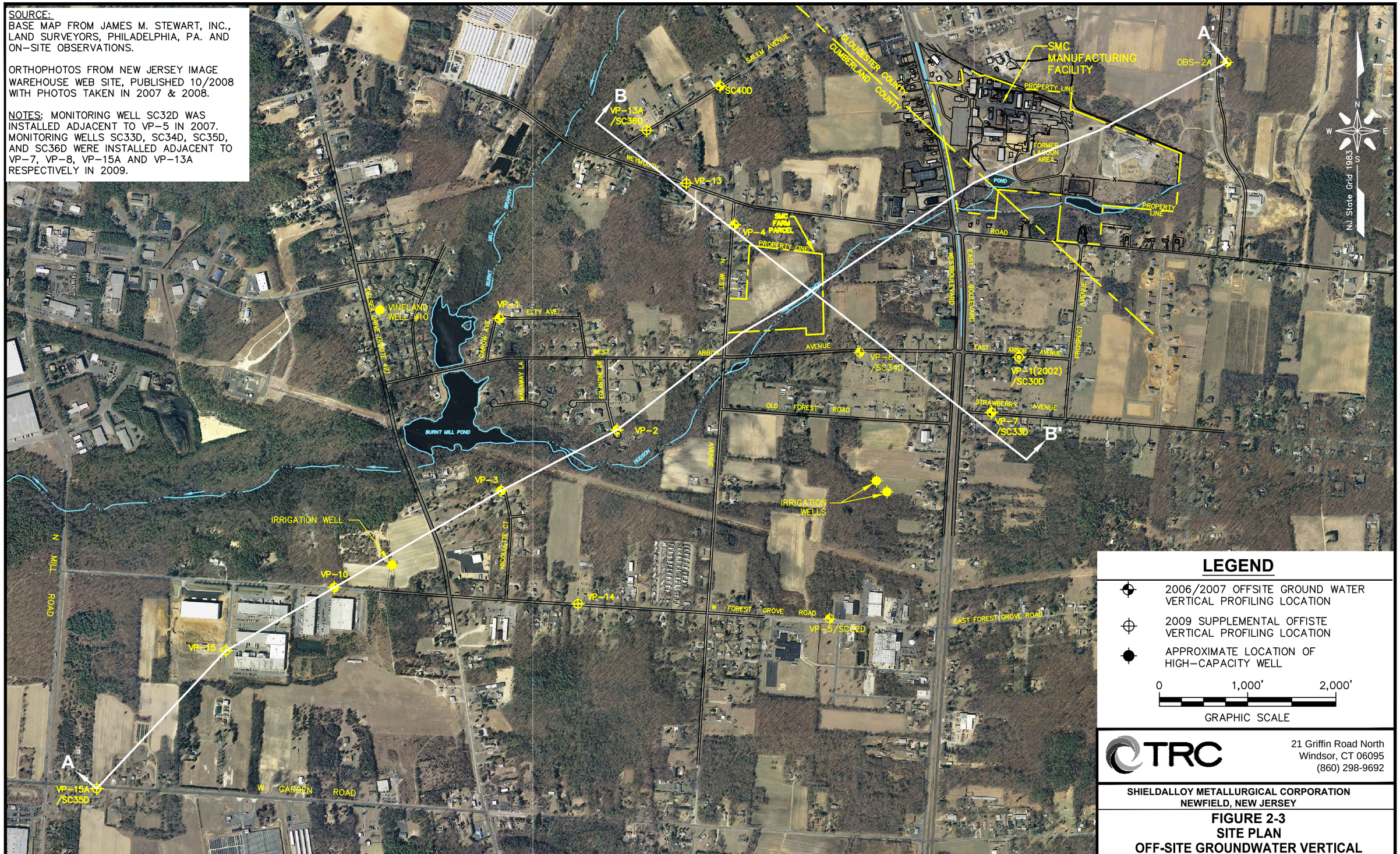
Date: 06/20/11 | **Project No.** 177208-000050-000000

J:\CAD\177208\000050\
Plate-1.dwg Layout:FIGURE 2-2 June 21, 2011-3:13PM Raloma

SOURCE:
BASE MAP FROM JAMES M. STEWART, INC., LAND SURVEYORS, PHILADELPHIA, PA. AND ON-SITE OBSERVATIONS.

ORTHOPHOTOS FROM NEW JERSEY IMAGE WAREHOUSE WEB SITE, PUBLISHED 10/2008 WITH PHOTOS TAKEN IN 2007 & 2008.

NOTES: MONITORING WELL SC32D WAS INSTALLED ADJACENT TO VP-5 IN 2007. MONITORING WELLS SC33D, SC34D, SC35D, AND SC36D WERE INSTALLED ADJACENT TO VP-7, VP-8, VP-15A AND VP-13A RESPECTIVELY IN 2009.



LEGEND

- 2006/2007 OFFSITE GROUND WATER VERTICAL PROFILING LOCATION
- 2009 SUPPLEMENTAL OFFISTE VERTICAL PROFILING LOCATION
- APPROXIMATE LOCATION OF HIGH-CAPACITY WELL

0 1,000' 2,000'

GRAPHIC SCALE

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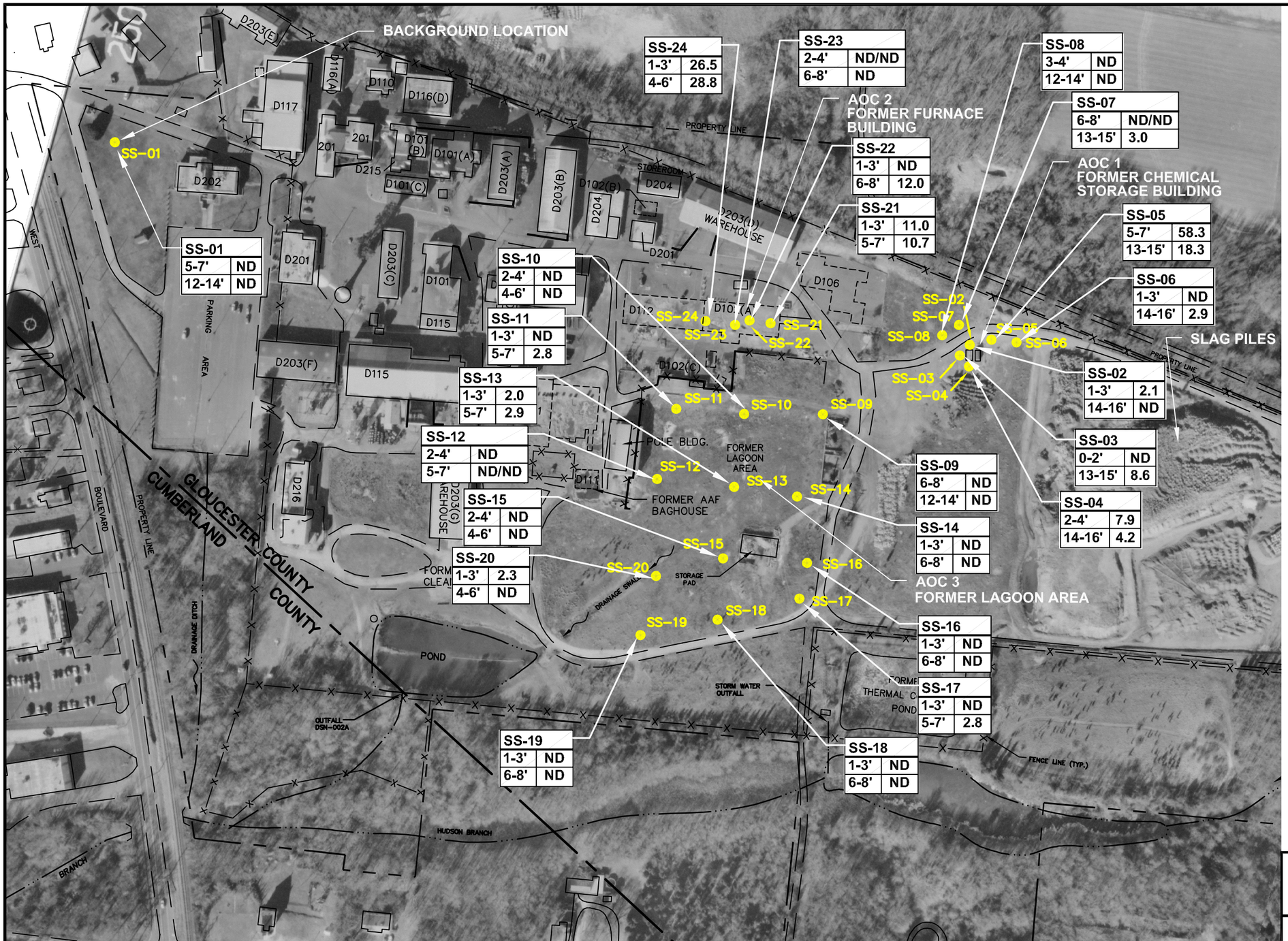
FIGURE 2-3
SITE PLAN
OFF-SITE GROUNDWATER VERTICAL PROFILES AND WELLS

Date: 06/20/11 | Project No. 177208-000050-000000

J:\CAD\177208\000050\
Plate-2.dwg Layout:FIGURE 2-3 June 22, 2011-10:17AM Raloma



KEY

INDICATES DEMOLISHED STRUCTURE

SOIL SAMPLING LOCATION

SS-11	
1-3'	ND
5-7'	2.8

SOIL SAMPLE IDENTIFICATION

PERCHLORATE CONCENTRATION (µg/kg)

SAMPLE DEPTH

ND/ND – RESULTS SEPARATED BY A FORWARD SLASH INDICATES DUPLICATE SAMPLE RESULTS

ND = NON–DETECT

NOTE:
EPA REGIONAL SCREENING LEVEL FOR PERCHLORATE IN RESIDENTIAL SOIL IS 55,000 µg/kg AND 720,000 µg/kg IN INDUSTRIAL SOIL.

N W E S

NJ State Grid 1983

0 200' 400'

GRAPHIC SCALE

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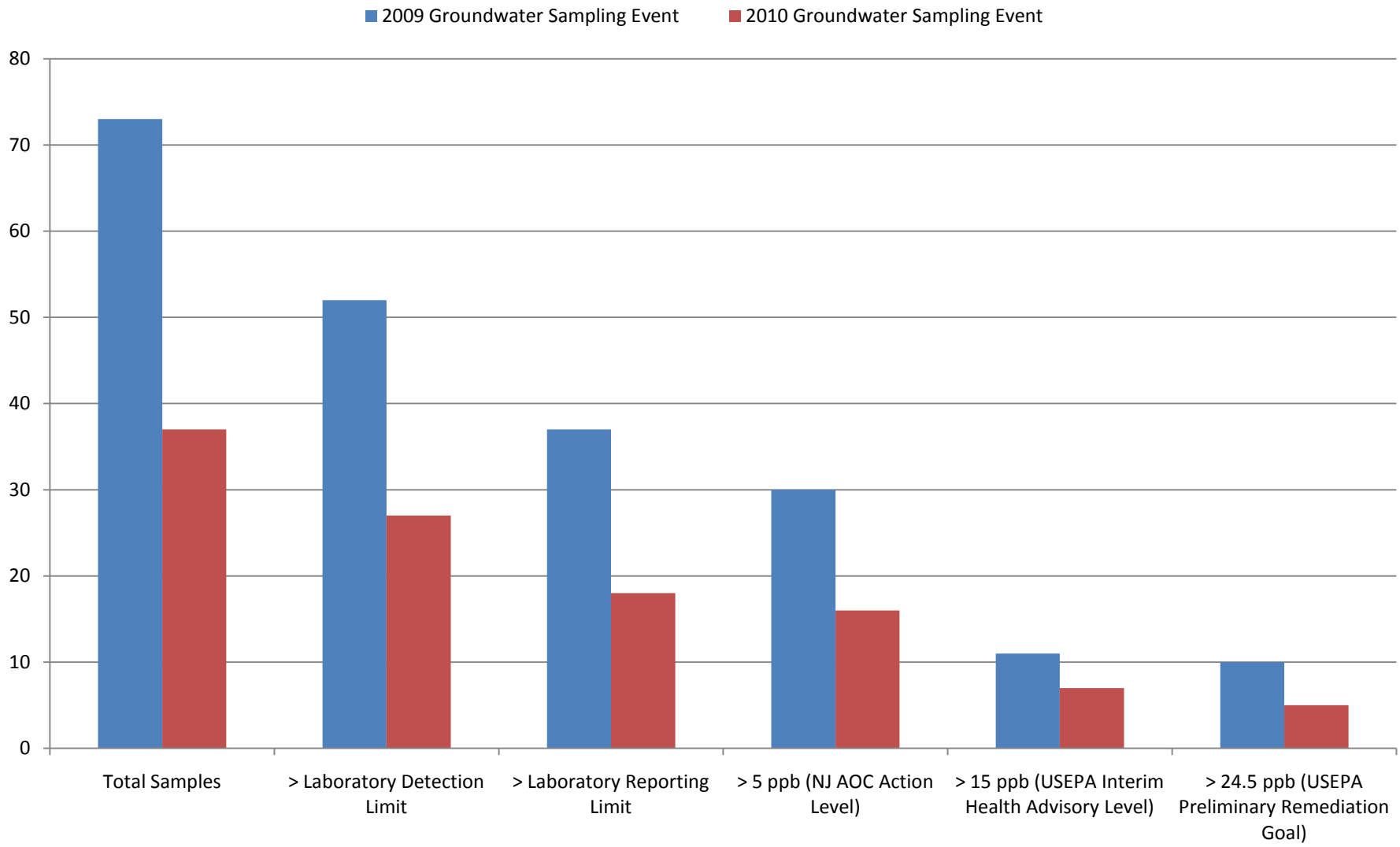
SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY

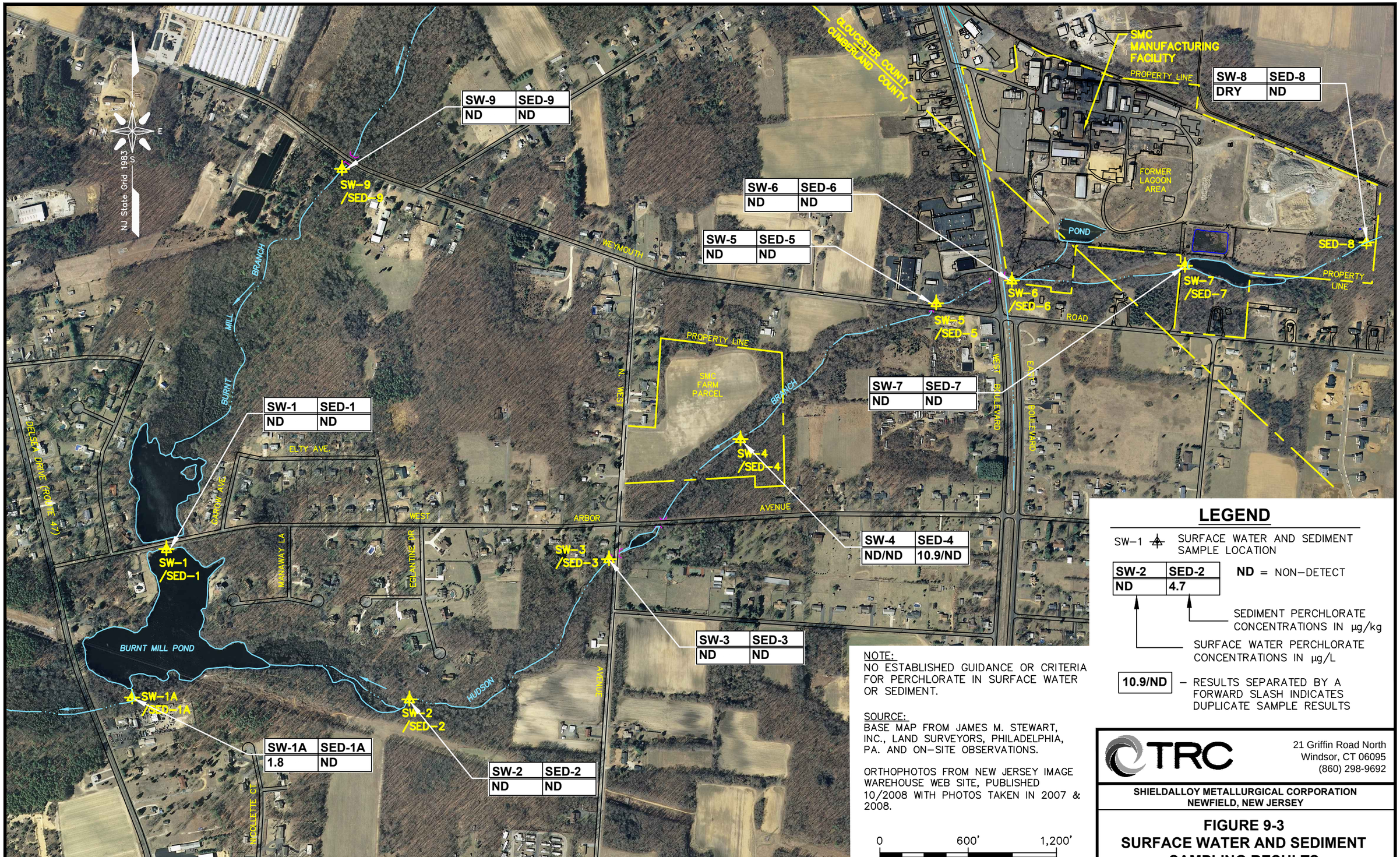
FIGURE 9-1
SOIL SAMPLING RESULTS

Date: 03/11/10 | Project No. 171441–000050–000000

J:\CAD\171441\000050\Remedial Inv Report\
Plate–2.dwg Layout:FIGURE 9–1 March 15, 2010–1:16PM Khollenbeck

Figure 9-2
2009 and 2010 Groundwater Sampling Events
Distribution of Detected Perchlorate Concentrations





LEGEND

SW-1 — SURFACE WATER AND SEDIMENT SAMPLE LOCATION

SW-2	SED-2
ND	4.7

ND = NON-DETECT

SEDIMENT PERCHLORATE CONCENTRATIONS IN µg/kg

SURFACE WATER PERCHLORATE CONCENTRATIONS IN µg/L

10.9/ND – RESULTS SEPARATED BY A FORWARD SLASH INDICATES DUPLICATE SAMPLE RESULTS

NOTE:
NO ESTABLISHED GUIDANCE OR CRITERIA FOR PERCHLORATE IN SURFACE WATER OR SEDIMENT.

SOURCE:
BASE MAP FROM JAMES M. STEWART, INC., LAND SURVEYORS, PHILADELPHIA, PA. AND ON-SITE OBSERVATIONS.

ORTHOPHOTOS FROM NEW JERSEY IMAGE WAREHOUSE WEB SITE, PUBLISHED 10/2008 WITH PHOTOS TAKEN IN 2007 & 2008.

0 600' 1,200'
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FIGURE 9-3
SURFACE WATER AND SEDIMENT SAMPLING RESULTS

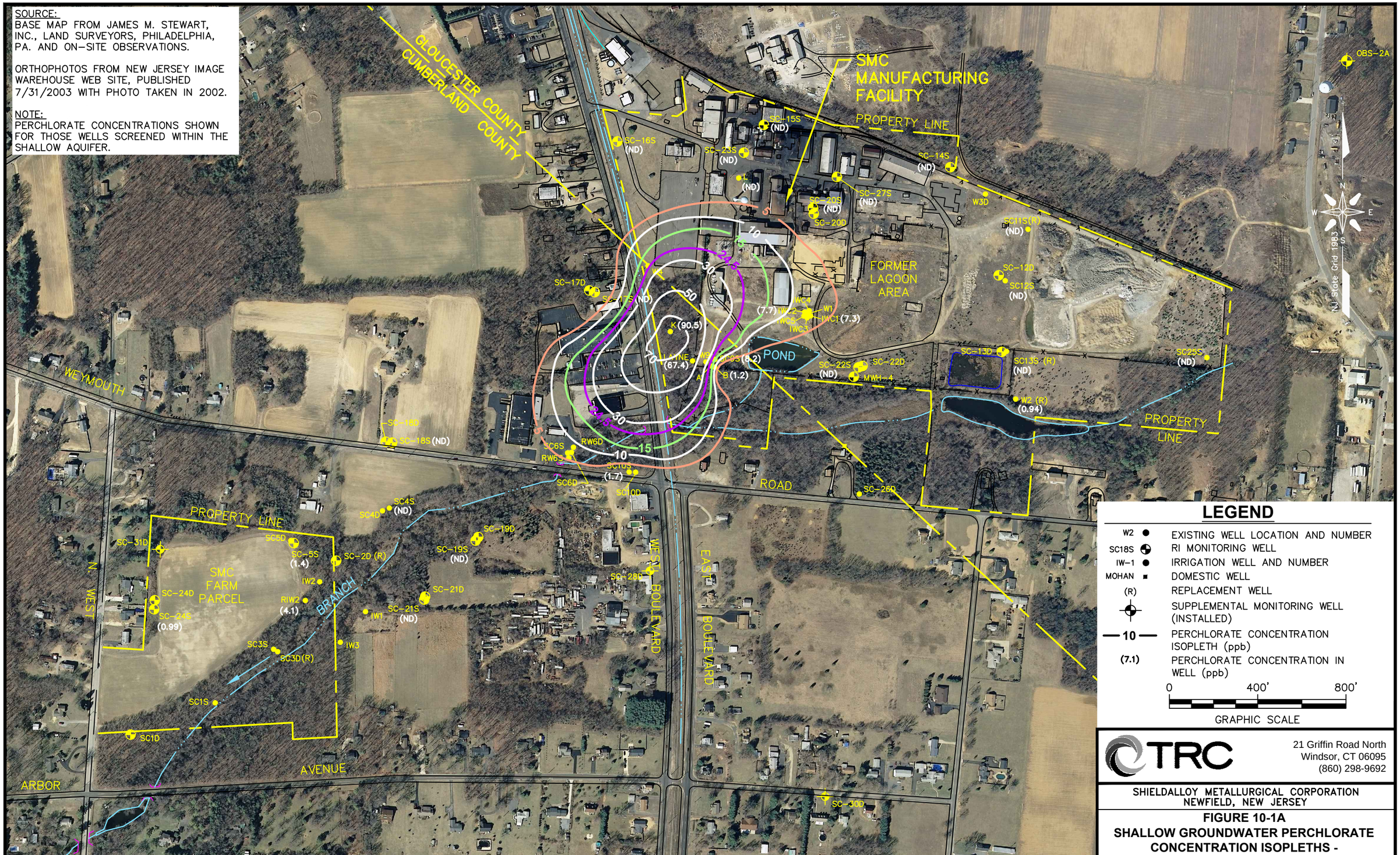
Date: 03/11/10 | Project No. 171441-000050-000000

J:\CAD\171441\000050\Remedial Inv Report\
Plate-1.dwg Layout:FIGURE 9-3 November 19, 2010-1:36PM KHollenbeck

SOURCE:
BASE MAP FROM JAMES M. STEWART, INC., LAND SURVEYORS, PHILADELPHIA, PA. AND ON-SITE OBSERVATIONS.

ORTHOPHOTOS FROM NEW JERSEY IMAGE WAREHOUSE WEB SITE, PUBLISHED 7/31/2003 WITH PHOTO TAKEN IN 2002.

NOTE:
PERCHLORATE CONCENTRATIONS SHOWN FOR THOSE WELLS SCREENED WITHIN THE SHALLOW AQUIFER.



LEGEND

W2 ●	EXISTING WELL LOCATION AND NUMBER
SC18S	RI MONITORING WELL
IW-1 ●	IRRIGATION WELL AND NUMBER
MOHAN ■	DOMESTIC WELL
(R)	REPLACEMENT WELL
⊕	SUPPLEMENTAL MONITORING WELL (INSTALLED)
— 10 —	PERCHLORATE CONCENTRATION ISOPLETH (ppb)
(7.1)	PERCHLORATE CONCENTRATION IN WELL (ppb)

0 400' 800'
GRAPHIC SCALE

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SHIELDALLOY METALLURGICAL CORPORATION
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FIGURE 10-1A
SHALLOW GROUNDWATER PERCHLORATE CONCENTRATION ISOPLETHS - SMC SITE AND FARM PARCEL

Date: 11/18/10 | Project No. 171441-000050-000000

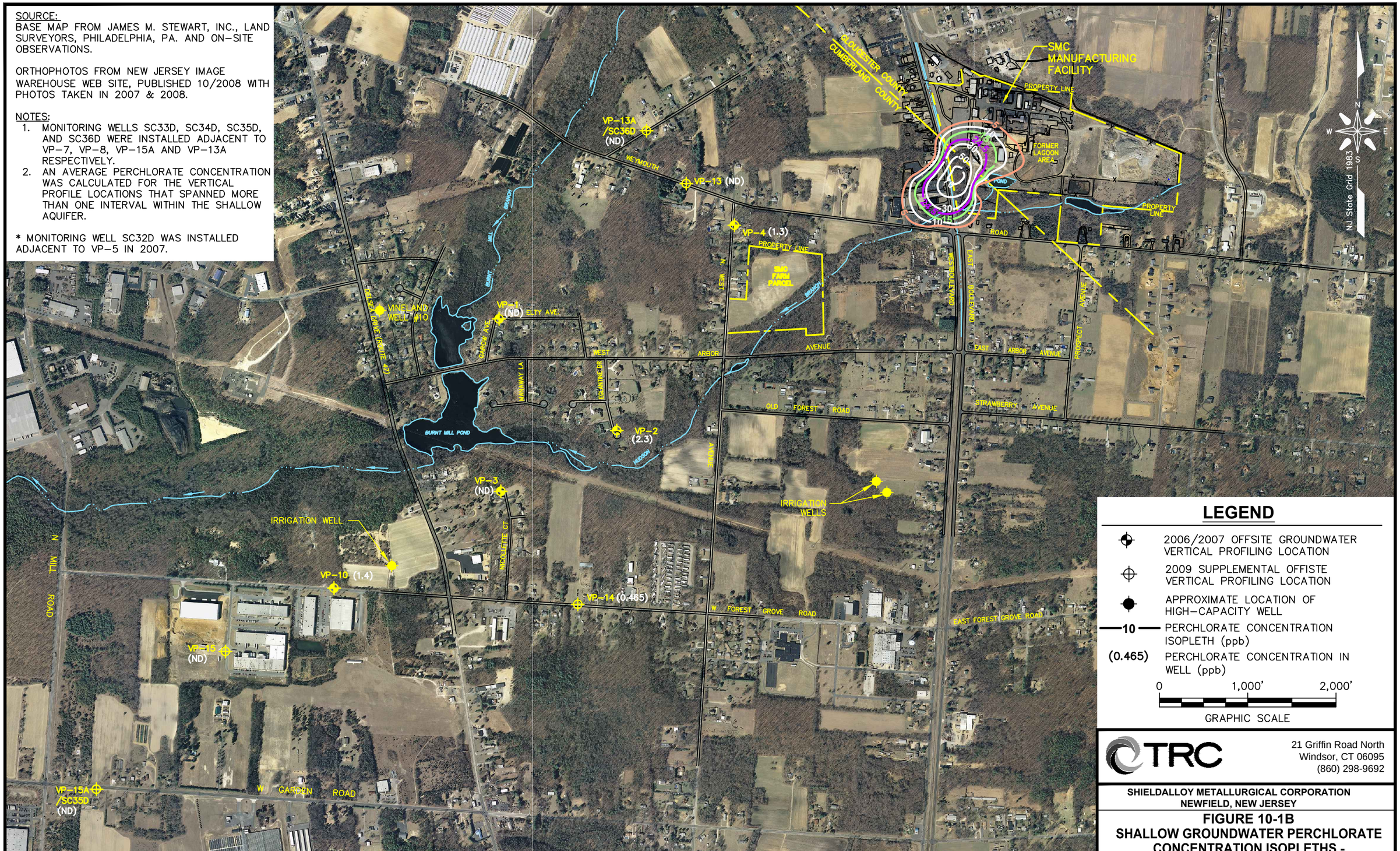
J:\CAD\171441\000050\Remedial Inv Report\
Plate-1.dwg Layout:FIGURE 10-1A November 19, 2010-1:32PM KHollenbeck

SOURCE:
BASE MAP FROM JAMES M. STEWART, INC., LAND SURVEYORS, PHILADELPHIA, PA. AND ON-SITE OBSERVATIONS.

ORTHOPHOTOS FROM NEW JERSEY IMAGE WAREHOUSE WEB SITE, PUBLISHED 10/2008 WITH PHOTOS TAKEN IN 2007 & 2008.

NOTES:
1. MONITORING WELLS SC33D, SC34D, SC35D, AND SC36D WERE INSTALLED ADJACENT TO VP-7, VP-8, VP-15A AND VP-13A RESPECTIVELY.
2. AN AVERAGE PERCHLORATE CONCENTRATION WAS CALCULATED FOR THE VERTICAL PROFILE LOCATIONS THAT SPANNED MORE THAN ONE INTERVAL WITHIN THE SHALLOW AQUIFER.

* MONITORING WELL SC32D WAS INSTALLED ADJACENT TO VP-5 IN 2007.



LEGEND

- 2006/2007 OFFSITE GROUNDWATER VERTICAL PROFILING LOCATION
- 2009 SUPPLEMENTAL OFFISTE VERTICAL PROFILING LOCATION
- APPROXIMATE LOCATION OF HIGH-CAPACITY WELL
- —10— PERCHLORATE CONCENTRATION ISOPLETH (ppb)
- (0.465) PERCHLORATE CONCENTRATION IN WELL (ppb)

0 1,000' 2,000'
GRAPHIC SCALE

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NEWFIELD, NEW JERSEY

FIGURE 10-1B
SHALLOW GROUNDWATER PERCHLORATE CONCENTRATION ISOPLETHS - REGIONAL SCALE

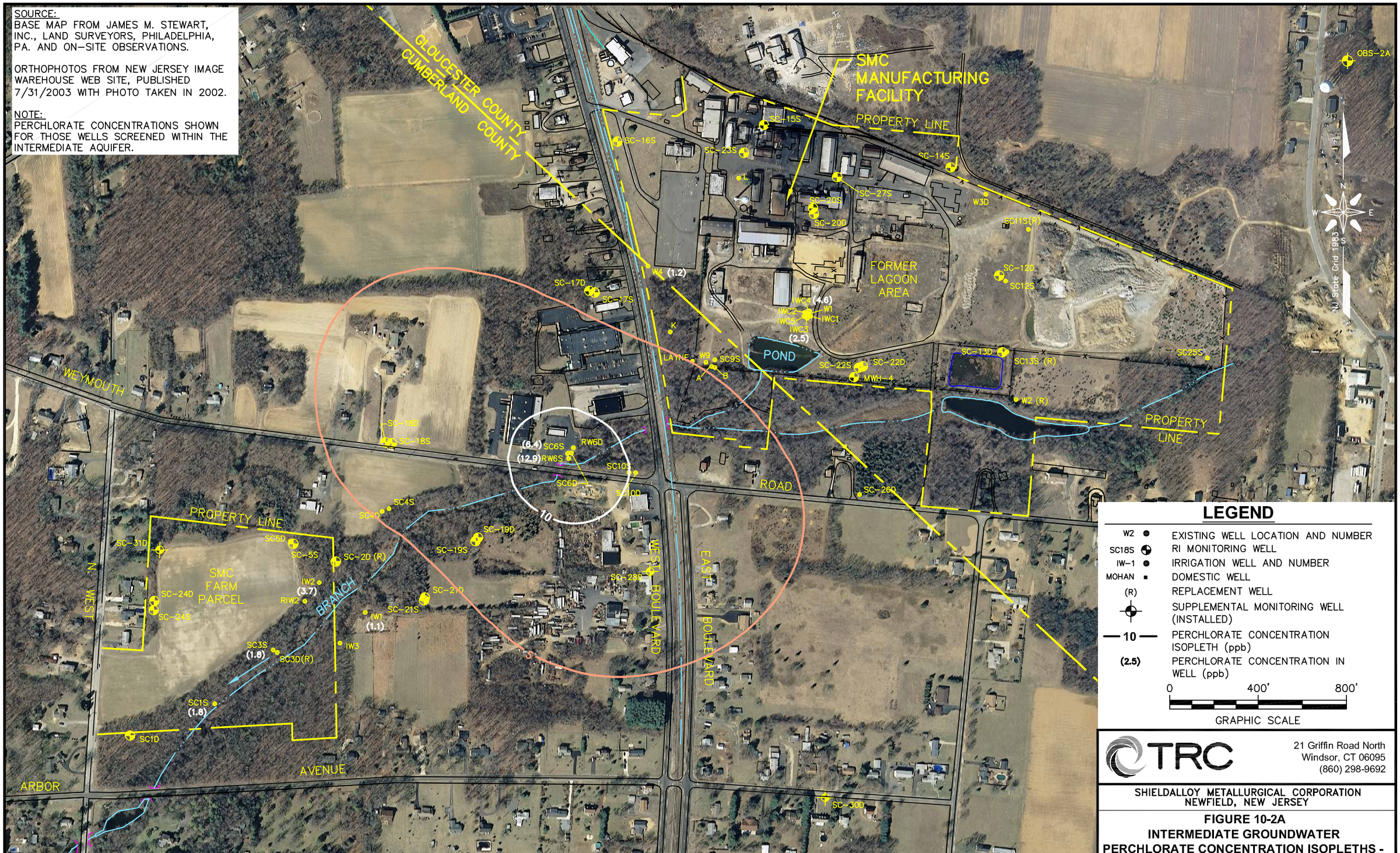
Date: 11/18/10 | Project No. 171441-000050-000000

J:\CAD\171441\000050\Remedial Inv Report\
Plate-4.dwg Layout:FIGURE 10-1B November 19, 2010-1:40PM KHollenbeck

SOURCE:
BASE MAP FROM JAMES M. STEWART, INC., LAND SURVEYORS, PHILADELPHIA, PA. AND ON-SITE OBSERVATIONS.

ORTHOPHOTOS FROM NEW JERSEY IMAGE WAREHOUSE WEB SITE, PUBLISHED 7/31/2003 WITH PHOTO TAKEN IN 2002.

NOTE:
PERCHLORATE CONCENTRATIONS SHOWN FOR THOSE WELLS SCREENED WITHIN THE INTERMEDIATE AQUIFER.



LEGEND

W2 ●	EXISTING WELL LOCATION AND NUMBER
SC18S	RI MONITORING WELL
IW-1 ●	IRRIGATION WELL AND NUMBER
MOHAN ▪	DOMESTIC WELL
(R)	REPLACEMENT WELL
⊕	SUPPLEMENTAL MONITORING WELL (INSTALLED)
— 10 —	PERCHLORATE CONCENTRATION ISOPLETH (ppb)
(2.5)	PERCHLORATE CONCENTRATION IN WELL (ppb)

0 400' 800'

GRAPHIC SCALE

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SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY

FIGURE 10-2A
INTERMEDIATE GROUNDWATER PERCHLORATE CONCENTRATION ISOPLETHS - SMC SITE AND FARM PARCEL

Date: 03/11/10 | Project No. 171441-000050-000000

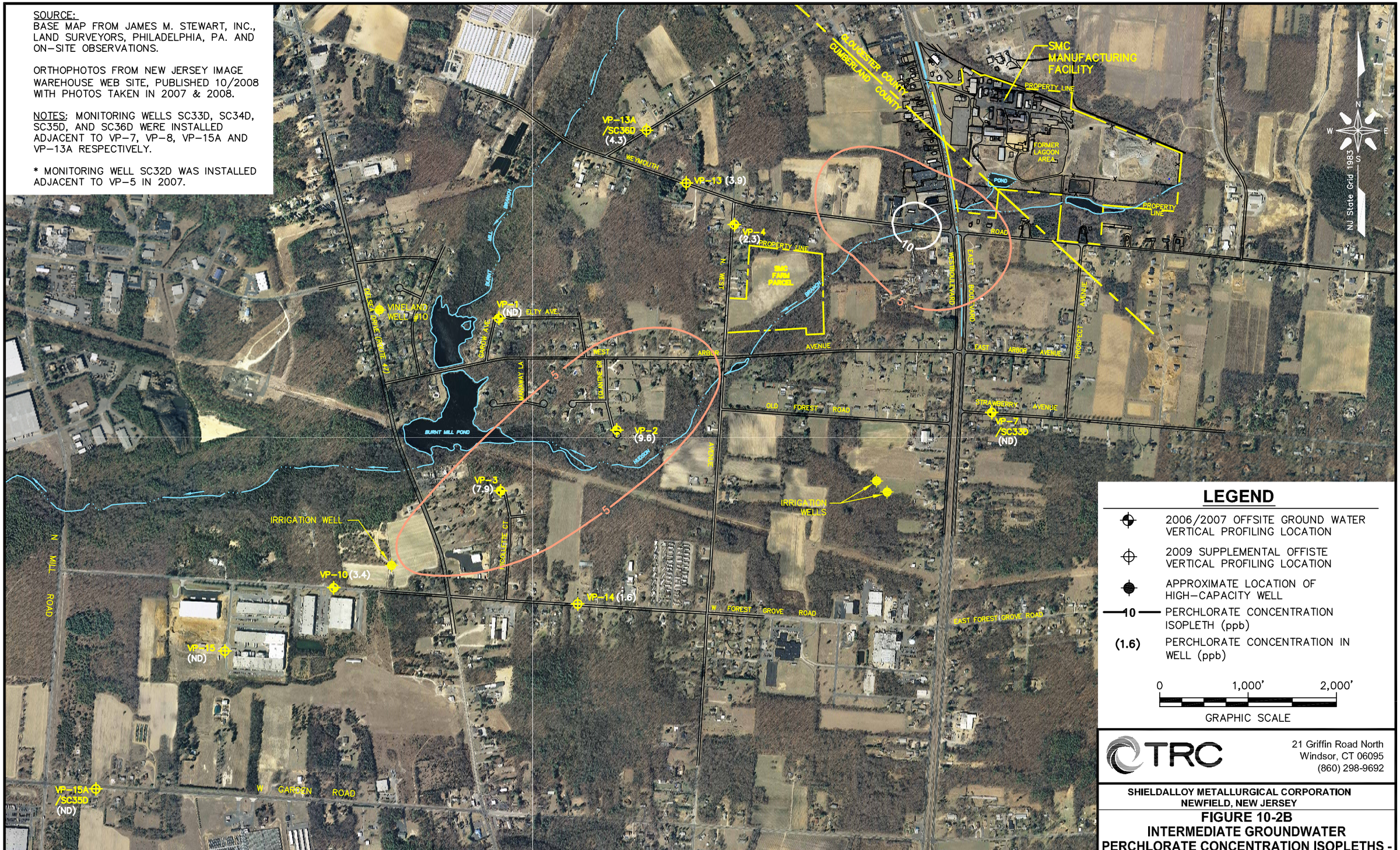
J:\CAD\171441\000050\Remedial Inv Report\
Plate-1.dwg Layout:FIGURE 10-2A March 15, 2010-10:27AM KHollenbeck

SOURCE:
BASE MAP FROM JAMES M. STEWART, INC., LAND SURVEYORS, PHILADELPHIA, PA. AND ON-SITE OBSERVATIONS.

ORTHOPHOTOS FROM NEW JERSEY IMAGE WAREHOUSE WEB SITE, PUBLISHED 10/2008 WITH PHOTOS TAKEN IN 2007 & 2008.

NOTES: MONITORING WELLS SC33D, SC34D, SC35D, AND SC36D WERE INSTALLED ADJACENT TO VP-7, VP-8, VP-15A AND VP-13A RESPECTIVELY.

* MONITORING WELL SC32D WAS INSTALLED ADJACENT TO VP-5 IN 2007.



LEGEND

- 2006/2007 OFFSITE GROUND WATER VERTICAL PROFILING LOCATION
- 2009 SUPPLEMENTAL OFFISTE VERTICAL PROFILING LOCATION
- APPROXIMATE LOCATION OF HIGH-CAPACITY WELL
- —10— PERCHLORATE CONCENTRATION ISOPLETH (ppb)
- (1.6) PERCHLORATE CONCENTRATION IN WELL (ppb)

0 1,000' 2,000'
GRAPHIC SCALE

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FIGURE 10-2B
INTERMEDIATE GROUNDWATER PERCHLORATE CONCENTRATION ISOPLETHS - REGIONAL SCALE

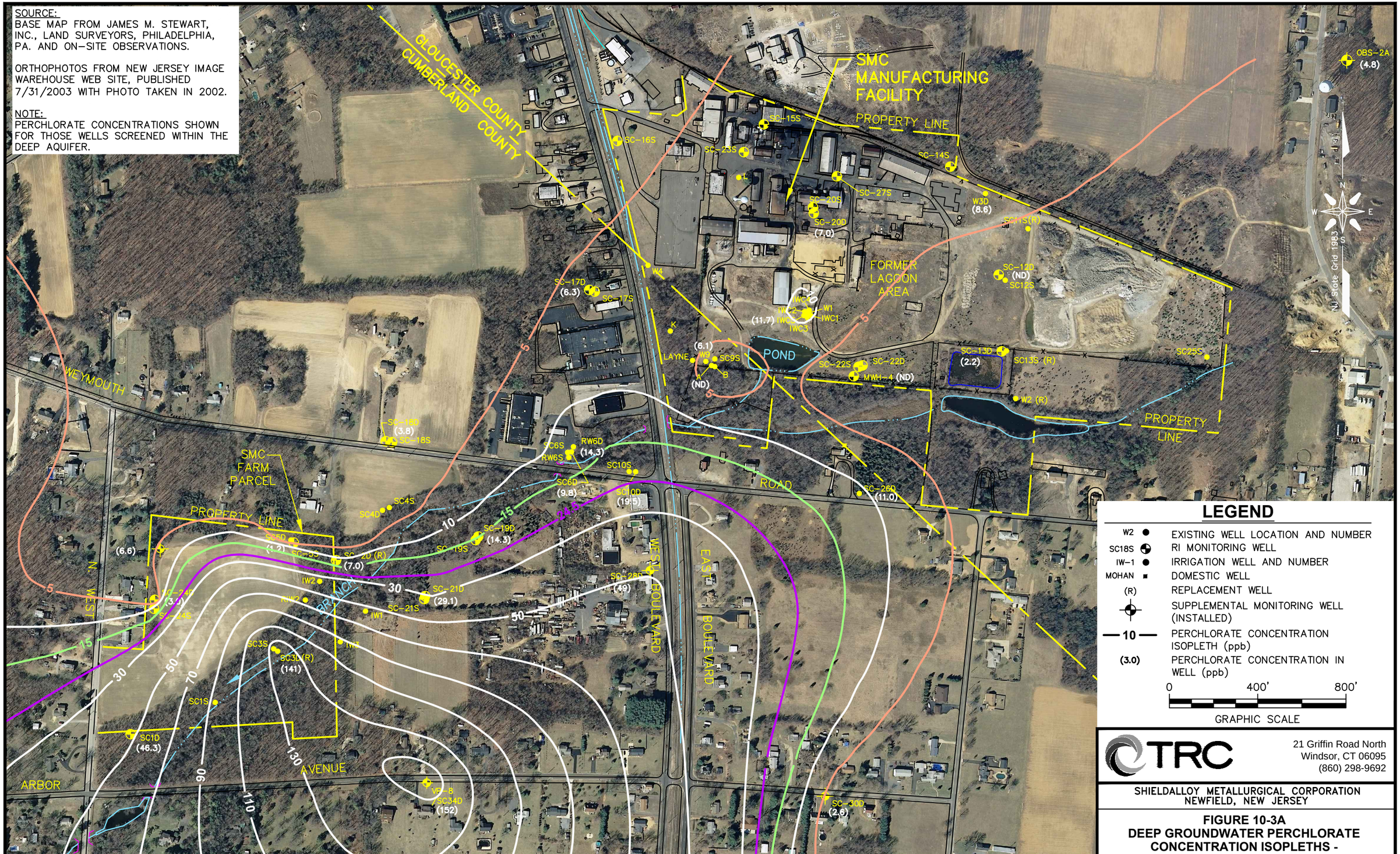
Date: 03/11/10 | Project No. 171441-000050-000000

J:\CAD\171441\000050\Remedial Inv Report\
Plate-4.dwg Layout:FIGURE 10-2B March 15, 2010-10:15AM KHollenbeck

SOURCE:
BASE MAP FROM JAMES M. STEWART, INC., LAND SURVEYORS, PHILADELPHIA, PA. AND ON-SITE OBSERVATIONS.

ORTHOPHOTOS FROM NEW JERSEY IMAGE WAREHOUSE WEB SITE, PUBLISHED 7/31/2003 WITH PHOTO TAKEN IN 2002.

NOTE:
PERCHLORATE CONCENTRATIONS SHOWN FOR THOSE WELLS SCREENED WITHIN THE DEEP AQUIFER.



LEGEND

W2 ●	EXISTING WELL LOCATION AND NUMBER
SC18S ⊕	RI MONITORING WELL
IW-1 ●	IRRIGATION WELL AND NUMBER
MOHAN ■	DOMESTIC WELL
(R)	REPLACEMENT WELL
⊕	SUPPLEMENTAL MONITORING WELL (INSTALLED)
— 10 —	PERCHLORATE CONCENTRATION ISOPLETH (ppb)
(3.0)	PERCHLORATE CONCENTRATION IN WELL (ppb)

0 400' 800'
GRAPHIC SCALE

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FIGURE 10-3A
DEEP GROUNDWATER PERCHLORATE CONCENTRATION ISOPLETHS - SMC SITE AND FARM PARCEL

Date: 06/20/11 | Project No. 177208-000050-000000

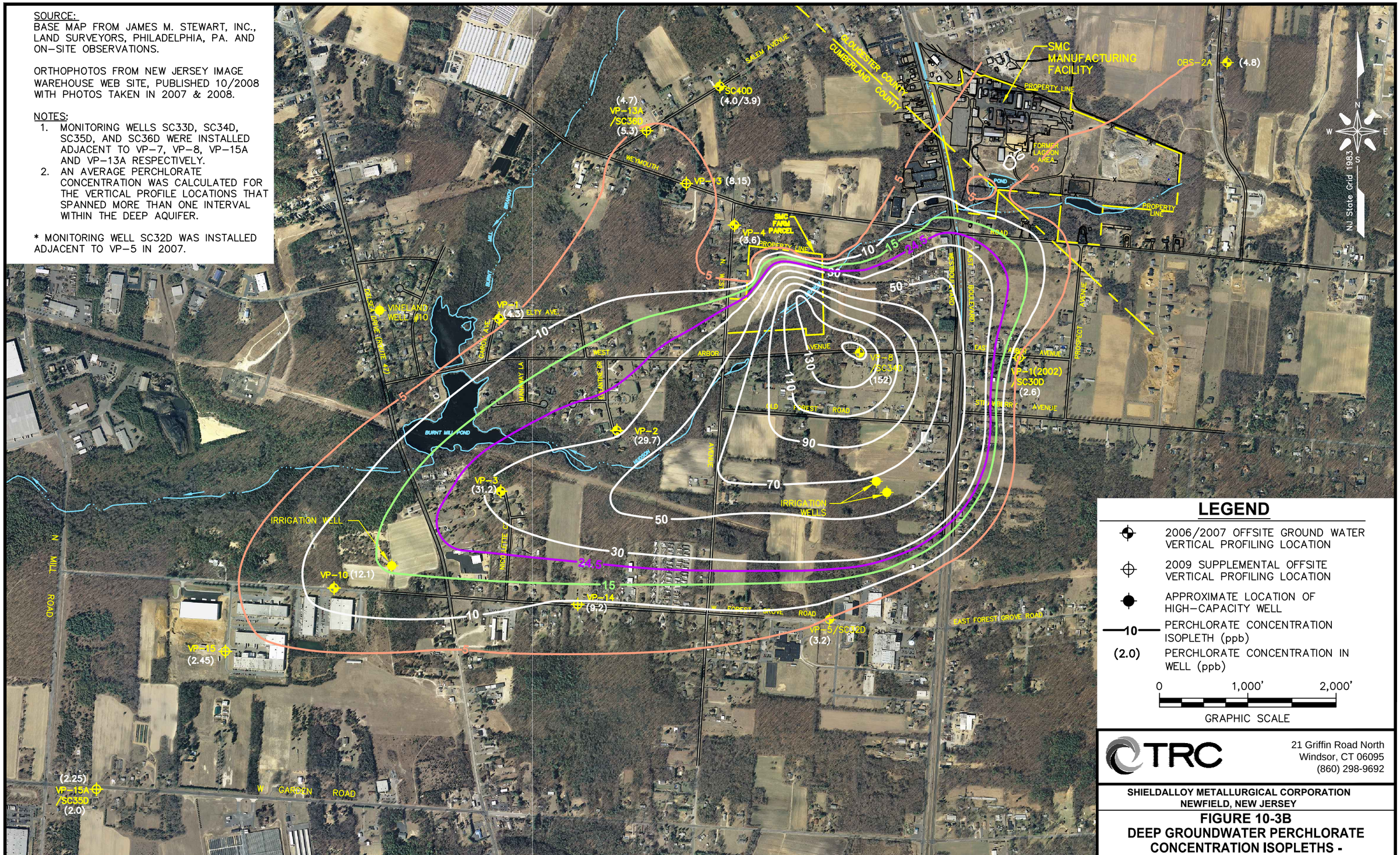
J:\CAD\177208\000050\
Plate-1.dwg Layout:FIGURE 10-3A June 21, 2011-3:16PM Raloma

SOURCE:
BASE MAP FROM JAMES M. STEWART, INC., LAND SURVEYORS, PHILADELPHIA, PA. AND ON-SITE OBSERVATIONS.

ORTHOPHOTOS FROM NEW JERSEY IMAGE WAREHOUSE WEB SITE, PUBLISHED 10/2008 WITH PHOTOS TAKEN IN 2007 & 2008.

NOTES:
1. MONITORING WELLS SC33D, SC34D, SC35D, AND SC36D WERE INSTALLED ADJACENT TO VP-7, VP-8, VP-15A AND VP-13A RESPECTIVELY.
2. AN AVERAGE PERCHLORATE CONCENTRATION WAS CALCULATED FOR THE VERTICAL PROFILE LOCATIONS THAT SPANNED MORE THAN ONE INTERVAL WITHIN THE DEEP AQUIFER.

* MONITORING WELL SC32D WAS INSTALLED ADJACENT TO VP-5 IN 2007.



LEGEND

⊕	2006/2007 OFFSITE GROUND WATER VERTICAL PROFILING LOCATION
⊕	2009 SUPPLEMENTAL OFFSITE VERTICAL PROFILING LOCATION
●	APPROXIMATE LOCATION OF HIGH-CAPACITY WELL
—10—	PERCHLORATE CONCENTRATION ISOPLETH (ppb)
(2.0)	PERCHLORATE CONCENTRATION IN WELL (ppb)

0 1,000' 2,000'
GRAPHIC SCALE

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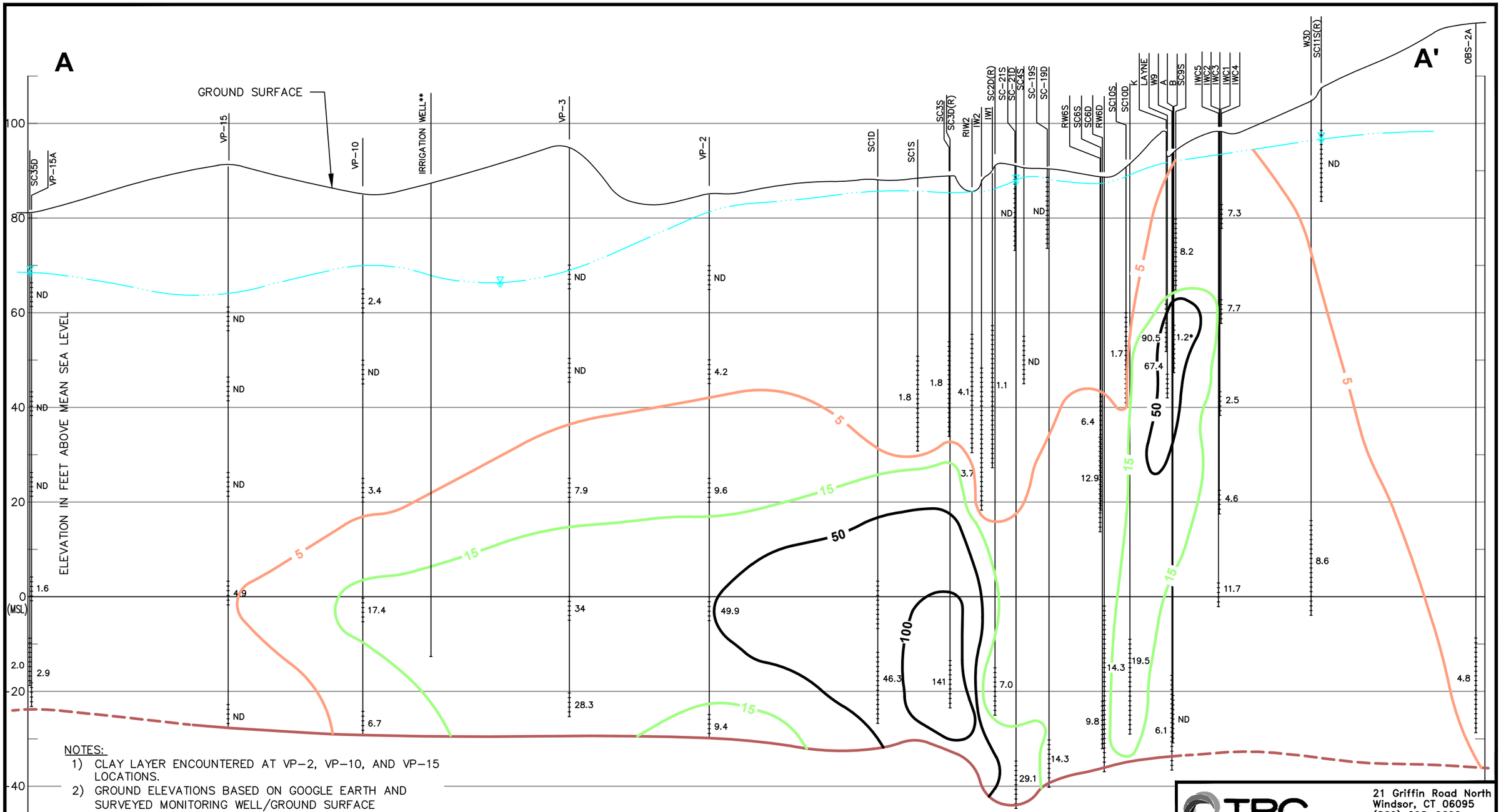
FIGURE 10-3B
DEEP GROUNDWATER PERCHLORATE CONCENTRATION ISOPLETHS - REGIONAL SCALE

Date: 06/20/11 | Project No. 177208-000050-000000

J:\CAD\177208\000050\
Plate-2.dwg Layout:FIGURE 10-3B June 21, 2011-3:18PM Raloma



NOTES:

1) CLAY LAYER ENCOUNTERED AT VP-2, VP-10, AND VP-15 LOCATIONS.
2) GROUND ELEVATIONS BASED ON GOOGLE EARTH AND SURVEYED MONITORING WELL/GROUND SURFACE ELEVATIONS. VERTICAL DATUM IS NGVD 1929.
3) PERMANENT MONITORING WELL INSTALLED AT VP-8 (SC34D) AND VP-15A (SC35D) IN 2009.
4) *=PERCHLORATE RESULT OF 1.2 µg/L AT WELL B NOT USED IN DRAFTING PERCHLORATE ISOPLETHS.
5) **=IRRIGATION WELL REPORTED TO BE APPROXIMATELY 100 FEET DEEP. SCREEN INTERVAL UNKNOWN.

LEGEND

‡	GROUNDWATER SAMPLE INTERVAL
17.7	PERCHLORATE CONCENTRATION (µg/L)
ND	NOT DETECTED
	APPROXIMATE TOP OF CONFINING CLAY LAYER (DASHED WHERE INFERRED)
	APPROXIMATE WATER TABLE DEPTH
—50—	PERCHLORATE ISOPLETH (µg/L)

0 1,000' 2,000'
HORIZONTAL GRAPHIC SCALE

0 20' 40'
VERTICAL GRAPHIC SCALE
VERTICAL EXAGGERATION = 50X

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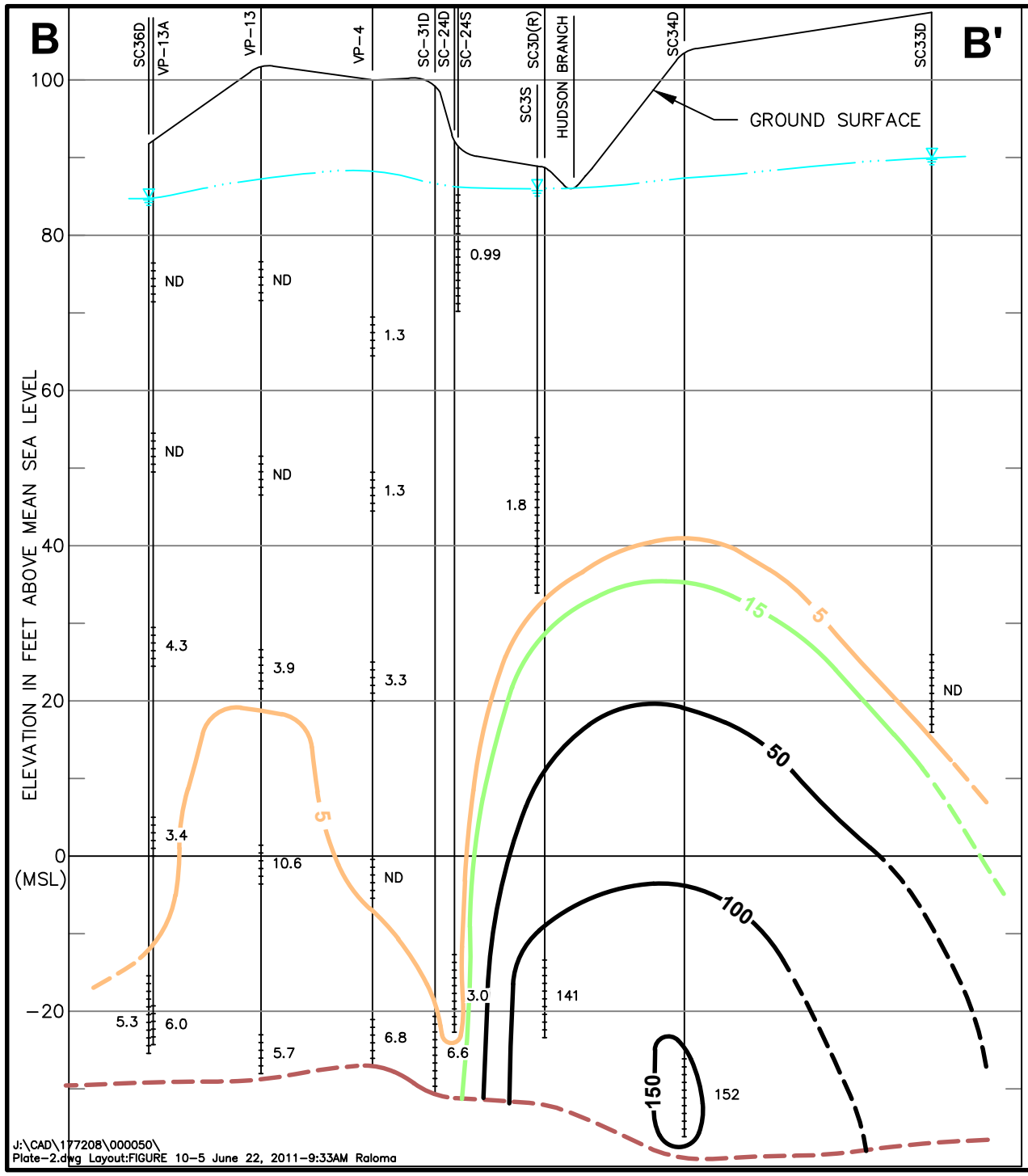
FIGURE 10-4
VERTICAL PROFILING CROSS SECTION (SC35D TO OBS-2A)
PERCHLORATE CONCENTRATION

Date: 03/11/10 | Project No. 171441-000050-000000

J:\CAD\177208\000050\
Plate-2.dwg Layout:FIGURE 10-4 June 22, 2011-9:29AM Raloma



LEGEND

- APPROXIMATE TOP OF CONFINING CLAY LAYER (DASHED WHERE INFERRED)
- APPROXIMATE WATER TABLE DEPTH
- 50 — PERCHLORATE ISOPLETH (µg/L) (DASHED WHERE INFERRED)
- GROUNDWATER SAMPLE INTERVAL
- 17.7 — PERCHLORATE CONCENTRATION (µg/L)
- ND — NOT DETECTED

NOTES:

1) CLAY LAYER ENCOUNTERED AT VP-4 AND SC31D LOCATIONS.
2) GROUND ELEVATIONS BASED ON GOOGLE EARTH AND SURVEYED MONITORING WELL/GROUND SURFACE ELEVATIONS. VERTICAL DATUM IS NGVD 1929.
3) PERMANENT MONITORING WELLS INSTALLED AT VP-7 (SC33D) AND VP-8 (SC34D) IN 2009.

0 1,000' 2,000'

HORIZONTAL GRAPHIC SCALE

0 20' 40'

VERTICAL GRAPHIC SCALE

VERTICAL EXAGGERATION = 50X

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FIGURE 10-5
VERTICAL PROFILING CROSS SECTION (SC36D TO SC33D)
PERCHLORATE CONCENTRATION

Date: 03/11/10	Project No. 171441-000050-000000

APPENDIX A

RELEVANT BORING LOGS AND MONITORING WELL CONSTRUCTION DIAGRAMS

Dan Raviv Associates, Inc.

588 Eagle Rock Avenue, West Orange, New Jersey 07052

FIELD LOG OF Monitoring WELL NO. SC1D

Project	Boring Location	Elevation in Datum	Project No.	Date Started	Date Finished
Shieldalloy	Newfield, N.J.	91.03' asl t.o.c.	83C152	5/29/84	5/30/84

Drilling Company	Driller	Drilling Equipment	Drill Method
Vance Skinner Drilling Co., Inc.	Dana Lewis	Gardner-Denver 10R	Mud Rotary

Completion Depth	Number of Samples	Size and Type of Casing	Water Elevation
125' drilled 115' cased	26	2" I.D. PVC 0-85/95-100 blank 85-95/100-115 screen	6/9/84 84.90' asl

Bit	Core Barrel Type	Length	Sampler Hammer	Weight	Drop	Logged By	Checked By
5" Drag	-	-	-	-	-	RNH	-

Casing Stickup = 3.00'.

Depth Feet	Description	Well Data	Remarks
0	SAND 80% SAND; FINE TO COARSE, MOSTLY MEDIUM TO COARSE; QUARTZ; OVERALL COLOR IS ORANGE, GRAINS ARE CLEAR TO GREY, ORANGE; SUBROUNDED TO ROUNDED; BLOCKY. 15% GRAVEL; FINE; QTZ; OVERALL COLOR IS ORANGE, GRAINS ARE CLEAR, ORANGE; SUBROUNDED TO ROUNDED; BLOCKY TO TABULAR. 5% CLAY; SOFT; PLASTIC; ORANGE.	Cement Grout 2-inch I.D. blank PVC casing	COMPOSITE SAMPLES OVER 5-FOOT INTERVALS.
5	SANDY GRAVEL 55% GRAVEL; FINE; QTZ.; OVERALL COLOR IS TANNISH ORANGE; GRAINS ARE CLEAR TO GREY, ORANGE; SUBANGULAR TO ROUNDED; BLOCKY. 25% SAND; FINE TO COARSE, MOSTLY MED. TO COARSE; QTZ.; OVERALL COLOR IS ORANGISH TAN, GRAINS ARE CLEAR TO GREY, ORANGE, WHITE; SUBANGULAR TO ROUNDED. 20% CLAY; SOFT; PLASTIC; PALE TANNISH ORANGE.		
10	CLAYEY GRAVEL 55% GRAVEL - SIMILAR TO ABOVE. 30% CLAY; SOFT TO FAIRLY STIFF; PLASTIC; ORANGE. 15% SAND - SIMILAR TO ABOVE.		

Project No. 83C152

FIELD LOG OF Mon. WELL NO. SC1D

Depth Feet	Description	Well Data	Remarks
	CLAYEY GRAVEL DESCRIPTION ON PRECEDING PAGE.	Cement Grout 2-inch I.D. blank PVC casing	COMPOSITE SAMPLES OVER 5-FOOT INTERVALS.
15	GRAVELLY SAND 70% SAND; FINE TO VERY COARSE, MOSTLY MED. TO V. COARSE; QTZ.; OVERALL COLOR IS TAN, GRAINS ARE CLEAR TO GREY, WHITE, MINOR ORANGE; SUBANGULAR TO ROUNDED; BLOCKY. 25% GRAVEL; FINE; QTZ.; OVERALL COLOR IS ORANGISH TAN, GRAINS ARE CLEAR TO GREY, ORANGE, WHITE; SUBANGULAR TO ROUNDED; BLOCKY TO TABULAR. 5% CLAY; SOFT; PLASTIC; ORANGE.		← DRILLING RATE INDICATES A CLAY LAYER AT 15 FT.
	GRAVELLY SAND 70% SAND - SIMILAR TO ABOVE, EXCEPT DECREASING NUMBER OF ORANGE GRAINS. 25% GRAVEL - SIMILAR TO ABOVE, EXCEPT DECREASING NUMBER OF ORANGE GRAINS. 5% CLAY - SIMILAR TO ABOVE.		
25	GRAVELLY SAND 70% SAND - SIMILAR TO 15-20-FOOT INTERVAL, EXCEPT DECREASING NUMBER OF ORANGE GRAINS. 25% GRAVEL - SIMILAR TO 15-20-FOOT INTERVAL, EXCEPT DECREASING NUMBER OF ORANGE GRAINS. 5% CLAY - SIMILAR TO 15-20-FOOT INTERVAL.		
30	GRAVELLY SAND 70% SAND - SIMILAR TO 15-20-FOOT INTERVAL, EXCEPT DECREASING NUMBER OF ORANGE GRAINS. 25% GRAVEL - SIMILAR TO 15-20-FOOT INTERVAL, EXCEPT DECREASING NUMBER OF ORANGE GRAINS. 5% CLAY - SIMILAR TO 15-20-FOOT INTERVAL.		
35			

Project No. 83C152

FIELD LOG OF Mon. WELL NO. SC1D

Depth Feet	Description	Well Data	Remarks
35	**GRAVELLY SAND** 70% SAND - SIMILAR TO 15-20-FOOT INTERVAL, EXCEPT SOME YELLOW GRAINS AND INCREASING NUMBER OF ORANGE GRAINS. 25% GRAVEL - SIMILAR TO 15-20-FOOT INTERVAL, EXCEPT SOME YELLOW GRAINS & INCREASING NUMBER OF ORANGE GRAINS. 5% CLAY - SIMILAR TO 15-20-FOOT INTERVAL.	Cement Grout 2-inch I.D. blank PVC casing	COMPOSITE SAMPLES OVER 5-FOOT INTERVALS.
40	**SAND** 90% SAND; FINE TO COARSE, MOSTLY MED. TO COARSE; QTZ.; OVERALL COLOR IS TANNISH ORANGE, GRAINS ARE CLEAR TO GREY, WHITE, ORANGE; SUBANGULAR TO SUBROUNDED; BLOCKY TO TABULAR. 5% GRAVEL; VERY FINE; SIMILAR TO SAND. 5% CLAY; SOFT; PLASTIC; PALE ORANGE.		
45	**SAND** 80% SAND - SIMILAR TO ABOVE. 10% GRAVEL - SIMILAR TO ABOVE. 10% CLAY - SIMILAR TO ABOVE.		
50	**SAND** 80% SAND - SIMILAR TO 40-45-FOOT INTERVAL. 10% GRAVEL - SIMILAR TO 40-45-FOOT INTERVAL. 10% CLAY - SIMILAR TO 40-45 FOOT INTERVAL, EXCEPT SOME CLAY IS WHITE.		
55	**SAND** DESCRIPTION ON FOLLOWING PAGE.		

Project No. 83C152

FIELD LOG OF Mon. WELL NO. SC1D

Depth Feet	Description	Well Data	Remarks
	SAND 80% SAND - SIMILAR TO 40-45-FOOT INTERVAL, EXCEPT SAND IS SOMEWHAT COARSER. 10% GRAVEL - SIMILAR TO 40-45-FOOT INTERVAL. 10% CLAY - SIMILAR TO 40-45-FOOT INTERVAL.	Cement Grout	COMPOSITE SAMPLES OVER 5-FOOT INTERVALS.
60	SAND 80% SAND - SIMILAR TO 40-45-FOOT INTERVAL, EXCEPT SAND IS SOMEWHAT COARSER. 10% GRAVEL - SIMILAR TO 40-45-FOOT INTERVAL. 10% CLAY - SIMILAR TO 40-45-FOOT INTERVAL.	Bentonite Pellets	
65	SAND 80% SAND - SIMILAR TO 40-45-FOOT INTERVAL EXCEPT SAND IS SOMEWHAT COARSER. 10% GRAVEL - SIMILAR TO 40-45-FOOT INTERVAL. 10% CLAY - SIMILAR TO 40-45-FOOT INTERVAL.	2-inch I.D. blank PVC casing	
70	SAND 80% SAND - SIMILAR TO 40-45-FOOT INTERVAL. 10% GRAVEL - SIMILAR TO 40-45-FOOT INTERVAL. 10% CLAY - SIMILAR TO 40-45-FOOT INTERVAL, EXCEPT SOME WHITE CLAY.	Collapsed borehole material	
75	SAND 80% SAND - SIMILAR TO 40-45-FOOT INTERVAL, EXCEPT SAND IS SOMEWHAT COARSER. 10% GRAVEL - SIMILAR TO 40-45-FOOT INTERVAL. 10% CLAY - SIMILAR TO 40-45 FOOT INTERVAL.		

Project No. 83C152

FIELD LOG OF Mon. WELL NO. SC1D

Depth Feet	Description	Well Data	Remarks
	SAND DESCRIPTION ON PRECEDING PAGE.		COMPOSITE SAMPLES OVER 5-FOOT INTERVALS.
80	SAND 80% SAND - SIMILAR TO 40-45-FOOT INTERVAL, EXCEPT SAND IS SOMEWHAT COARSER. 10% GRAVEL - SIMILAR TO 40-45-FOOT INTERVAL. 10% CLAY - SIMILAR TO 40-45-FOOT INTERVAL.	2-inch I.D. blank PVC casing	
85	SAND 90% SAND - SIMILAR TO 40-45-FOOT INTERVAL. 5% GRAVEL - SIMILAR TO 40-45 FOOT INTERVAL. 5% CLAY - SIMILAR TO 40-45 FOOT INTERVAL.	Collapsed borehole material 2-inch I.D. PVC screen (0.02 slot)	DRILLING RATE INDICATES MORE CLAY.
90	SAND 80% SAND - SIMILAR TO 40-45-FOOT INTERVAL, EXCEPT SAND IS SOMEWHAT COARSER. 10% GRAVEL - SIMILAR TO 40-45-FOOT INTERVAL. 10% CLAY - SIMILAR TO 40-45 FOOT INTERVAL.		
95	CLAYEY SAND 50% SAND; FINE TO V. COARSE, MOSTLY MED. TO V. COARSE; QTZ.; OVERALL COLOR IS RUSTY TAN, GRAINS ARE CLEAR TO GREY, RUST, ORANGE; SUBANGULAR TO SUBROUNDED; BLOCKY TO TABULAR. 30% CLAY; SOFT TO STIFF; PLASTIC; PALE ORANGE TO WHITE. 20% GRAVEL; FINE; QTZ.; OVERALL COLOR IS ORANGE, GRAINS ARE CLEAR TO GREY, ORANGE, RUST; SUBANGULAR TO SUBROUNDED; BLOCKY.	2-inch I.D. blank PVC casing	DRILLING RATE INDICATES A FEW FEET OF CLAY IN THIS INTERVAL.

Depth Feet	Description	Well Data	Remarks
	CLAYEY SAND DESCRIPTION ON PRECEDING PAGE.	2-inch I.D. blank PVC casing	DRILLING RATE INDICATES A FEW FEET OF CLAY IN THIS INTERVAL.
100	**SAND** 75% SAND - SIMILAR TO 40-45-FOOT INTERVAL. 15% CLAY - SIMILAR TO 40-45-FOOT INTERVAL, EXCEPT SOME CLAY IS WHITE. 10% GRAVEL - SIMILAR TO 40-45-FOOT INTERVAL.		COMPOSITE SAMPLES OVER 5-FOOT INTERVALS.
105	**SAND** 75% SAND - SIMILAR TO 40-45-FOOT INTERVAL. 15% CLAY - SIMILAR TO 40-45-FOOT INTERVAL, EXCEPT SOME CLAY IS WHITE. 10% GRAVEL - SIMILAR TO 40-45-FOOT INTERVAL.	Collapsed borehole material	2-inch I.D. PVC screen (0.02 slot)
110	**SAND** 70% SAND - SIMILAR TO 40-45-FOOT INTERVAL. 20% CLAY - SIMILAR TO 40-45-FOOT INTERVAL, EXCEPT SOME CLAY IS WHITE. 10% GRAVEL - SIMILAR TO 40-45-FOOT INTERVAL, EXCEPT SOME DARK GREY SHALE FRAGMENTS WHICH GIVE SAMPLE A MOTTLED APPEARANCE.		
115	**SHALEY SAND** 50% SAND - SIMILAR TO 40-45-FOOT INTERVAL. 30% SHALE FRAGMENTS; SAND & GRAVEL SIZED; DARK GREY. 20% CLAY; SOFT; PLASTIC; GREY, MINOR ORANGE.	Backfill (sand from cuttings)	DRILLING RATE INDICATES ALTERNATE LAYERS OF SAND & CLAY.
120			

Project No. 83C152

FIELD LOG OF Mon. WELL NO. SC1D

Depth Feet	Description	Well Data	Remarks
20	CLAY 80% CLAY; SOFT TO STIFF; PLASTIC; DARK GREY. 20% SAND; FINE TO COARSE; QTZ.	Backfill (sand from cuttings)	COMPOSITE SAMPLE OVER 5-FOOT INTERVAL.
25	CLAY 100% CLAY; STIFF; PLASTIC; DARK GREY.		SPLIT SPOON SAMPLE - HAD PROBLEMS OBTAINING SAMPLE DUE TO FILL.
27			

BORING NO.:	SC-12D	CONTRACTOR:	EMPIRE SOILS	DATE STARTED:	11/16/90
PROJECT NO.:	7650-N51	DRILLERS:	KENNEY, EDWARDS	DATE COMPLETED:	11/19/90
PROJECT:	SHIELD ALLOY	TRC INSPECTOR:	MCMORROW	WATER TABLE LEVEL:	9.0 FT
CLIENT:	SMC	DRILLING METHOD:	MUD ROTARY	LOCATION: N	258008.45
LOCATION:	NEWFIELD, NJ	GROUND ELEVATION:	102.16	E	1901049.83
BORING DEPTH:	142 FT	INNER CASING ELEVATION:	103.19	NJDEP PERMIT NUMBER:	3135226-0

DEPTH (FT)	BLOWS	SOIL DESCRIPTION
0 - 2	9 11	DARK BROWN, FINE TO MEDIUM SAND, TRACE SILT, MOIST
	5 7	RECOVERY - 22"
2 - 4	7 6	BROWN FINE TO MEDIUM SAND, MOIST
	6 6	RECOVERY - 18"
4 - 6	5 8	BROWN/ORANGE FINE TO COARSE SAND, TRACE GRAVEL, MOIST
	9 8	RECOVERY - 22"
6 - 8	6 5	0-12" BROWN FINE SAND, LITTLE SILT, TRACE CLAY, MOIST
	10 15	12-20" BROWN/ORANGE FINE TO MEDIUM SAND, MOIST
8 - 10	13 11	BROWN/ORANGE FINE TO COARSE SAND, TRACE SILT, WET
	8 8	RECOVERY - 24"
15 - 17	4 5	BROWN FINE TO COARSE SAND, TRACE GRAVEL, WET
	4 6	RECOVERY - 8"
20 - 22	8 7	BROWN/ORANGE FINE TO COARSE SAND
	7 6	RECOVERY - 10"
25 - 27	10 9	BROWN/ORANGE FINE TO COARSE SAND, LITTLE GRAVEL
	8 11	RECOVERY - 6"
30 - 32	6 1	0-3" SAME AS ABOVE
	1 3	3-10" DARK GRAY CLAY, VERY STIFF
35 - 37	3 4	0-12" LT. GRAY CLAY, LITTLE SILT
	5 8	12-18" BROWN SILT, SOME FINE SAND, TRACE CLAY, MOIST
40 - 42	2 3	BROWN FINE TO COARSE SAND
	3 5	RECOVERY - 8"

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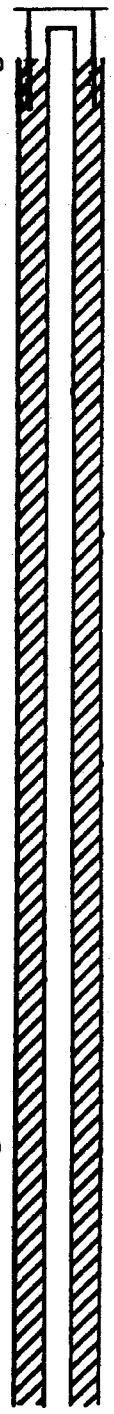
LITHOLOGY

WELL CONSTRUCTION



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DEPTH (FT)	BLOWS	SOIL DESCRIPTION	LITHOLOGY	WELL CONSTRUCTION
45 - 47	2 8 9 13	BROWN FINE TO COARSE SAND RECOVERY - 12"		
50 - 52	3 5 30 30	LT. BROWN FINE TO MEDIUM SAND, TRACE SILT RECOVERY - 4"		
55 - 57	5 11 15 20	SAME AS ABOVE WITH THIN WHITE LAYERS OF SILT THROUGHOUT RECOVERY - 14"		
60 - 62	10 15 20 20	LT. BROWN TO WHITE FINE TO MEDIUM SAND RECOVERY - 14"	60.0	4" SCHEDULE 40 PVC RISER
65 - 67	9 15 21 21	LT. BROWN FINE TO MEDIUM SAND RECOVERY - 12"	65.0	
70 - 72	10 15 33 37	SAME AS ABOVE RECOVERY - 8"		
75 - 77	22 24 28 32	SAME AS ABOVE RECOVERY - 12"		BENTONITE SLURRY
80 - 82	20 19 17 18	BROWN FINE SAND, TRACE SILT RECOVERY - 2"		
85 - 87	10 12 11 20	LT. BROWN FINE SAND, TRACE SILT RECOVERY - 22"		
90 - 92	15 29 16 18	LT. BROWN FINE TO COARSE SAND RECOVERY - 12"		

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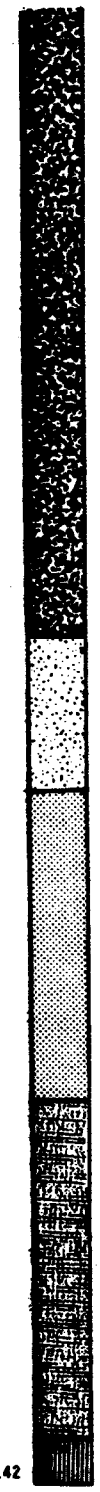
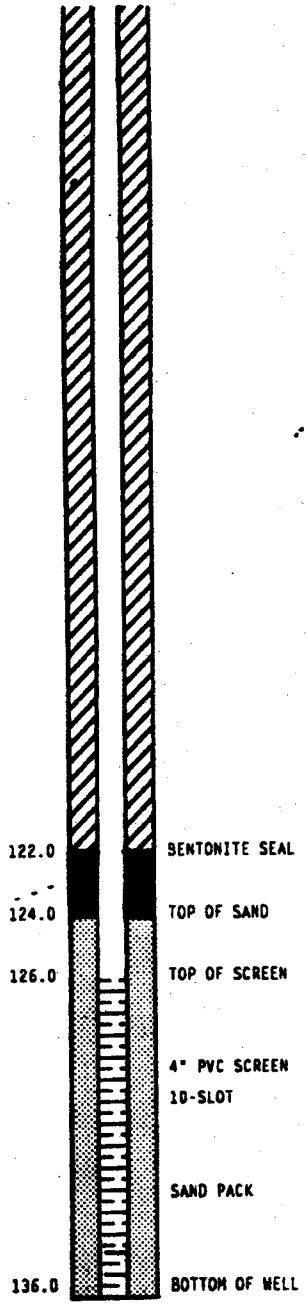
DEPTH (FT)	BLOWS	SOIL DESCRIPTION
95 - 97	19 21 32 29	LT. BROWN FINE TO COARSE SAND RECOVERY = 12"
100 - 102	35 42 67 65	BROWN/ORANGE FINE TO COARSE SAND, TRACE SILT RECOVERY = 8"
105 - 107	25 52 67 100	SAME AS ABOVE RECOVERY = 14"
110 - 112	34 100/5"	SAME AS ABOVE RECOVERY = 8"
115 - 117	100/5"	BROWN/RED FINE TO MEDIUM SAND, TRACE SILT RECOVERY = 3"
120 - 122	12 11 19 28	BROWN FINE SAND, LITTLE SILT RECOVERY = 10"
125 - 127	12 22 20 18	LT. BROWN FINE SAND, LITTLE SILT RECOVERY = 12"
130 - 132	6 6 9 9	DARK GRAY FINE SAND AND SILT RECOVERY = 14"
135 - 137	5 6 5 8	SAME AS ABOVE RECOVERY = 20"
140 - 142	3 5 12 16	0-18" SAME AS ABOVE 18-24" DARK GRAY SILT, SOME CLAY END OF BORING = 142 FT

LITHOLOGY



WELL CONSTRUCTION



BORING NO.:	SC-21D	CONTRACTOR:	EMPIRE SOILS	DATE STARTED:	11/06/90
PROJECT NO.:	7650-N51	DRILLERS:	KENNEY, EDWARDS	DATE COMPLETED:	11/27/90
PROJECT:	SHIELD ALLOY	TRC INSPECTOR:	GLEZEN, MCMORROW	WATER TABLE LEVEL:	6.0 FT
CLIENT:	SMC	DRILLING METHOD:	MUD ROTARY	LOCATION:	N 256545.97
LOCATION:	NEWFIELD, NJ	GROUND ELEVATION:	90.44		E 1898454.64
BORING DEPTH:	137 FT	INNER CASING ELEVATION:	91.65	NJDEP PERMIT NUMBER:	3135220-1

DEPTH (FT)	BLOWS	SOIL DESCRIPTION
0 - 2	3 3	0-12" DARK BROWN SILT AND FINE SAND, TRACE ORGANICS
	3 3	12-18" ORANGE/BROWN MEDIUM TO COARSE SAND, TRACE GRAVEL, TRACE SILT
2 - 4	6 8	0-4" TAN MEDIUM TO COARSE SAND, LITTLE GRAVEL
	12 17	4-14" ORANGE MEDIUM TO COARSE SAND, LITTLE GRAVEL, TRACE SILT
4 - 6	14 16	0-6" TAN MEDIUM TO COARSE SAND, LITTLE FINE SAND, TRACE GRAVEL
	18 12	6-15" ORANGE MEDIUM TO COARSE SAND, TRACE GRAVEL
6 - 8	11 14	0-20" ORANGE/BROWN MED. SAND, SOME C. SAND, TRACE GRAVEL, TRACE SILT.
	16 30	20-24" ORANGE SILT, LITTLE CLAY, LITTLE FINE SAND, WET
8 - 10	28 25	NO RECOVERY
	22 21	
10 - 12	4 3	LT. BROWN/ORANGE FINE SAND AND SILT, LITTLE CLAY STRINGERS, DAMP
	4 7	RECOVERY - 15"
12 - 14	6 6	ORANGE FINE SAND AND SILT W/LT. GRAY CLAY STRINGERS, TRACE GRAVEL.
	4 9	RECOVERY - 16"
15 - 17	6 9	ORANGE MEDIUM TO COARSE SAND, LITTLE FINE SAND, TRACE GRAVEL
	14 14	RECOVERY - 12"
20 - 22	7 16	0-2" ORANGE FINE SAND, SOME SILT, LITTLE CLAY
	25 23	2-12" TAN FINE SAND, SOME MEDIUM SAND
25 - 27	18 41	LT. BROWN/ORANGE MEDIUM TO COARSE SAND AND GRAVEL, TRACE FINE SAND
	44 40	RECOVERY - 18"
30 - 32	14 20	LIGHT TAN/PINK FINE SAND, TRACE SILT, TRACE MEDIUM SAND
	22 29	RECOVERY - 14"
35 - 37	13 22	LT. TAN/PINK MEDIUM SAND, LITTLE FINE SAND
	25 39	RECOVERY - 12"
40 - 42	21 29	LIGHT BROWN MEDIUM SAND, TRACE COARSE SAND, TRACE FINE SAND
	39 45	RECOVERY - 12"

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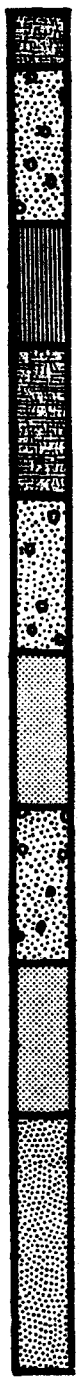
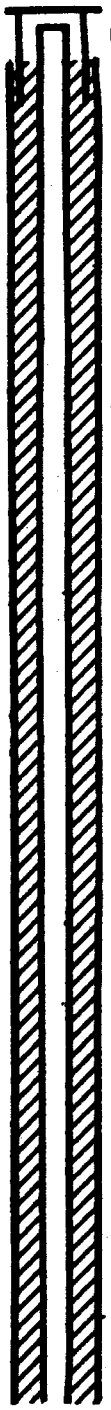
LITHOLOGY



WELL CONSTRUCTION



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DEPTH (FT)	BLOWS	SOIL DESCRIPTION	LITHOLOGY	WELL CONSTRUCTION
45 - 47	22 35 50 60	TAN MEDIUM TO COARSE SAND, TRACE GRAVEL, TRACE FINE SAND RECOVERY - 18"		
50 - 52	21 41 54 70	TAN MEDIUM TO COARSE SAND, SOME GRAVEL IN TOP 4", SOME FINE SAND RECOVERY - 18"		
55 - 57	41 55 57 43	TAN MEDIUM TO COARSE SAND, SOME GRAVEL RECOVERY - 14"		4" SCHEDULE 40 PVC RISER
60 - 62	22 47 66 76	ORANGE/BROWN MEDIUM TO COARSE SAND, TRACE SILT, TRACE GRAVEL RECOVERY - 14"		
65 - 67	21 26 9 8	RED/BROWN FINE TO COARSE SAND, TRACE GRAVEL, TRACE SILT RECOVERY - 2"		
70 - 72	14 41 47 53	ORANGE/TAN FINE SAND, SOME SILT RECOVERY - 10"		BENTONITE SLURRY
75 - 77	25 22 32	SAME AS ABOVE RECOVERY - 10"		
80 - 82	22 30 42 46	SAME AS ABOVE RECOVERY - 14"		
85 - 87	7 20 25 37	LT. BROWN FINE SAND, LITTLE SILT RECOVERY - 18"		
90 - 92	15 21 32 44	SAME AS ABOVE RECOVERY - 14"		

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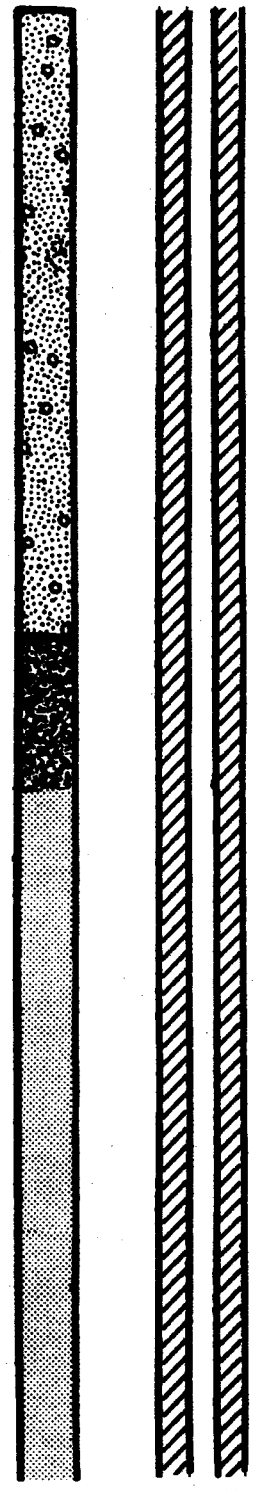

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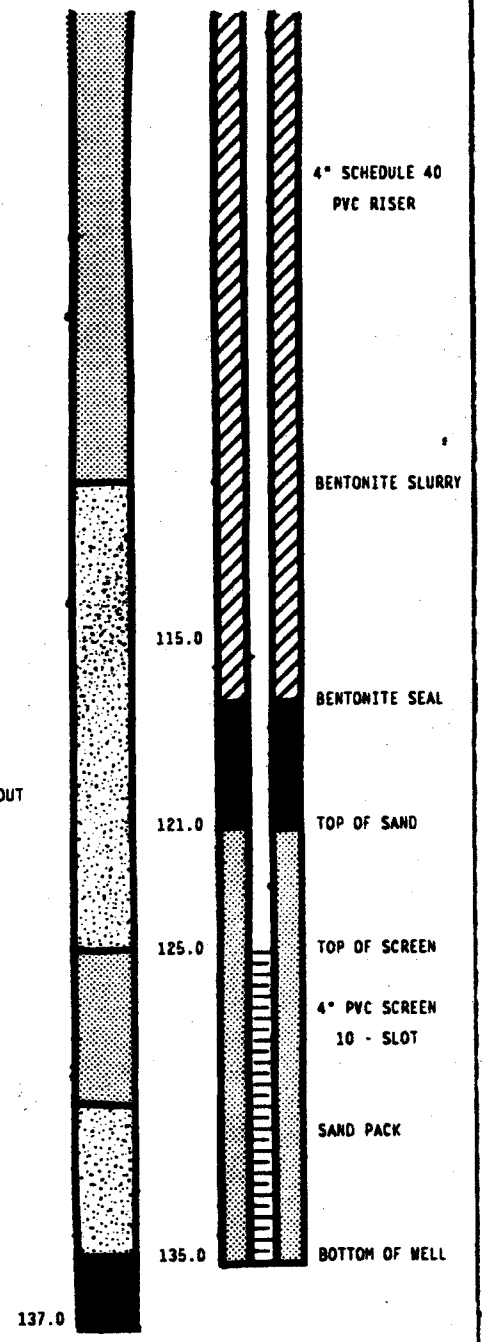
DEPTH (FT)	BLOWS	SOIL DESCRIPTION
95 - 97	30 30 22 18	LT. BROWN FINE SAND, LITTLE SILT RECOVERY - 18"
100 - 102	11 16 22 26	LT. BROWN/ORANGE FINE SAND, TRACE SILT WITH THIN WHITE SILT LAYERS RECOVERY - 12"
105 - 107	13 15 27 30	SAME AS ABOVE, NO SILT LAYERS RECOVERY - 12"
110 - 112	22 32 34 30	BROWN/ORANGE FINE TO MEDIUM SAND, TRACE SILT RECOVERY - 12"
115 - 117	21 52 100/5"	SAME AS ABOVE RECOVERY - 8"
120 - 122	6 8 10 15	BROWN/ORANGE FINE TO MEDIUM SAND WITH THIN WHITE SILT LAYERS THROUGHOUT RECOVERY - 12"
125 - 127	3 5 15 18	BROWN FINE SAND, SOME SILT, TRACE CLAY RECOVERY - 20"
130 - 132	20 21 20 25	BROWN FINE TO MEDIUM SAND, TRACE SILT, TRACE CLAY RECOVERY - 12"
135 - 137	5 10 26 47	DARK GRAY SILT AND CLAY, LITTLE FINE SAND RECOVERY - 24"

END OF BORING - 137 FT



WELL NO:	SC-28D	CONTRACTOR:	UNI-TECH DRILLING	DATE STARTED:	8/24/93
PROJECT NO:	19080-0080-00010	DRILLERS:	JESTER, SACCO, WARREN	DATE COMPLETED:	7 8/25/93
PROJECT:	SHIELD ALLOY (SMC)	TRC INSPECTOR:	SUSCA	WATER TABLE EL:	86.85 (8/31/95)
LOCATION:	NEWFIELD, NJ	DRILLING METHOD:	MUD ROTARY	LOCATION:	N 256,668.00
WELL DEPTH:	153 FEET	GROUND EL.:	107.41		E 1,899,472.69
PERMIT NO.:	3147408	CASING EL:	107.82		

DEPTH (FT)	BLOWS	SOIL DESCRIPTION	WELL CONSTRUCTION
			LOCKING COVER
0 - 2	7 13 17 21	0-3" Topsoil; Dk. Brown F-M SAND, little silt-clay 3-13" Orange F-M SAND, little m-c gravel, dry.	CEMENT/BENTONITE GROUT
5 - 7	2 8 21 18	Orange/Yellow F-C SAND, some f-c gravel to 1" 6" Recovery.	10.0
10 - 12	3 9 9 12	Orange F-M SAND, tr C sand, damp, dense 11" Recovery	BENTONITE GROUT
15 - 17	7 13 13 14	Same as Above 6" Recovery	8" BOREHOLE
20 - 22	13 13 10 15	Orange F-M SAND, tr c sand, tr mod. gravel, some cobbles, wet 14" Recovery	
25 - 27	10 14 16 15	Orange F-M SAND, tr c sand, tr gravel. 14" Recovery	4" PVC RISER
30 - 32	15 17 21 18	Orange F-C SAND, tr-little f-c gravel, wet. 14" Recovery	
35 - 37	12 15 18 18	Orange M-C SAND, tr f sand, tr-little gravel, wet 13" Recovery	
40 - 42	8 20 39 32	Orange M-C SAND, tr gravel. 11" Recovery	
45 - 47	21 25 32 40	Tan F-M SAND, little c sand, tr gravel 12" Recovery	
50 - 52	20 75 100/3"	Tan/pink Fine SAND, little-some m-c sand. 13" Recovery	
55 - 57	40 90 100/5"	Tan/pink Med. SAND, tr-little f sand in bands 10" Recovery	
60 - 62	25 100/3"	White/Tan F-C SAND 9" Recovery	
		(CONTINUED)	

SHIELD ALLOY METALLURGICAL

SC-28D, continued

DEPTH (FT)	BLOWS	SOIL DESCRIPTION	WELL CONSTRUCTION
65 - 67	47 100/5"	Tan/white/pink Fine SAND, tr m-c sand, tr white clay stringers 10" Recovery	
70 - 72	48 52 100/4"	Same as Above 12" Recovery	8" BOREHOLE
75 - 80	62 100/4"	Tan M-C SAND, tr f sand, tr gravel 10" Recovery	
80 - 82	40 100/3"	Tan F-C SAND, tr gravel 12" Recovery	
85 - 87	36 100/4"	Tan F-C SAND, tr f-c gravel 10" Recovery	100% BENTONITE GROUT
90 - 92	61 100/3"	Tan F-C SAND, tr gravel 10" Recovery	
95 - 97	19 32 38 46	Tan F-VF SAND, tr clay stringers @ 2" and 8". 13" Recovery	
100 - 102	17 26 50 67	Orange/Tan/Red F-VF SAND, some white sand stringers 17" Recovery	4" PVC RISER (SCHEDUL 40)
105 - 107	35 100/5"	Tan/Orange F SAND 8" Recovery	
110 - 112	20 25 60 100/2"	Orange/Tan F-VF SAND, little white clay stringers 11" Recovery	
115 - 117	64 100/2"	Orange/Tan F-M SAND, tr c sand 6" Recovery	
120 - 122	55 100/4"	Tan F-M SAND, tr c sand, white clay stringer in tip of sample 6" Recovery	
125 - 127	14 24 37 42	Tan/White F-VF SAND, tr clay stringers 10" Recovery	
		127	#00 SAND SEAL
130 - 132	30 100/3"	Tan/Brown F-VF SAND 7" Recovery	130 TOP OF SAND PACK
		133 -	TOP OF SCREEN

SHIELD ALLOY METALLURGICAL

SC-28D, continued

DEPTH (FT)	BLOWS	SOIL DESCRIPTION	WELL CONSTRUCTION
135 - 137	52 100/5"	Tan F SAND (possibly silt wash) 7" Recovery	8" BOREHOLE
140 - 142	34 42 22 28	Tan F SAND, tr clay stringers 9" Recovery	#1 SAND PACK
145 - 147	23 30 37 40	Tan F SAND, tr clay stringers 10" Recovery	4" PVC SCREEN 10 SLOT
150 - 152	36 59 66 70	Same as Above 8" Recovery	153.0 BOTTOM OF WELL
155 - 157	26 22 50 25	Gray CLAY, tr f sand, dense. 24" Recovery	

END OF BORING – 157 FEET

WELL NO:	SC-29D	CONTRACTOR:	UNI-TECH DRILLING	DATE STARTED:	2/18/97
PROJECT NO:	19080-0080-00010	DRILLERS:	DAVE, MIKE, GEORGE	DATE COMPLETED:	2/20/97
PROJECT:	SHIELD ALLOY (SMC)	TRC INSPECTOR:	BROWN	WATER TABLE EL:	
LOCATION:	NEWFIELD, NJ	DRILLING METHOD:	MUD ROTARY	LOCATION:	N
WELL DEPTH:	148 FEET	GROUND EL:			E
PERMIT NO.:	3147409	CASING EL:			

DEPTH (FT)	BLOWS	SOIL DESCRIPTION	WELL CONSTRUCTION
0 - 2	4 6 6 10	0-2" Topsoil, Dk. Brown F Sand and Silt, some organics 2-6" Brown F Sand and Silt, some Gravel 6-16" Yellow brown F-M SAND, some gravel, little Silt 16" Recovery; No Odor; OVA = ND	PLUSH MOUNT LOCKING COVER CEMENT PAD CEMENT GROUT 5.6
5 - 7	13 17 12 12	0-5" Yellow brown C Sand and Gravel 5-10" Yellow brown F-M SAND 10" Recovery; No Odor; OVA=2 ppm	
10 - 12	10 11 10 10	Yellow brown F-M SAND, little Silt, tr C Sand 10" Recovery; No Odor	CEMENT/BENTONITE GROUT
15 - 17	5 8 8 10	Yellow brown M-C SAND, some Gravel 8" Recovery; No Odor; OVA=ND Delivers estimate at water table (all samples have been wet due to drilling slurry)	8" BOREHOLE
20 - 22	5 5 8 8	No Recovery, several pieces of gravel 0" Recovery	
25 - 27	5 10 10 8	Yellow orange F Sand and Silt, little Clay 12" Recovery; No Odor; OVA=ND	4" PVC RISER
30 - 32	12 18 20 20	Yellow orange F-M SAND, little C Sand; C Sand increasing w/depth Last 2" Red orange color 10" Recovery; OVA=ND	
35 - 37	17 25 27 28	Reddish brown F-M SAND, Silty at tip of spoon. 8" Recovery; No Odor; OVA=1 ppm	
40 - 42	17 25 27 29	Orange yellow M-C SAND, tr F Sand 5" Recovery; No Odor; OVA=8 ppm	
45 - 47	27 23 25 29	0-4" Yellow F SAND 4-7" Yellow brown F-M SAND, little C Sand 7-9" Dark Red F SAND 9" Recovery; No Odor; OVA=10 ppm	
50 - 52	37 35 37 50/2"	Tan F-M SAND 9" Recovery; No Odor; OVA=3 ppm	
55 - 57	38 32 34 45	Tan F SAND, little Silt; some orange color 7" Recovery; No Odor; OVA=6 ppm	
60 - 62	34 37 45 50/2"	0-4" Brown M-C SAND, tr. F Sand 4-14" Yellow orange F-M SAND 14" Recovery; No Odor; OVA=12 ppm	

(CONTINUED)

DEPTH (FT)	BLOWS	SOIL DESCRIPTION		WELL CONSTRUCTION
65 - 67	37 44 49 50/3"	Tan F-M SAND; tight/compact 6" Recovery; No Odor; OVA=0 ppm		
70 - 72	34 44 50/3"	0-4" Tan F-M SAND 4-8" Tan F-M SAND, some Gravel, little C Sand 8-10" Tan F-M SAND, little C Sand; Lt. Red F-M Sand in tip of spoon 10" Recovery; No Odor; OVA=ND		8" BOREHOLE
75 - 77	18 34 48 50/3"	0-2" Tan F SAND 2-5" GRAVEL, little F Sand 5-12" Tan F SAND 12" Recovery; No Odor		
80 - 82	20 31 44 50	Lt. Tan F SAND 5" Recovery; No Odor; OVA=6 ppm		
85 - 87	44 50/3"	Lt. Tan F SAND; lots of wash 4" Recovery; No Odor; OVA=2.5 ppm		CEMENT/BENTONITE GROUT
90 - 92	21 50/4"	Tan F SAND, little M Sand 4" Recovery; No Odor; OVA=ND		
95 - 97	47 50/4"	Tan VF SAND; slightly orange at top, reddish at tip 4" Recovery; No Odor; OVA=1.8 ppm		
100 - 102	17 44 50/4"	No Recovery, all wash 0" Recovery		4" PVC RISER (SCHEDULE 40)
105 - 107	33 44 49 50	Orange brown F-C SAND, tr. Clay stringer, tight 10" Recovery; OVA=<1 ppm		
110 - 112	22 39 54 50/4"	Orange brown F-M SAND, little C Sand 6" Recovery; No Odor; OVA=<1 ppm		
115 - 117	33 45 49 50	Tan F-M SAND, little C Sand; wash on top <8" Recovery		
120 - 122	49 100/4"	Tan F SAND, some M Sand, tr. C Sand; very tight 6" Recovery; OVA=2 ppm	120.0	#00 SAND SEAL
125 - 127	51 100/3"	Tan F SAND, little M Sand; tight 5" Recovery; No Odor; OVA=1.9 ppm	123.0	TOP OF SAND PACK
130 - 132	30 100/5"	Tan/Orange F SAND, tr. Clay; tight 8" Recovery; No Odor; OVA=2.25 ppm (CONTINUED)	128.0	TOP OF SCREEN

DEPTH (ft)	BLOWS	SOIL DESCRIPTION	WELL CONSTRUCTION
135 - 137	32 47 70 63	0-4" Lt. Gray CLAY 4-5" F Sand and Clay 5-14" Orange brown F-M SAND 14" Recovery; No Odor; OVA=2.3 ppm	8" BOREHOLE
140 - 142	40 65 68 83	0-5" Tan F SAND 5-8.5" Tan F Sand Gray Clay; tight 8.5" Recovery; No Odor; OVA=2.25 ppm	6ft MORIE SAND PACK
145 - 147	24 23 24 24	0-6" Tan F SAND 6-9" Orange F SAND, tr. Clay 9" Recovery; No Odor; OVA=2.9 ppm	4" PVC SCREEN 10 SLOT
148.5		Dk. Gray CLAY On drill bit	148.0 BOTTOM OF WELL
			150.0 BOTTOM OF BOREHOLE
		END OF BORING = 150 FEET	

SOIL BORING / MONITORING WELL CONSTRUCTION LOG

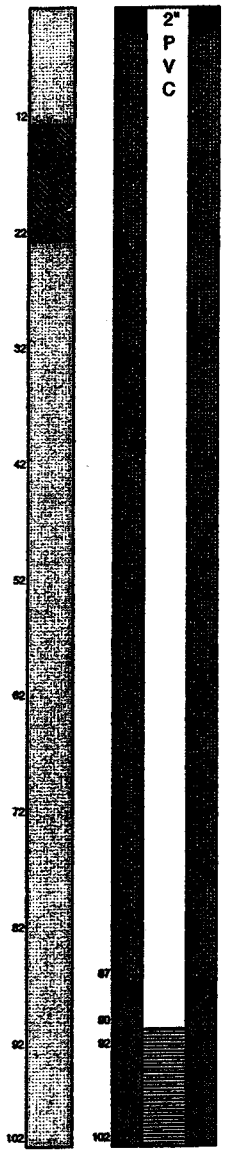
TRC

Project Name: SMC Offsite Ground Water Investigation
Project Number: 51903-GWAT-02230
Project Location: Vineland, New Jersey
Boring Location: West Forest Grove Road

Drilling Company: Unitech Drilling Co., Inc.
Drillers: Joe and Dan
TRC Inspector: Kate McAndrew
Drill Equipment / Method: 1500 Midway Truck Rig
Mud Rotary / Pressure Tremie

Boring: SC-32D
Date Started: 12/18/2006
Date Completed: 12/19/2006
Depth to Water:10.55
Horizontal Coordinates: E343355.150, N252952.385 (VP-5)
Ground Elevation: NA
Inner Casing Elevation: NA

10-12	14/24	6 12 18 24	12 17 19 18	Saturated, medium brown-orange F-C SAND, trace silt, no odor, no stains.
20-22	12/24	6 12 18 24	6 7 7 9	Wet, a 4" clay layer located at 20-20.4-ftbgs turning to medium brown-orange F-M SAND and gray CLAY, no odor, no stains.
30-32	8/24	6 12 18 24	12 18 21 26	Wet, medium brown F-M SAND, little C-sand, top 2" was rock fragments (quartz), no odor, no stains.
40-42	10/24	6 12 18 24	7 8 12 15	Wet, medium brown F-SAND, some M-sand, 1" gray clay layer at 40-tbgs, no odor, no stains.
50-52	4/8	6 12 18 24	22 50/2	Wet, medium brown-orange F-C SAND, trace F-gravel, no odor, no stains. Spoon refusal at 50.8-ftbgs.
60-62	10/13	6 12 18 24	21 33 50/1	Wet, medium brown-orange F-C SAND, trace F-gravel, no odor, no stains. Spoon refusal at 61.1-ftbgs.
70-72	7/11	6 12 18 24	41 50/5	Wet, medium brown-orange VF-M SAND, some thin (<1") gray stringers, no odor, no stains. Spoon refusal at 70.11-ftbgs.
80-82	8/9	6 12 18 24	29 50/3	Clay layer at 80-ftbgs turning to medium brown VF-M SAND, trace C-sand, no odor, no stains. Spoon refusal at 80.9-ftbgs.
90-92	4/14	6 12 18 24	16 32 50/2	Wet, 1" gray clay layer at 90-ftbgs turning to medium brown-orange-red F-M SAND, no odor, no stains. Spoon refusal at 91.2-ftbgs.
100-102	4/8	6 12 18 24	27 50/2	Wet, medium brown VF-M SAND, no odor, no stains. Spoon refusal at 100.8-ftbgs.



Legend
- Sand
- Sand and Clay
- # 0 Well Sand
- # 00 Well Sand
- Grout
- Screen (10-slot PVC)
- Concrete Pad
- PVC Riser

WELL CONSTRUCTION:
- 10-Slot PVC Screen (2") = 102-92 ftbgs
- PVC Riser (2") = 92 ftbgs-grade
- # 0 Well Sand = 102-90 ftbgs
- #00 Well Sand = 90-87 ftbgs
- Grout (bentonite/cement mixture) = 87-4 ftbgs
- Native Backfill = 4-0.5 ftbgs
- Concrete Pad = 0.5-grade
- Monitoring well secured with a locking sanitary plug.
- Monitoring well completed with a flush-mounted curb box.

NOTES:
- ftbgs - feet below ground surface.
- NA - Data not available at time of reporting.
- Horizontal datum (New Jersey State Plane Coordinates, NAD 83).
- Samples collected for geological description every 10 feet using split spoon (140 lb hammer droped 30").
- Monitoring well developed using a Grundfos Redi-flow pump using surge block and pump technique.

APPENDIX B

PERCHLORATE PURCHASE RECORDS

POTASSIUM PERCHLORATE

102

ORDER NO.	DATE	VENDOR	QUANTITY	PRICE	F.O.B.	TERMS	DELIVERY
RM9336	9.13.83	Hummel Chemical	3000 #	$0.830 #	S. Plainfield	net 30	
9374	10.6.83	"	4500 #	.830	"	"	
9401	11.8.83	"	3000 #	.830	"	"	
9432	12.9.83	" 14,960	9020 #	.855	"	"	
9570	2.28.84	Technichem Inc	2204	.675	Little Falls	COD	
9884	8.24.84	"	5070	1.200	"	net 30	
2807	6.25.87	Service Chemical	1000	.890	Hatfield	"	
2972	9.16.87	"	1000	.890	"	"	
3000	9.29.87	"	2000	.890	"	"	
3023	10.7.87	"	6000	"	"	"	wk 11/2 10/16 3-5 M/p
3188	12.9.87	"	3000	"	"	"	1/4
63273	1.8.88	"	3000	"	"	"	
63795	1.09.89	"	40,000	1.030	"	"	
64272	1.03.90	"		1.065	"	"	
64676	1.07.91	"	2000	1.160	"	net 60	
65207	2.27.92	"	500	1.150	"	"	

3000 #/mo 0.20700

POTASSIUM PERCHLORATE

102

ORDER NO.	DATE	VENDOR	QUANTITY	PRICE	F.O.B.	TERMS	DELIVERY
RM7619	12.5.78	Kerr McGee	5100	.411 #	Henderson N	net 30	5/19/79 - 6/21
7693	2.14.79	" " .5933 .5932	5100	.411	"	"	1/13/79 - [illegible]
7766	4.18.79	Hummel Chemical	10,200	.505	S. Plainfield	"	56-59
8088	2.27.80	Kerr McGee	10,200	.4892	Henderson	"	5/1/80 - 7/14/80
8259	8.12.80	" " 1.1392	5,100	.4892	"	"	11/1 -
8260	8.12.80	Hummel	4,200	.680	S. Plainfield	"	11/5 - 9/15
8356	11.19.80	" .7235	5,100	.680	"	"	11/21
8439	1.12.81	Kerr McGee	10,200	.5830	Henderson	"	2/18 + 4/1
8444	1.15.81	Hummel	10,200	.680	S. Plainfield	"	
8465	1.30.81	"	72,000	11@ .680 61@ .310	"	"	
9103	1.17.83	"	3000	.840	"	"	
9117	2.14.83	"	3000	.840	"	"	
9137	3.4.83	"	9000	.830	"	"	A/R
9259	6.21.83	"	3000	.830	"	"	
9269	7.1.83	"	3000	.800	"	"	
9322	8.30.83	"	3000	.830	"	"	

POTASSIUM PERCHLORATE

ORDER NO.	DATE	VENDOR	QUANTITY	PRICE	F.O.B.	TERMS	DELIVERY
RM 6196	3.26.74	Hooker	25,000	.2175	Niagara F	net 30	1974
6279	7.17.74	Kerr-McGee	9900	.2175	Henderson Nevada	"	8/11/74
6323	9.17.74	" "	9900	.2175	"	"	10/14/74
6805	9.14.76	" "	5000	.31	"	"	
6964	4.14.77	" "	5100	.3775	"	"	Ship w/o 5/9/77
7035	6.14.77	" "	5100	.3775	"	.5019	" " 2/20/78
7044	6.24.77	Hummel Chemical	5100	.425	S. Plainfield	"	
7128	10.5.77	" "	5100	.45	"	"	
7243	1.13.78	" "	5100	.45	"	"	Ship w/o 1/30/78
7258	1.23.78	" "	15,480	.45+50	"	"	" " 3/27-3/2
7259	1.23.78	Kerr McGee	5100	.3775	Henderson Nev	"	" " 6/19 8th
7334	3.15.78	" "	5100	.375	"	"	" " 9/1 10th
7368	4.5.78	Hummel Chemical	15300	.50	S. Plainfield	"	5/22, 6/19, 7/17
7474	7.7.78	" "	15300	.50	"	"	17, 9/4, 10/2
7514	9.5.78	Kerr McGee	5100	.4110	Henderson Nevada	"	3/17/79
7539	10.10.78	Hummel Chemical	15300	.50	S. Plainfield	"	11/1, 1/26/2/26

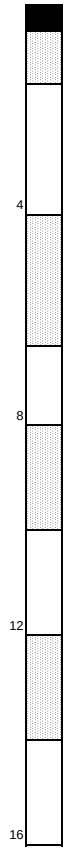
APPENDIX C

SOIL INVESTIGATION BORING LOGS

Project Name: SMC Off-Site Ground Water Investigation	Drilling Company: Unitech Drilling Co., Inc.	Boring:	SS-01
Project Number: 171441.000050.000000	Drillers: Michael	Date Started:	10/26/09
Project Location: Newfield, NJ	TRC Inspector: John Moss	Date Completed:	10/26/09
Boring Location: Background	Drill Equipment / Method: Geoprobe 66DT		

Depth (feet)	Penetration (ft)	Recovery (ft)	PID (ppm)	(ft)	Soil Description
0-4	4	1.2	NA	0-0.3	TOPSOIL.
				0.3-1.2	Orange-brown F-M SAND, little c-gravel, trace silt, trace f-gravel.
				1.2-4	No Recovery.
4-8	4	2.6	NA	0-2.6	Orange-brown M-C SAND, trace silt.
				2.6-4	No Recovery.
8-12	4	1.8	NA	0-1.8	Orange-brown M-C SAND, trace silt, trace c-gravel.
				1.8-4	No Recovery.
12-16	4	2	NA	0-2	Orange-brown M-C SAND, some m-c gravel, trace silt. Wet at 14 fbg.
				2-4	No Recovery.

Lithology



Legend

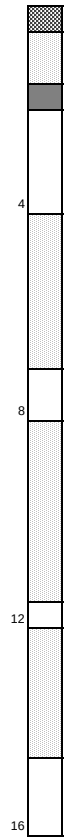
- Topsoil
- Sand
- No Recovery

Collect SS-01 (5-7)
Collect SS-01 (12-14)

Project Name: SMC Off-Site Ground Water Investigation	Drilling Company: Unitech Drilling Co., Inc.	Boring:	SS-02
Project Number: 171441.000050.000000	Drillers: Michael	Date Started:	10/26/09
Project Location: Newfield, NJ	TRC Inspector: John Moss	Date Completed:	10/26/09
Boring Location: Near former storage shed	Drill Equipment / Method: Geoprobe 66DT		

Depth (feet)	Penetration (ft)	Recovery (ft)	PID (ppm)	(ft)	Soil Description
0-4	4	2	NA	0-0.6	Gray ASH and M-C GRAVEL.
				0.6-1.2	Brown F-M SAND with some silty clay.
				1.2-2	Orange-brown SILTY CLAY with some f-m sand.
				2-4	No Recovery.
4-8	4	3	NA	0-0.8	Orange-brown F-M SAND, some clay.
				0.8-3	Orange-brown F-M SAND, trace silt, trace f-m gravel.
				3-4	No Recovery.
8-12	4	3.3	NA	0-3.3	Orange-brown M-C SAND, trace f-m gravel.
				3.3-4	No Recovery.
12-16	4	2.7	NA	0-2.7	Orange-brown M-C SAND, trace f-gravel, trace silt. Wet at 15.5-16 fbg.
				2.7-4	No Recovery,

Lithology



Legend

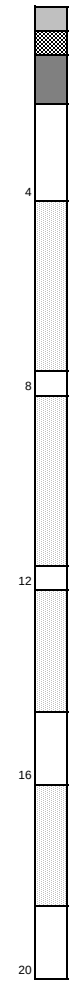
- Topsoil
- Sand
- Silty Clay
- Gravel
- No Recovery

Collect SS-02 (1-3)
Collect SS-02 (14-16)

Project Name: SMC Off-Site Ground Water Investigation	Drilling Company: Unitech Drilling Co., Inc.	Boring:	SS-03
Project Number: 171441.000050.000000	Drillers: Michael	Date Started:	10/26/09
Project Location: Newfield, NJ	TRC Inspector: John Moss	Date Completed:	10/26/09
Boring Location: Near former storage shed	Drill Equipment / Method: Geoprobe 66DT		

Depth (feet)	Penetration (ft)	Recovery (ft)	PID (ppm)	(ft)	Soil Description
0-4	4	2	NA	0-0.4	Gray-brown F-M SAND and SILT, some m-c gravel.
				0.4-0.8	Light gray ASH with some m-c gravel, very moist.
				0.8-2	Orange-brown SILTY CLAY, some f-m sand, trace f-gravel.
				2-4	No Recovery.
4-8	4	3.6	NA	0-3.6	Orange-brown F-M SAND, little silt, little f-gravel.
				3.6-4	No Recovery.
8-12	4	3.3	NA	0-2.7	Orange-brown F-M SAND, little silt, little f-gravel.
				2.7-3.3	M-C SAND, trace silt, some m-c gravel.
				3.3-4	No Recovery.
12-16	4	2.5	NA	0-2.5	Orange-brown M-C SAND, trace silt, trace f-gravel, wet at 15.5-16 fbg.
				2.5-4	No Recovery.
16-20	4	2.5	NA	0-2.5	Orange-brown M-C SAND, little f-m gravel, wet.
				2.5-4	No Recovery.

Lithology



Legend

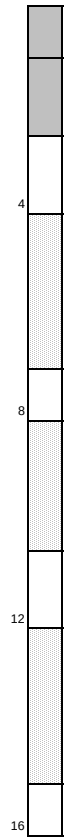
- Topsoil
- Sand
- Silty Clay
- Gravel
- Sand and Silt
- Ash
- No Recovery

Collect SS-03 (0-2)
Collect SS-03 (13-15)

Project Name: SMC Off-Site Ground Water Investigation	Drilling Company: Unitech Drilling Co., Inc.	Boring:	SS-04
Project Number: 171441.000050.000000	Drillers: Michael	Date Started:	10/26/09
Project Location: Newfield, NJ	TRC Inspector: John Moss	Date Completed:	10/26/09
Boring Location: Near former storage shed	Drill Equipment / Method: Geoprobe 66DT		

Depth (feet)	Penetration (ft)	Recovery (ft)	PID (ppm)	(ft)	Soil Description
0-4	4	2.6	NA	0-1	Brown VF-M SAND and SILT, little m-c gravel.
				1-2.6	Orange-brown F-M SAND and SILT, trace clay, little f-m gravel.
				2.6-4	No Recovery.
4-8	4	3	NA	0-3	Orange-brown F-M SAND, some silt, little f-m gravel.
				3-4	No Recovery.
8-12	4	2.7	NA	0-2.7	Orange-brown M-C SAND, trace silt, little f-m gravel.
				2.7-4	No Recovery.
12-16	4	2.9	NA	0-2.9	Orange-brown M-C SAND, trace silt, little f-m gravel, wet at 15-16 fbg.
				2.9-4	No Recovery.

Lithology



Legend

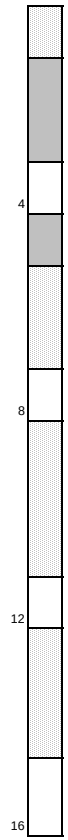
- Topsoil
- Sand
- Silty Clay
- Gravel
- Sand and Silt
- Ash
- No Recovery

Collect SS-04 (2-4)
Collect SS-03 (14-16)

Project Name: SMC Off-Site Ground Water Investigation	Drilling Company: Unitech Drilling Co., Inc.	Boring:	SS-05
Project Number: 171441.000050.000000	Drillers: Michael	Date Started:	10/26/09
Project Location: Newfield, NJ	TRC Inspector: John Moss	Date Completed:	10/26/09
Boring Location: Near former storage shed	Drill Equipment / Method: Geoprobe 66DT		

Depth (feet)	Penetration (ft)	Recovery (ft)	PID (ppm)	(ft)	Soil Description
0-4	4	2.9	NA	0-1	Brown F-M SAND, some silt, some m-c gravel.
				1-2.9	Orange-brown F-M SAND and SILT, trace clay, trace f-m gravel.
				2.9-4	No Recovery.
4-8	4	3	NA	0-1	Orange-brown F-M SAND and SILT, trace f-m gravel.
				1-3	Orange-brown F-C SAND, trace f-m gravel.
				3-4	No Recovery.
8-12	4	3	NA	0-1.5	Orange-brown F-C SAND, trace-silt, trace f-m gravel.
				1.5-3	Orange-brown M-C SAND, trace f-c gravel.
				3-4	No Recovery.
12-16	4	2.3	NA	0-2.3	Orange-brown M-C SAND, trace f-c gravel, wet at 15.5-16 fbg.
				2.3-4	No Recovery.

Lithology



Legend

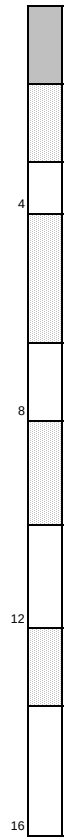
- Topsoil
- Sand
- Silty Clay
- Gravel
- Sand and Silt
- Ash
- No Recovery

Collect SS-05 (5-7)
Collect SS-05 (13-15)

Project Name: SMC Off-Site Ground Water Investigation	Drilling Company: Unitech Drilling Co., Inc.	Boring:	SS-06
Project Number: 171441.000050.000000	Drillers: Michael	Date Started:	10/26/09
Project Location: Newfield, NJ	TRC Inspector: John Moss	Date Completed:	10/26/09
Boring Location: Near former storage shed	Drill Equipment / Method: Geoprobe 66DT		

Depth (feet)	Penetration (ft)	Recovery (ft)	PID (ppm)	(ft)	Soil Description
0-4	4	2.9	NA	0-0.6	Gray-brown VF-FSAND and SILT, trace f-m gravel.
				0.6-1	Brown F-M SAND and SILT, trace f-m gravel.
				1-1.5	Orange-brown F-M SAND and SILT, trace clay, trace f-m gravel.
				1.5-2.9	Orange-brown F-M SAND, little silt.
				2.9-4	No Recovery.
4-8	4	2.5	NA	0-2.5	Orange-brown F-M SAND, trace silt, little m-c gravel.
				2.5-4	No Recovery,
8-12	4	2.2	NA	0-2.2	Orange-brown F-C SAND, little m-c gravel.
				2.2-4	No Recovery.
12-16	4	1.6	NA	0-1.6	Orange-brown F-C SAND, little m-c gravel, wet at 15.5-16 fbg.
				1.6-4	No Recovery.

Lithology



Legend

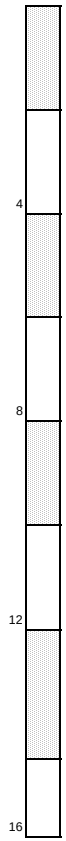
- Topsoil
- Sand
- Silty Clay
- Gravel
- Sand and Silt
- Ash
- No Recovery

Collect SS-06 (1-3)
Collect SS-06 (14-16)

Project Name: SMC Off-Site Ground Water Investigation	Drilling Company: Unitech Drilling Co., Inc.	Boring:	SS-07
Project Number: 171441.000050.000000	Drillers: Michael	Date Started:	10/26/09
Project Location: Newfield, NJ	TRC Inspector: John Moss	Date Completed:	10/26/09
Boring Location: Near former storage shed	Drill Equipment / Method: Geoprobe 66DT		

Depth (feet)	Penetration (ft)	Recovery (ft)	PID (ppm)	(ft)	Soil Description
0-4	4	2.1	NA	0-1	Dark brown F-M SAND, little silt, some m-c gravel.
				1-2.1	Orange-brown F-M SILTY SAND, little clay.
				2.1-4	No Recovery.
4-8	4	2.2	NA	0-0.5	Orange-brown F-M SILTY SAND, little clay.
				0.5-2.2	Orange-brown F-M SAND, little f-m gravel.
				2.2-4	No Recovery.
8-12	4	2.3	NA	0-1	Orange-brown F-M SAND, little f-m gravel.
				1-2.3	Orange-brown M-C SAND, little f-m gravel.
				2.3-4	No Recovery.
12-16	4	2.5	NA	0-2.5	Orange-brown M-C SAND, little f-m gravel. Wet at 15.5-16 fbg.
				2.5-5	No Recovery.

Lithology



Legend

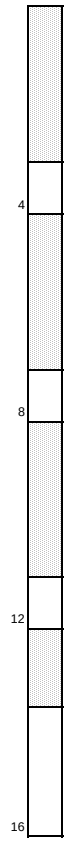
- Topsoil
- Sand
- Silty Clay
- Gravel
- Sand and Silt
- Ash
- No Recovery

Collect SS-07 (6-8)
Collect SS-07 (13-15)

Project Name: SMC Off-Site Ground Water Investigation	Drilling Company: Unitech Drilling Co., Inc.	Boring:	SS-08
Project Number: 171441.000050.000000	Drillers: Michael	Date Started:	10/26/09
Project Location: Newfield, NJ	TRC Inspector: John Moss	Date Completed:	10/26/09
Boring Location: Near former storage shed	Drill Equipment / Method: Geoprobe 66DT		

Depth (feet)	Penetration (ft)	Recovery (ft)	PID (ppm)	(ft)	Soil Description
0-4	4	3	NA	0-0.2	Dark brown F-M SAND, little m-c gravel.
				0.2-3	Orange-brown F-M SAND, some silt, trace clay, trace f-m gravel.
				3-4	No Recovery.
4-8	4	2.9	NA	0-2.9	Orange-brown F-M SAND, little silt, trace f-m gravel.
				2.9-4	No Recovery.
8-12	4	2.8	NA	0-2.8	Orange-brown F-M SAND, trace silt, trace f-gravel.
				2.8-4	No Recovery.
12-16	4	2.5	NA	0-1	Orange-brown F-M SAND, trace silt, trace f-gravel.
				1-2.5	Orange-brown M-C SAND, trace f-m gravel, wet at 15.5-16 fbg.
				2.5-4	No Recovery.

Lithology



Legend

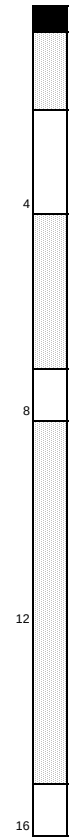
- Topsoil
- Sand
- Silty Clay
- Gravel
- Sand and Silt
- Ash
- No Recovery

Collect SS-08 (3-4)
Collect SS-08 (12-14)

Project Name: SMC Off-Site Ground Water Investigation	Drilling Company: Unitech Drilling Co., Inc.	Boring:	SS-09
Project Number: 171441.000050.000000	Drillers: Michael	Date Started:	10/26/09
Project Location: Newfield, NJ	TRC Inspector: John Moss	Date Completed:	10/26/09
Boring Location: Former lagoons	Drill Equipment / Method: Geoprobe 66DT		

Depth (feet)	Penetration (ft)	Recovery (ft)	PID (ppm)	(ft)	Soil Description
0-4	4	1.9	NA	0-0.5	TOPSOIL.
				0.5-1.9	Orange-brown F-C SAND, some silt, trace clay, some f-c gravel, very moist.
				1.9-4	No Recovery.
4-8	4	3.3	NA	0-3.3	Orange-brown F-M SAND, little silt, trace clay, little f-m gravel, very moist near bottom.
				3.3-4	No Recovery.
8-12	4	3.8	NA	0-1	Orange-brown F-M SAND, little silt, trace clay, little f-m gravel
				1-3.8	Orange-brown F-C SAND, little silt, trace f-m gravel.
				3.8-4	No Recovery.
12-16	4	3.1	NA	0-2	Orange-brown F-C SAND, trace silt, trace f-m gravel.
				2-3.1	Red-brown F-C SAND, trace f-m gravel, wet at 14-16 fbg.
				3.1-4	No Recovery.

Lithology



Legend

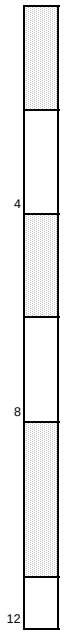
- Topsoil
- Sand
- Silty Clay
- Gravel
- Sand and Silt
- Ash
- No Recovery

Collect SS-09 (6-8)
Collect SS-09 (12-14)

Project Name: SMC Off-Site Ground Water Investigation	Drilling Company: Unitech Drilling Co., Inc.	Boring:	SS-10
Project Number: 171441.000050.000000	Drillers: Michael	Date Started:	10/26/09
Project Location: Newfield, NJ	TRC Inspector: John Moss	Date Completed:	10/26/09
Boring Location: Former lagoons	Drill Equipment / Method: Geoprobe 66DT		

Depth (feet)	Penetration (ft)	Recovery (ft)	PID (ppm)	(ft)	Soil Description
0-4	4	2	NA	0-1	Brown F-M SAND, some silt, little f-m gravel.
				1-2	Orange-brown F-M SAND, some silt, little f-m gravel.
				2-4	No Recovery.
4-8	4	2.2	NA	0-1	Orange-brown M-C SAND.
				1-2.2	F-M SAND, some silt, trace f-m gravel, wet at tip.
				2.2-4	No Recovery.
8-12	4	3.2	NA	0-3.2	Orange-brown F-C SAND, trace f-m gravel, wet.
				3.2-4	No Recovery.

Lithology



Legend

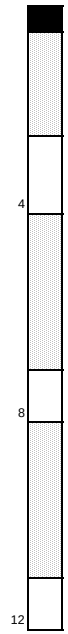
- Topsoil
- Sand
- Silty Clay
- Gravel
- Sand and Silt
- Ash
- No Recovery

Collect SS-10 (2-4)
Collect SS-10 (4-6)

Project Name: SMC Off-Site Ground Water Investigation	Drilling Company: Unitech Drilling Co., Inc.	Boring:	SS-11
Project Number: 171441.000050.000000	Drillers: Michael	Date Started:	10/27/09
Project Location: Newfield, NJ	TRC Inspector: John Moss	Date Completed:	10/27/09
Boring Location: Former lagoons	Drill Equipment / Method: Geoprobe 66DT		

Depth (feet)	Penetration (ft)	Recovery (ft)	PID (ppm)	(ft)	Soil Description
0-4	4	2.6	NA	0-0.4	TOPSOIL
				0.4-2.6	Orange-brown F-M SAND, some silt, little clay, trace f-m gravel.
				2.6-4	No Recovery.
4-8	4	2.8	NA	0-1	Orange-brown F-M SAND, some silt, little clay, trace f-m gravel.
				1-2	Orange-brown M-C SAND, trace silt, little f-m gravel.
				2-2.8	Tan F-M SAND.
				2.8-4	No Recovery.
8-12	4	3	NA	0-0.5	Tan F-M SAND.
				0.5-3	Orange-brown F-M SAND, some silt, trace clay, trace f-m gravel. Wet at 8-12 fbg.
				3-4	No Recovery.

Lithology



Legend

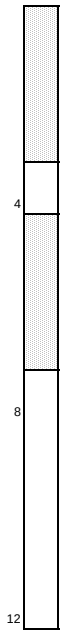
- Topsoil
- Sand
- Silty Clay
- Gravel
- Sand and Silt
- Ash
- No Recovery

Collect SS-11 (1-3)
Collect SS-11 (5-7)

Project Name: SMC Off-Site Ground Water Investigation	Drilling Company: Unitech Drilling Co., Inc.	Boring:	SS-12
Project Number: 171441.000050.000000	Drillers: Michael	Date Started:	10/27/09
Project Location: Newfield, NJ	TRC Inspector: John Moss	Date Completed:	10/27/09
Boring Location: Former lagoons	Drill Equipment / Method: Geoprobe 66DT		

Depth (feet)	Penetration (ft)	Recovery (ft)	PID (ppm)	(ft)	Soil Description
0-4	4	3	NA	0-1	Brown F-M SAND, little silt, trace f-m gravel.
				1-3	Orange-brown F-M SAND, little silt, little f-m gravel.
				3-4	No Recovery.
4-8	4	3	NA	0-0.5	Orange-brown F-M SAND, little silt, little f-m gravel.
				0.5-2.2	Orange-brown M-C SAND, little f-m gravel.
				2.2-3	Orange-brown F-M SAND, some silt, little clay. Wet at tip.
				3-4	No Recovery.
8-12	4	0	NA	0-4	No Recovery. Sleeve jammed inside macro-core. Wet.

Lithology



Legend

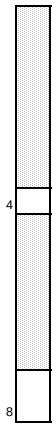
- Topsoil
- Sand
- Silty Clay
- Gravel
- Sand and Silt
- Ash
- No Recovery

Collect SS-12 (2-4)
Collect SS-12 (5-7)

Project Name: SMC Off-Site Ground Water Investigation	Drilling Company: Unitech Drilling Co., Inc.	Boring:	SS-13
Project Number: 171441.000050.000000	Drillers: Michael	Date Started:	10/27/09
Project Location: Newfield, NJ	TRC Inspector: John Moss	Date Completed:	10/27/09
Boring Location: Former lagoons	Drill Equipment / Method: Geoprobe 66DT		

Depth (feet)	Penetration (ft)	Recovery (ft)	PID (ppm)	(ft)	Soil Description
0-4	4	3.4	NA	0-1.2	Brown F-M SAND, little silt, little f-m gravel.
				1.2-3.4	Orange-brown F-M SAND, little silt, little f-m gravel.
				3.4-4	No Recovery.
4-8	4	2.9	NA	0-1.9	Orange-brown F-M SAND, little silt, little f-m gravel.
				1.9-2.9	Orange-brown m-c sand, little f-m gravel. Wet at bottom 0.2'
				2.9-4	No Recovery.

Lithology



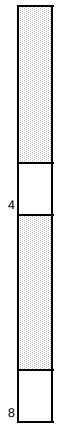
Legend

- Topsoil
- Sand
- Silty Clay
- Gravel
- Sand and Silt
- Ash
- No Recovery

Collect SS-13 (1-3)
Collect SS-13 (5-7)

Project Name: SMC Off-Site Ground Water Investigation	Drilling Company: Unitech Drilling Co., Inc.	Boring:	SS-14
Project Number: 171441.000050.000000	Drillers: Michael	Date Started:	10/27/09
Project Location: Newfield, NJ	TRC Inspector: John Moss	Date Completed:	10/27/09
Boring Location: Former lagoons	Drill Equipment / Method: Geoprobe 66DT		

Depth (feet)	Penetration (ft)	Recovery (ft)	PID (ppm)	(ft)	Soil Description	Lithology
0-4	4	3	NA	0-3	Brown F-M SAND, little silt, little f-m gravel.	
				3-4	No Recovery.	
4-8	4	3	NA	0-1	Brown F-M SAND, little silt, little f-m gravel.	
				1-3	Red brown M-C SAND, trace f-m gravel. Wet at bottom 0.2'	
				3-4	No Recovery.	



Legend

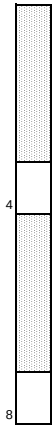
- Topsoil
- Sand
- Silty Clay
- Gravel
- Sand and Silt
- Ash
- No Recovery

Collect SS-14 (1-3)
Collect SS-14 (6-8)

Project Name: SMC Off-Site Ground Water Investigation	Drilling Company: Unitech Drilling Co., Inc.	Boring:	SS-15
Project Number: 171441.000050.000000	Drillers: Michael	Date Started:	10/27/09
Project Location: Newfield, NJ	TRC Inspector: John Moss	Date Completed:	10/27/09
Boring Location: Former lagoons	Drill Equipment / Method: Geoprobe 66DT		

Depth (feet)	Penetration (ft)	Recovery (ft)	PID (ppm)	(ft)	Soil Description
0-4	4	2.9	NA	0-1	Brown F-M SAND, little silt, little f-c gravel.
				1-1.1	C-GRAVEL.
				1.1-2.9	Orange-brown F-C SAND, little f-m gravel.
				2.9-4	No Recovery.
4-8	4	3.5	NA	0-0.5	Orange-brown F-C SAND, little f-m gravel.
				0.5-1.9	Orange-brown F-M SILTY SAND, some clay.
				1.9-3.5	Orange-brown F-M SAND, little silt. Wet at bottom 0.1'
				3.5-4	No Recovery.

Lithology



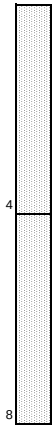
Legend

- Topsoil
- Sand
- Silty Clay
- Gravel
- Sand and Silt
- Ash
- No Recovery

Collect SS-15 (2-4)
Collect SS-15 (4-6)

Project Name: SMC Off-Site Ground Water Investigation	Drilling Company: Unitech Drilling Co., Inc.	Boring:	SS-16
Project Number: 171441.000050.000000	Drillers: Michael	Date Started:	10/27/09
Project Location: Newfield, NJ	TRC Inspector: John Moss	Date Completed:	10/27/09
Boring Location: Former lagoons	Drill Equipment / Method: Geoprobe 66DT		

Depth (feet)	Penetration (ft)	Recovery (ft)	PID (ppm)	(ft)	Soil Description	Lithology
0-4	4	4	NA	0-0.8	Dk. Brown F-M SAND, little silt	
				0.8-2.1	Brown F-M SAND, little silt, some f-c gravel.	
				2.1-4	Orange-brown F-M SAND, some silt, trace clay, little f-c gravel.	
4-8	4	4	NA	0-4	Orange-brown F-M SAND, some silt, trace clay. Wet at tip.	



Legend

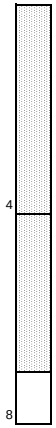
- Topsoil
- Sand
- Silty Clay
- Gravel
- Sand and Silt
- Ash
- No Recovery

Collect SS-16 (1-3)
Collect SS-16 (6-8)

Project Name: SMC Off-Site Ground Water Investigation	Drilling Company: Unitech Drilling Co., Inc.	Boring:	SS-17
Project Number: 171441.000050.000000	Drillers: Michael	Date Started:	10/27/09
Project Location: Newfield, NJ	TRC Inspector: John Moss	Date Completed:	10/27/09
Boring Location: Former lagoons	Drill Equipment / Method: Geoprobe 66DT		

Depth (feet)	Penetration (ft)	Recovery (ft)	PID (ppm)	(ft)	Soil Description
0-4	4	4	NA	0-2.5	Brown F-M SAND, little silt, little f-c gravel.
				2.5-4	Orange-brown F-M SAND, some silt, little clay, little f-m gravel.
4-8	4	3	NA	0-3	Orange-brown F-M SAND, some silt, little clay, little f-m gravel. Wet at bottom 0.5'
				3-4	No Recovery.

Lithology



Legend

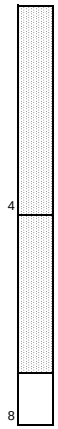
- Topsoil
- Sand
- Silty Clay
- Gravel
- Sand and Silt
- Ash
- No Recovery

Collect SS-17 (1-3)
Collect SS-17 (5-7)

Project Name: SMC Off-Site Ground Water Investigation	Drilling Company: Unitech Drilling Co., Inc.	Boring:	SS-18
Project Number: 171441.000050.000000	Drillers: Michael	Date Started:	10/27/09
Project Location: Newfield, NJ	TRC Inspector: John Moss	Date Completed:	10/27/09
Boring Location: Former lagoons	Drill Equipment / Method: Geoprobe 66DT		

Depth (feet)	Penetration (ft)	Recovery (ft)	PID (ppm)	(ft)	Soil Description
0-4	4	4	NA	0-1.3	Dk. Brown F-M SAND, little silt, trace clay, trace f-m gravel.
				1.3-4	Brown F-M SAND, some silt, little clay, trace f-c gravel.
4-8	4	3	NA	0-0.5	Brown F-M SAND, some silt, little clay, trace f-c gravel.
				2.5-3	Orange-brawn M-C SAND, little f-m gravel, red at bottom. Wet at bottom 0.2'
				3-4	No Recovery.

Lithology



Legend

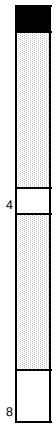
- Topsoil
- Sand
- Silty Clay
- Gravel
- Sand and Silt
- Ash
- No Recovery

Collect SS-18 (1-3)
Collect SS-18 (6-8)

Project Name: SMC Off-Site Ground Water Investigation	Drilling Company: Unitech Drilling Co., Inc.	Boring:	SS-19
Project Number: 171441.000050.000000	Drillers: Michael	Date Started:	10/27/09
Project Location: Newfield, NJ	TRC Inspector: John Moss	Date Completed:	10/27/09
Boring Location: Former lagoons	Drill Equipment / Method: Geoprobe 66DT		

Depth (feet)	Penetration (ft)	Recovery (ft)	PID (ppm)	(ft)	Soil Description
0-4	4	3.5	NA	0-0.5	Dk. Brown F-M SAND, some silt (TOPSOIL).
				0.5-1.5	Orange-brown F-M SAND, little f-m gravel, trace silt.
				1.5-1.7	Brown-black F-M SAND
				1.7-2.6	Brown F-M SAND, little sitl, little f-m gravel.
				2.6-3.5	Orange-brown F-C SAND, little f-c gravel.
				3.5-4	No Recovery.
4-8	4	3.3	NA	0-0.8	Orange-brown F-M SAND, little silt, little clay
				0.8-3.3	Orange-brown m-c sand,some m-c Wet at bottom 0.5'
				3.3-4	No Recovery.

Lithology



Legend

- Topsoil
- Sand
- Silty Clay
- Gravel
- Sand and Silt
- Ash
- No Recovery

Collect SS-19 (1-3)
Collect SS-19 (6-8)

Project Name: SMC Off-Site Ground Water Investigation	Drilling Company: Unitech Drilling Co., Inc.	Boring:	SS-20
Project Number: 171441.000050.000000	Drillers: Michael	Date Started:	10/27/09
Project Location: Newfield, NJ	TRC Inspector: John Moss	Date Completed:	10/27/09
Boring Location: Former lagoons	Drill Equipment / Method: Geoprobe 66DT		

Depth (feet)	Penetration (ft)	Recovery (ft)	PID (ppm)	(ft)	Soil Description	Lithology
0-4	4	3.2	NA	0-2.4	Brown F-M SAND, trace silt. Little f-m gravel.	
				2.4-2.6	Dense orange-brown F-SILTY SAND gravel, trace silt.	
				2.6-3.2	Brown F-M SAND, some f-m gravel.	
				3.2-4	No recovery.	
4-8	4	3.2	NA	0-3.2	Brown F-M SAND, trace silt, little f-m gravel. Wet at tip.	
				3.2-4	No Recovery.	

Legend

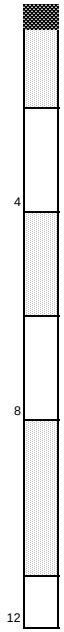
- Topsoil
- Sand
- Silty Clay
- Gravel
- Sand and Silt
- Ash
- No Recovery

Collect SS-20 (1-3)
Collect SS-20 (4-6)

Project Name: SMC Off-Site Ground Water Investigation	Drilling Company: Unitech Drilling Co., Inc.	Boring:	SS-21
Project Number: 171441.000050.000000	Drillers: Michael	Date Started:	10/28/09
Project Location: Newfield, NJ	TRC Inspector: John Moss	Date Completed:	10/28/09
Boring Location: Former Bldg. D102 footprint	Drill Equipment / Method: Geoprobe 66DT		

Depth (feet)	Penetration (ft)	Recovery (ft)	PID (ppm)	(ft)	Soil Description
0-4	4	1.4	NA	0-0.5	Concrete
				0.5-1	Brown F-M SAND, little f-m gravel.
				1-1.9	Orange-brown M-C SAND, little f-m gravel.
				1.9-4	No Recovery.
4-8	4	2.3	NA	0-2.3	Orange-brown M-C SAND, little m-c gravel. Wet at tip.
				2.3-4	No Recovery.
8-12	4	3	NA	0-1	Orange-brown F-M SAND, some silt, trace f-m gravel. Wet.
				1-3	Orange-brown F-M SAND. Wet.
				3-4	No Recovery.

Lithology



Legend

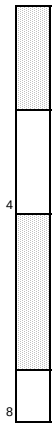
- Topsoil
- Sand
- Silty Clay
- Gravel
- Sand and Silt
- Ash
- Concrete
- No Recovery

Collect SS-21 (1-3)
Collect SS-21 (5-7)

Project Name: SMC Off-Site Ground Water Investigation	Drilling Company: Unitech Drilling Co., Inc.	Boring:	SS-22
Project Number: 171441.000050.000000	Drillers: Michael	Date Started:	10/28/09
Project Location: Newfield, NJ	TRC Inspector: John Moss	Date Completed:	10/28/09
Boring Location: Former Bldg. D102 footprint	Drill Equipment / Method: Geoprobe 66DT		

Depth (feet)	Penetration (ft)	Recovery (ft)	PID (ppm)	(ft)	Soil Description
0-4	4	2.1	NA	0-0.6	Brown F-M SAND, some f-m gravel, little silt.
				0.6-0.9	Orange-brown F-M SAND.
				0.9-1.2	Black F-M SAND, petro odor.
				1.2-2.1	Brown F-M SAND, little silt, little f-m gravel.
				2.1-4	No recovery.
4-8	4	3.1	NA	0-0.6	Brown F-M SAND, little silt, little f-m gravel.
				0.6-3.1	Orange-brown M-C SAND, little f-m gravel. Wet at tip.
				3.1-4	No recovery.

Lithology



Legend

- Topsoil
- Sand
- Silty Clay
- Gravel
- Sand and Silt
- Ash
- No Recovery

Collect SS-22 (1-3)
Collect SS-22 (6-8)

Project Name: SMC Off-Site Ground Water Investigation	Drilling Company: Unitech Drilling Co., Inc.	Boring:	SS-23
Project Number: 171441.000050.000000	Drillers: Michael	Date Started:	10/28/09
Project Location: Newfield, NJ	TRC Inspector: John Moss	Date Completed:	10/28/09
Boring Location: Former Bldg. D102 footprint	Drill Equipment / Method: Geoprobe 66DT		

Depth (feet)	Penetration (ft)	Recovery (ft)	PID (ppm)	(ft)	Soil Description	Lithology
0-4	4	2.9	NA	0-0.6	Brown F-M SAND, some m-c gravel and concrete fragments.	
				0.6-1.6	Orange-brown F-M SAND, little f-m gravel.	
				1.6-2.9	Dk. Brown F-M SAND, little silt.	
				2.9-4	No recovery.	
4-8	4	3.3	NA	0-0.6	Orange-brown M-C SAND, little f-m gravel. Wet at tip.	
				3.3-4	No recovery.	

Legend

- Topsoil
- Sand
- Silty Clay
- Gravel
- Sand and Silt
- Ash
- No Recovery

Collect SS-23 (2-4)
Collect SS-23 (6-8)

Project Name: SMC Off-Site Ground Water Investigation	Drilling Company: Unitech Drilling Co., Inc.	Boring:	SS-24
Project Number: 171441.000050.000000	Drillers: Michael	Date Started:	10/28/09
Project Location: Newfield, NJ	TRC Inspector: John Moss	Date Completed:	10/28/09
Boring Location: Former Bldg. D102 footprint	Drill Equipment / Method: Geoprobe 66DT		

Depth (feet)	Penetration (ft)	Recovery (ft)	PID (ppm)	(ft)	Soil Description
0-4	4	2.5	NA	0-0.9	Black-Brown F-M SAND, little c-sand, some f-c gravel and concrete fragments.
				0.9-1.6	Orange-brown F-M SAND, little f-m gravel.
				1.6-1.8	Black gravel.
				1.8-2.5	Brown F-M SAND, little f-m gravel.
				2.5-4	No recovery.
4-8	4	3.3	NA	0-1.4	Brown F-M SAND, little f-m gravel.
				1.4-3.3	Orange-Brown F-M SAND, some silt, little clay. Wet at tip.
				3.3-4	No recovery.

Lithology

Legend

- Topsoil
- Sand
- Silty Clay
- Gravel
- Sand and Silt
- Ash
- No Recovery

Collect SS-24 (1-3)
Collect SS-24 (4-6)

APPENDIX D

GROUNDWATER VERTICAL PROFILING/SAMPLING LOG SHEETS

Ground Water Sampling Log

Client: SMC
Project Number: 112434.00GWAT.002235
Site Name / Location: SMC / Newfield / Off-site locations in Vineland
Site Conditions / Weather:
Purge Method: Whale pump
Purge Equipment/Material: SAT
Headspace PID/FID (ppm): NA
Pump Intake (ftbtoc):

Well Identification: VP-13 (25-30')
Date: 10/14/2009
Depth to Water (ftbtoc): NA
Depth to Bottom (ftbtoc): NA
Standing Column (ft): NA
Well Diameter (in): 4.25"
Standing Volume (gal,liter): NA
Screened Interval (ftbtoc):

Purging Information Start purge at: 11:05 Well Casing Volumes: 1" = 0.04 gal/ft = 0.15 L/ft, 2" = 0.16 gal/ft = 0.62 L/ft, 4" = 0.65 gal/ft = 2.47 L/ft, 6" = 1.47 gal/ft = 5.56 L/ft

Time	DTW (ftbtoc)	Purge Rate (gpm,lpm)	Volume Purged (gal,liter)	pH	Specific Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (ºC)	Other	ORP (mV)	Comments / Observations (color, odor, etc.)
11:10				4.62	0.138	986.1	8.02	12.97		242.0	Orange-brown, silty
11:14				4.42	0.141	614.8	8.13	12.93		267.0	Orange-brown, silty
11:17				4.34	0.144	461.0	8.23	12.90		281.9	Orange-brown, silty
11:21				4.32	0.147	321.0	8.30	12.88		288.8	Orange-brown, silty
11:26				4.33	0.150	219.3	8.40	12.85		295.6	Orange-brown, silty
11:30				4.30	0.152	128.2	8.47	12.85		297.4	Orange-brown, silty
11:35				4.31	0.153	57.3	8.59	12.82		302.3	Clear
3@3-5 m.			30-gal	+/- 0.1	3%	10%	10%	3%		+/- 10 mV	

Sampling Information Sample Identity: VP-13 (25-30') Sample Time: 11:35 TRC Personnel: J. Moss

Analysis	Containers Number	Containers Size	Containers Type	Containers Preservative	Sampling Method/Material	Comments / Observations
VOCs						
Total Cr						
Cr+6						
Perchlorate						
Methane						
Nitrate						
Fe+2						

Ground Water Sampling Log

Client: SMC
Project Number: 112434.00GWAT.002235
Site Name / Location: SMC / Newfield / Off-site locations in Vineland
Site Conditions / Weather:
Purge Method: SAT & submersible pump / packer assembly
Purge Equipment/Material: SAT
Headspace PID/FID (ppm): NA
Pump Intake (ftbtoc):

Well Identification: VP-13 (50-55')
Date: 10/14/2009
Depth to Water (ftbtoc): NA
Depth to Bottom (ftbtoc): NA
Standing Column (ft): NA
Well Diameter (in): 4.25"
Standing Volume (gal,liter): NA
Screened Interval (ftbtoc):

Purging Information Start purge at: 13:14 Well Casing Volumes: 1" = 0.04 gal/ft = 0.15 L/ft, 2" = 0.16 gal/ft = 0.62 L/ft, 4" = 0.65 gal/ft = 2.47 L/ft, 6" = 1.47 gal/ft = 5.56 L/ft

Time	DTW (ftbtoc)	Purge Rate (gpm,lpm)	Volume Purged (gal,liter)	pH	Specific Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (ºC)	Other	ORP (mV)	Comments / Observations (color, odor, etc.)
13:17				5.18	0.171	1086.4	2.97	14.09		208.5	Orange-brown, silty
13:20				4.78	0.174	1035.5	3.11	13.96		227.1	Orange-brown, silty
13:23				4.62	0.175	506.4	2.69	13.82		245.5	Orange-brown, silty
13:26				4.60	0.174	284.8	2.44	13.67		252.8	Orange-brown, silty, clearing
13:29				4.62	0.176	177.0	2.35	13.63		257.8	Orange-brown, silty, clearing
13:32				4.61	0.176	97.7	2.28	13.57		266.9	Orange-brown, silty, clearing
13:37				4.62	0.176	59.5	2.28	13.52		269.4	Slightly cloudy
13:45				4.65	0.175	46.9	2.17	13.44		277.6	Slightly cloudy
3@3-5 m.			~100-gal	+/- 0.1	3%	10%	10%	3%		+/- 10 mV	

Sampling Information Sample Identity: VP-13 (50-55') Sample Time: 13:45 TRC Personnel: J. Moss

Analysis	Containers Number	Containers Size	Containers Type	Containers Preservative	Sampling Method/Material	Comments / Observations
VOCs						
Total Cr						
Cr+6						
Perchlorate						
Methane						
Nitrate						
Fe+2						

Ground Water Sampling Log

Client: SMC
Project Number: 112434.00GWAT.002235
Site Name / Location: SMC / Newfield / Off-site locations in Vineland
Site Conditions / Weather:
Purge Method: SAT & submersible pump / packer assembly
Purge Equipment/Material: SAT
Headspace PID/FID (ppm): NA
Pump Intake (ftbtoc):

Well Identification: VP-13 (75-80')
Date: 10/14/2009
Depth to Water (ftbtoc): NA
Depth to Bottom (ftbtoc): NA
Standing Column (ft): NA
Well Diameter (in): 4.25"
Standing Volume (gal,liter): NA
Screened Interval (ftbtoc):

Purging Information Start purge at: 14:40 Well Casing Volumes: 1" = 0.04 gal/ft = 0.15 L/ft, 2" = 0.16 gal/ft = 0.62 L/ft, 4" = 0.65 gal/ft = 2.47 L/ft, 6" = 1.47 gal/ft = 5.56 L/ft

Time	DTW (ftbtoc)	Purge Rate (gpm,lpm)	Volume Purged (gal,liter)	pH	Specific Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (ºC)	Other	ORP (mV)	Comments / Observations (color, odor, etc.)
14:43				4.48	0.131	408.0	6.41	14.19		245.7	Slight orange-brown, silty
14:48				4.46	0.125	26.8	7.36	14.20		269.8	clear
14:53				4.41	0.125	8.2	7.50	14.16		287.0	clear
3@3-5 m.			~70-gal	+/- 0.1	3%	10%	10%	3%		+/- 10 mV	

Sampling Information Sample Identity: VP-13 (75-80') Sample Time: 14:55 TRC Personnel: J. Moss

Analysis	Containers Number	Containers Size	Containers Type	Containers Preservative	Sampling Method/Material	Comments / Observations
VOCs						
Total Cr						
Cr+6						
Perchlorate						
Methane						
Nitrate						
Fe+2						

Ground Water Sampling Log

Client: SMC
Project Number: 112434.00GWAT.002235
Site Name / Location: SMC / Newfield / Off-site locations in Vineland
Site Conditions / Weather:
Purge Method: SAT & submersible pump / packer assembly
Purge Equipment/Material: SAT
Headspace PID/FID (ppm): NA
Pump Intake (ftbtoc):

Well Identification: VP-13 (100-105')
Date: 10/15/2009
Depth to Water (ftbtoc): NA
Depth to Bottom (ftbtoc): NA
Standing Column (ft): NA
Well Diameter (in): 4.25"
Standing Volume (gal,liter): NA
Screened Interval (ftbtoc):

Purging Information Start purge at: 8:28 Well Casing Volumes: 1" = 0.04 gal/ft = 0.15 L/ft, 2" = 0.16 gal/ft = 0.62 L/ft, 4" = 0.65 gal/ft = 2.47 L/ft, 6" = 1.47 gal/ft = 5.56 L/ft

Time	DTW (ftbtoc)	Purge Rate (gpm,lpm)	Volume Purged (gal,liter)	pH	Specific Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (ºC)	Other	ORP (mV)	Comments / Observations (color, odor, etc.)
8:31				5.70	0.148	1109.7	3.18	13.81		96.2	Orange-brown, silty
8:36				5.34	0.122	321.4	6.61	14.09		153.7	Orange-brown, silty
8:41				5.14	0.117	528.5	7.62	14.18		183.2	Orange-brown, silty
8:46				5.02	0.115	328.5	7.87	14.21		200.6	Orange-brown, silty
8:51				4.88	0.113	274.6	8.05	14.00		218.4	Orange-brown, silty
8:56				4.77	0.113	166.7	8.13	13.98		232.0	Orange-brown, silty
9:01				4.74	0.113	99.4	8.16	13.98		240.4	Slightly cloudy
9:06				4.71	0.113	54.3	8.18	13.99		247.0	Slightly cloudy
9:11				4.68	0.113	35.4	8.20	13.99		252.4	Clear
3@3-5 m.			~100-gal	+/- 0.1	3%	10%	10%	3%		+/- 10 mV	

Sampling Information Sample Identity: VP-13 (100-105') Sample Time: 9:15 TRC Personnel: J. Moss

Analysis	Containers Number	Containers Size	Containers Type	Containers Preservative	Sampling Method/Material	Comments / Observations
VOCs						
Total Cr						
Cr+6						
Perchlorate						
Methane						
Nitrate						
Fe+2						

Ground Water Sampling Log

Client: SMC
Project Number: 112434.00GWAT.002235
Site Name / Location: SMC / Newfield / Off-site locations in Vineland
Site Conditions / Weather:
Purge Method: SAT & submersible pump / packer assembly
Purge Equipment/Material: SAT
Headspace PID/FID (ppm): NA
Pump Intake (ftbtoc):

Well Identification: VP-13 (125-130')
Date: 10/15/2009
Depth to Water (ftbtoc): NA
Depth to Bottom (ftbtoc): NA
Standing Column (ft): NA
Well Diameter (in): 4.25"
Standing Volume (gal,liter): NA
Screened Interval (ftbtoc):

Purging Information — Start purge at: 10:32 — Well Casing Volumes: 1" = 0.04 gal/ft = 0.15 L/ft, 2" = 0.16 gal/ft = 0.62 L/ft, 4" = 0.65 gal/ft = 2.47 L/ft, 6" = 1.47 gal/ft = 5.56 L/ft

Time	DTW (ftbtoc)	Purge Rate (gpm,lpm)	Volume Purged (gal,liter)	pH	Specific Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (ºC)	Other	ORP (mV)	Comments / Observations (color, odor, etc.)
10:37				6.22	0.039	1113.1	8.08	14.18		208.6	Orange-brown, silty
10:42				5.13	0.035	718.5	8.50	14.19		223.3	Orange-brown, silty
10:45 - 10:49	Not pumping										
10:52				5.14	0.034	1085.0	8.39	14.17		222.7	Orange-brown, silty
10:56 - 11:22	Not pumping										
11:25				5.22	0.034	500.8	8.24	14.10		213.2	Orange-brown, silty
11:30				5.13	0.033	116.9	8.40	14.14		226.8	Slightly cloudy
11:34				5.09	0.033	50.1	8.42	14.15		231.9	Clear
11:38				5.05	0.033	15.1	8.44	14.16		235.6	Clear
3@3-5 m.			~100-gal	+/- 0.1	3%	10%	10%	3%		+/- 10 mV	

Sampling Information — Sample Identity: VP-13 (125-130') — Sample Time: 11:40 — TRC Personnel: J. Moss

Analysis	Containers Number	Containers Size	Containers Type	Preservative	Sampling Method/Material	Comments / Observations
VOCs						
Total Cr						
Cr+6						
Perchlorate						
Methane						
Nitrate						
Fe+2						

Ground Water Sampling Log

Client: SMC
Project Number: 112434.00GWAT.002235
Site Name / Location: SMC / Newfield / Off-site locations in Vineland
Site Conditions / Weather: ~50-degrees, cloudy
Purge Method: SAT & submersible pump / packer assembly
Purge Equipment/Material: SAT
Headspace PID/FID (ppm): NA
Pump Intake (ftbtoc):

Well Identification: Vp-13A (15-20')
Date: 10/22/2009
Depth to Water (ftbtoc): NA
Depth to Bottom (ftbtoc): NA
Standing Column (ft): NA
Well Diameter (in): 4.25"
Standing Volume (gal,liter): NA
Screened Interval (ftbtoc):

Purging Information — Start purge at: 11:58 — Well Casing Volumes: 1" = 0.04 gal/ft = 0.15 L/ft, 2" = 0.16 gal/ft = 0.62 L/ft, 4" = 0.65 gal/ft = 2.47 L/ft, 6" = 1.47 gal/ft = 5.56 L/ft

Time	DTW (ftbtoc)	Purge Rate (gpm,lpm)	Volume Purged (gal,liter)	pH	Specific Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (ºC)	Other	ORP (mV)	Comments / Observations (color, odor, etc.)
12:04				4.63	0.387	1414.6	1.59	18.43		192.8	Orange-brown, silty
12:07 - 12:09	Not Pumping										
12:13				4.72	0.436	1420.2	0.86	18.90		199.1	Orange-brown, silty
12:15				4.68	0.447	1065.2	0.62	18.86		205.0	Orange-brown, silty
12:20				4.67	0.454	290.1	0.58	18.91		208.1	Cloudy
12:24				4.69	0.458	197.5	0.47	19.00		208.1	Slightly Cloudy
12:28				4.71	0.460	107.3	0.47	19.10		206.3	Clear
12:35				4.73	0.462	44.2	0.43	19.17		205.2	Clear
3@3-5 m.			~50-gal	+/- 0.1	3%	10%	10%	3%		+/- 10 mV	

Sampling Information — Sample Identity: VP-13A (15-20') — Sample Time: 12:35 — TRC Personnel: J. Moss

Analysis	Containers Number	Containers Size	Containers Type	Containers Preservative	Sampling Method/Material	Comments / Observations
VOCs						
Total Cr						
Cr+6						
Perchlorate						
Methane						
Nitrate						
Fe+2						

Ground Water Sampling Log

Client: SMC
Project Number: 112434.00GWAT.002235
Site Name / Location: SMC / Newfield / Off-site locations in Vineland
Site Conditions / Weather: ~60-degrees, sunny
Purge Method: SAT & submersible pump / packer assembly
Purge Equipment/Material: SAT
Headspace PID/FID (ppm): NA
Pump Intake (ftbtoc):

Well Identification: VP-13A (37-42')
Date: 10/22/2009
Depth to Water (ftbtoc): NA
Depth to Bottom (ftbtoc): NA
Standing Column (ft): NA
Well Diameter (in): 4.25"
Standing Volume (gal,liter): NA
Screened Interval (ftbtoc):

Purging Information Start purge at: 14:03 Well Casing Volumes: 1" = 0.04 gal/ft = 0.15 L/ft, 2" = 0.16 gal/ft = 0.62 L/ft, 4" = 0.65 gal/ft = 2.47 L/ft, 6" = 1.47 gal/ft = 5.56 L/ft

Time	DTW (ftbtoc)	Purge Rate (gpm,lpm)	Volume Purged (gal,liter)	pH	Specific Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (ºC)	Other	ORP (mV)	Comments / Observations (color, odor, etc.)
14:06				4.52	0.186	181.6	0.40	14.75		154.9	Slightly orange-brown, silty
14:11				4.44	0.183	42.7	0.25	14.56		197.4	Clear
14:14				4.42	0.182	32.8	0.23	14.50		213.9	Clear
3@3-5 m.			~80-gal	+/- 0.1	3%	10%	10%	3%		+/- 10 mV	

Sampling Information Sample Identity: VP-13A (37-42') Sample Time: 14:15 TRC Personnel: J. Moss

Analysis	Containers Number	Containers Size	Containers Type	Containers Preservative	Sampling Method/Material	Comments / Observations
VOCs						
Total Cr						
Cr+6						
Perchlorate						
Methane						
Nitrate						
Fe+2						

Ground Water Sampling Log

Client: SMC
Project Number: 112434.00GWAT.002235
Site Name / Location: SMC / Newfield / Off-site locations in Vineland
Site Conditions / Weather:
Purge Method: SAT & submersible pump / packer assembly
Purge Equipment/Material: SAT
Headspace PID/FID (ppm): NA
Pump Intake (ftbtoc):

Well Identification: VP-13A (62-67')
Date: 10/22/2009
Depth to Water (ftbtoc): NA
Depth to Bottom (ftbtoc): NA
Standing Column (ft): NA
Well Diameter (in): 4.25"
Standing Volume (gal,liter): NA
Screened Interval (ftbtoc):

Purging Information Start purge at: 15:06 Well Casing Volumes: 1" = 0.04 gal/ft = 0.15 L/ft, 2" = 0.16 gal/ft = 0.62 L/ft, 4" = 0.65 gal/ft = 2.47 L/ft, 6" = 1.47 gal/ft = 5.56 L/ft

Time	DTW (ftbtoc)	Purge Rate (gpm,lpm)	Volume Purged (gal,liter)	pH	Specific Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (ºC)	Other	ORP (mV)	Comments / Observations (color, odor, etc.)
15:13				4.62	0.148	1215.2	0.29	16.44		174.7	Orange-brown, silty
15:50				4.80	NA	3.7	NA	NA		NA	Clear
3@3-5 m.			~70-gal	+/- 0.1	3%	10%	10%	3%		+/- 10 mV	

Sampling Information Sample Identity: VP-13A (62-67') Sample Time: 15:50 TRC Personnel: J. Moss

Analysis	Containers Number	Containers Size	Containers Type	Containers Preservative	Sampling Method/Material	Comments / Observations
VOCs						
Total Cr						
Cr+6						
Perchlorate						
Methane						
Nitrate						
Fe+2						

Ground Water Sampling Log

Client: SMC
Project Number: 112434.00GWAT.002235
Site Name / Location: SMC / Newfield / Off-site locations in Vineland
Site Conditions / Weather: ~55-degrees, cloudy
Purge Method: SAT & submersible pump / packer assembly
Purge Equipment/Material: SAT
Headspace PID/FID (ppm): NA
Pump Intake (ftbtoc):

Well Identification: VP-13A (87-92')
Date: 10/23/2009
Depth to Water (ftbtoc): NA
Depth to Bottom (ftbtoc): NA
Standing Column (ft): NA
Well Diameter (in): 4.25"
Standing Volume (gal,liter): NA
Screened Interval (ftbtoc):

Purging Information Start purge at: 8:28 Well Casing Volumes: 1" = 0.04 gal/ft = 0.15 L/ft, 2" = 0.16 gal/ft = 0.62 L/ft, 4" = 0.65 gal/ft = 2.47 L/ft, 6" = 1.47 gal/ft = 5.56 L/ft

Time	DTW (ftbtoc)	Purge Rate (gpm,lpm)	Volume Purged (gal,liter)	pH	Specific Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (ºC)	Other	ORP (mV)	Comments / Observations (color, odor, etc.)
8:31				5.65	0.115	471.2	3.02	14.37		52.7	Orange-brown, silty
8:35				4.84	0.100	95.1	5.31	14.27		127.4	Clear
8:38				4.76	0.100	107.7	5.30	14.25		145.3	Clear
8:41				4.67	0.100	55.7	6.20	14.22		161.6	Clear
8:46				4.61	0.100	42.4	6.25	14.21		181.5	Clear
8:50				4.56	0.100	27.8	6.62	1.20		197.3	Clear
8:52				4.55	0.100	26.3	6.60	14.19		201.2	Clear
3@3-5 m.			~125-gal	+/- 0.1	3%	10%	10%	3%		+/- 10 mV	

Sampling Information Sample Identity: VP-13A (87-92') Sample Time: 8:55 TRC Personnel: J. Moss

Analysis	Containers Number	Containers Size	Containers Type	Containers Preservative	Sampling Method/Material	Comments / Observations
VOCs						
Total Cr						
Cr+6						
Perchlorate						
Methane						
Nitrate						
Fe+2						

Ground Water Sampling Log

Client: SMC

Project Number: 112434.00GWAT.002235

Site Name / Location: SMC / Newfield / Off-site locations in Vineland

Site Conditions / Weather: ~60-degrees, cloudy

Purge Method: SAT & submersible pump / packer assembly

Purge Equipment/Material: SAT

Headspace PID/FID (ppm): NA

Pump Intake (ftbtoc):

Well Identification: VP-13A (111-116')

Date: 10/26/2009

Depth to Water (ftbtoc): NA

Depth to Bottom (ftbtoc): NA

Standing Column (ft): NA

Well Diameter (in): 4.25"

Standing Volume (gal,liter): NA

Screened Interval (ftbtoc):

Purging Information Start purge at: 9:57 Well Casing Volumes: 1" = 0.04 gal/ft = 0.15 L/ft, 2" = 0.16 gal/ft = 0.62 L/ft, 4" = 0.65 gal/ft = 2.47 L/ft, 6" = 1.47 gal/ft = 5.56 L/ft

Time	DTW (ftbtoc)	Purge Rate (gpm,lpm)	Volume Purged (gal,liter)	pH	Specific Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (ºC)	Other	ORP (mV)	Comments / Observations (color, odor, etc.)
10:00				5.27	0.058	1374.0	5.41	14.64		133.5	Orange-brown, silty
10:06				4.87	0.039	138.7	7.47	14.60		181.1	Cloudy
10:11				4.85	0.038	38.9	7.62	14.54		191.6	Clear
10:15				4.87	0.037	18.5	7.67	14.50		198.2	Clear
10:17				4.88	0.037	15.1	7.70	14.49		200.7	Clear
3@3-5 m.			~75-gal	+/- 0.1	3%	10%	10%	3%		+/- 10 mV	

Sampling Information Sample Identity: VP-13A (111-116') Sample Time: 10:20 TRC Personnel: J. Moss

Analysis	Containers Number	Containers Size	Containers Type	Containers Preservative	Sampling Method/Material	Comments / Observations
VOCs						
Total Cr						
Cr+6						
Perchlorate						
Methane						
Nitrate						
Fe+2						

Ground Water Sampling Log

Client: SMC
Project Number: 112434.00GWAT.002235
Site Name / Location: SMC / Newfield / Off-site locations in Vineland
Site Conditions / Weather:
Purge Method: Whale pump
Purge Equipment/Material: SAT
Headspace PID/FID (ppm): NA
Pump Intake (ftbtoc):

Well Identification: VP-14 (35-40')
Date: 10/16/2009
Depth to Water (ftbtoc): NA
Depth to Bottom (ftbtoc): NA
Standing Column (ft): NA
Well Diameter (in): 4.25"
Standing Volume (gal,liter): NA
Screened Interval (ftbtoc):

Purging Information Start purge at: 12:00 Well Casing Volumes: 1" = 0.04 gal/ft = 0.15 L/ft, 2" = 0.16 gal/ft = 0.62 L/ft, 4" = 0.65 gal/ft = 2.47 L/ft, 6" = 1.47 gal/ft = 5.56 L/ft

Time	DTW (ftbtoc)	Purge Rate (gpm,lpm)	Volume Purged (gal,liter)	pH	Specific Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (ºC)	Other	ORP (mV)	Comments / Observations (color, odor, etc.)
12:27				5.20	0.188	1109.0	4.55	13.64		234.8	Orange-brown, silty
12:32				4.90	0.181	1074.6	5.48	14.30		232.5	Orange-brown, silty
12:40				4.76	0.215	581.0	3.16	14.81		224.4	Orange-brown, silty
12:45				4.73	0.228	487.7	2.97	14.84		215.0	Orange-brown, silty
12:49				4.73	0.237	530.0	2.90	14.85		208.9	Orange-brown, silty
12:53				4.73	0.242	408.8	2.90	14.90		197.5	Orange-brown, silty
13:00				4.74	0.248	254.6	2.91	14.94		189.6	Cloudy
13:06				4.76	0.252	180.0	2.87	14.94		177.5	Slightly cloudy
3@3-5 m.			~75-gal	+/- 0.1	3%	10%	10%	3%		+/- 10 mV	

Sampling Information Sample Identity: VP-14 (35-40') Sample Time: 13:10 TRC Personnel: J. Moss

Analysis	Containers Number	Containers Size	Containers Type	Containers Preservative	Sampling Method/Material	Comments / Observations
VOCs						
Total Cr						
Cr+6						
Perchlorate						
Methane						
Nitrate						
Fe+2						

Ground Water Sampling Log

Client: SMC
Project Number: 112434.00GWAT.002235
Site Name / Location: SMC / Newfield / Off-site locations in Vineland
Site Conditions / Weather:
Purge Method: SAT & submersible pump / packer assembly
Purge Equipment/Material: SAT
Headspace PID/FID (ppm): NA
Pump Intake (ftbtoc):

Well Identification: VP-14 (55-60')
Date: 10/16/2009
Depth to Water (ftbtoc): NA
Depth to Bottom (ftbtoc): NA
Standing Column (ft): NA
Well Diameter (in): 4.25"
Standing Volume (gal,liter): NA
Screened Interval (ftbtoc):

Purging Information Start purge at: 13:50 Well Casing Volumes: 1" = 0.04 gal/ft = 0.15 L/ft, 2" = 0.16 gal/ft = 0.62 L/ft, 4" = 0.65 gal/ft = 2.47 L/ft, 6" = 1.47 gal/ft = 5.56 L/ft

Time	DTW (ftbtoc)	Purge Rate (gpm,lpm)	Volume Purged (gal,liter)	pH	Specific Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (ºC)	Other	ORP (mV)	Comments / Observations (color, odor, etc.)
13:53				4.75	0.090	487.4	7.46	14.23		249.3	Cloudy, orange-brown silt
13:57				4.70	0.087	182.2	7.56	14.70		246.3	Cloudy
14:03				4.67	0.086	52.3	7.73	14.83		249.5	Clear
14:06				4.65	0.085	43.7	7.82	14.80		253.3	Clear
14:09				4.62	0.084	46.0	7.94	14.60		256.3	Clear
14:13				4.60	0.085	36.4	8.01	14.59		260.9	Clear
3@3-5 m.			~50-gal	+/- 0.1	3%	10%	10%	3%		+/- 10 mV	

Sampling Information Sample Identity: VP-14 (55-60') Sample Time: 14:15 TRC Personnel: J. Moss

Analysis	Containers Number	Containers Size	Containers Type	Containers Preservative	Sampling Method/Material	Comments / Observations
VOCs						
Total Cr						
Cr+6						
Perchlorate						
Methane						
Nitrate						
Fe+2						

Ground Water Sampling Log

Client: SMC
Project Number: 112434.00GWAT.002235
Site Name / Location: SMC / Newfield / Off-site locations in Vineland
Site Conditions / Weather:
Purge Method: SAT & submersible pump / packer assembly
Purge Equipment/Material: SAT
Headspace PID/FID (ppm): NA
Pump Intake (ftbtoc):

Well Identification: VP-14 (130-135')
Date: 10/19/2009
Depth to Water (ftbtoc): NA
Depth to Bottom (ftbtoc): NA
Standing Column (ft): NA
Well Diameter (in): 4.25"
Standing Volume (gal,liter): NA
Screened Interval (ftbtoc):

Purging Information Start purge at: 14:40 Well Casing Volumes: 1" = 0.04 gal/ft = 0.15 L/ft, 2" = 0.16 gal/ft = 0.62 L/ft, 4" = 0.65 gal/ft = 2.47 L/ft, 6" = 1.47 gal/ft = 5.56 L/ft

Time	DTW (ftbtoc)	Purge Rate (gpm,lpm)	Volume Purged (gal,liter)	pH	Specific Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (ºC)	Other	ORP (mV)	Comments / Observations (color, odor, etc.)
14:51				4.77	0.065	209.8	3.73	14.39		207.6	Cloudy, orange-brown silt
14:56				4.70	0.063	99.0	3.72	14.36		228.3	Slightly cloudy
14:58				4.68	0.062	77.3	3.71	14.35		235.5	Clear
15:01				4.66	0.062	64.6	3.70	14.36		242.0	Clear
15:05				4.60	0.061	58.3	3.68	14.32		249.5	Clear
15:07				4.60	0.061	55.0	3.67	14.32		251.6	Clear
3@3-5 m.			~100-gal	+/- 0.1	3%	10%	10%	3%		+/- 10 mV	

Sampling Information Sample Identity: VP-14 (130-135') Sample Time: 15:10 TRC Personnel: J. Moss

Analysis	Containers Number	Containers Size	Containers Type	Containers Preservative	Sampling Method/Material	Comments / Observations
VOCs						
Total Cr						
Cr+6						
Perchlorate						
Methane						
Nitrate						
Fe+2						

Ground Water Sampling Log

Client: SMC
Project Number: 112434.00GWAT.002235
Site Name / Location: SMC / Newfield / Off-site locations in Vineland
Site Conditions / Weather:
Purge Method: SAT & submersible pump / packer assembly
Purge Equipment/Material: SAT
Headspace PID/FID (ppm): NA
Pump Intake (ftbtoc):

Well Identification: VP-15 (30-35')
Date: 10/12/2009
Depth to Water (ftbtoc): NA
Depth to Bottom (ftbtoc): NA
Standing Column (ft): NA
Well Diameter (in): 4.25"
Standing Volume (gal,liter): NA
Screened Interval (ftbtoc):

Purging Information Start purge at: 14:03 Well Casing Volumes: 1" = 0.04 gal/ft = 0.15 L/ft, 2" = 0.16 gal/ft = 0.62 L/ft, 4" = 0.65 gal/ft = 2.47 L/ft, 6" = 1.47 gal/ft = 5.56 L/ft

Time	DTW (ftbtoc)	Purge Rate (gpm,lpm)	Volume Purged (gal,liter)	pH	Specific Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (ºC)	Other	ORP (mV)	Comments / Observations (color, odor, etc.)
14:15				8.60	0.124	1147.2	19.15	18.16		146.0	Yellow-brown, silty
14:24				5.87	0.129	1007.1	9.53	18.96		194.8	Yellow-brown, silty
14:28				5.27	0.121	135.2	8.51	18.01		229.8	Pale yellow
14:31				5.06	0.120	75.6	8.56	17.97		243.3	Pale yellow
14:34				4.94	0.119	48.7	8.53	17.94		254.2	Pale yellow
3@3-5 m.			~75-gal	+/- 0.1	3%	10%	10%	3%		+/- 10 mV	

Sampling Information Sample Identity: VP-15 (30-35') Sample Time: 14:40 TRC Personnel: J. Moss

Analysis	Containers Number	Containers Size	Containers Type	Containers Preservative	Sampling Method/Material	Comments / Observations
VOCs						
Total Cr						
Cr+6						
Perchlorate						
Methane						
Nitrate						
Fe+2						

Ground Water Sampling Log

Client: SMC
Project Number: 112434.00GWAT.002235
Site Name / Location: SMC / Newfield / Off-site locations in Vineland
Site Conditions / Weather:
Purge Method: SAT & submersible pump / packer assembly
Purge Equipment/Material: SAT
Headspace PID/FID (ppm): NA
Pump Intake (ftbtoc):

Well Identification: VP-15 (45-50')
Date: 10/12/2009
Depth to Water (ftbtoc): NA
Depth to Bottom (ftbtoc): NA
Standing Column (ft): NA
Well Diameter (in): 4.25"
Standing Volume (gal,liter): NA
Screened Interval (ftbtoc):

Purging Information Start purge at: 15:26 Well Casing Volumes: 1" = 0.04 gal/ft = 0.15 L/ft, 2" = 0.16 gal/ft = 0.62 L/ft, 4" = 0.65 gal/ft = 2.47 L/ft, 6" = 1.47 gal/ft = 5.56 L/ft

Time	DTW (ftbtoc)	Purge Rate (gpm,lpm)	Volume Purged (gal,liter)	pH	Specific Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (ºC)	Other	ORP (mV)	Comments / Observations (color, odor, etc.)
15:29				4.96	0.074	284.0	2.80	17.31		240.3	
15:31				4.89	0.072	114.1	2.79	17.21		245.2	
15:34				4.83	0.071	33.3	2.79	17.10		256.7	
3@3-5 m.			~50-gal	+/- 0.1	3%	10%	10%	3%		+/- 10 mV	

Sampling Information Sample Identity: VP-15 (45-50') Sample Time: 15:35 TRC Personnel: J. Moss

Analysis	Containers Number	Containers Size	Containers Type	Containers Preservative	Sampling Method/Material	Comments / Observations
VOCs						
Total Cr						
Cr+6						
Perchlorate						
Methane						
Nitrate						
Fe+2						

Ground Water Sampling Log

Client: SMC
Project Number: 112434.00GWAT.002235
Site Name / Location: SMC / Newfield / Off-site locations in Vineland
Site Conditions / Weather:
Purge Method: SAT & submersible pump / packer assembly
Purge Equipment/Material: SAT
Headspace PID/FID (ppm): NA
Pump Intake (ftbtoc):

Well Identification: VP-15 (65-70)
Date: 10/13/2009
Depth to Water (ftbtoc): NA
Depth to Bottom (ftbtoc): NA
Standing Column (ft): NA
Well Diameter (in): 4.25"
Standing Volume (gal,liter): NA
Screened Interval (ftbtoc):

Purging Information Start purge at: 9:00 Well Casing Volumes: 1" = 0.04 gal/ft = 0.15 L/ft, 2" = 0.16 gal/ft = 0.62 L/ft, 4" = 0.65 gal/ft = 2.47 L/ft, 6" = 1.47 gal/ft = 5.56 L/ft

Time	DTW (ftbtoc)	Purge Rate (gpm,lpm)	Volume Purged (gal,liter)	pH	Specific Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (ºC)	Other	ORP (mV)	Comments / Observations (color, odor, etc.)
9:05				5.07	0.073	82.5	4.54	16.48		202.2	Yellow, silty, then clearing
9:08				4.94	0.072	29.8	4.78	16.43		215.9	Slightly yellow, silty
9:11				4.82	0.072	18.1	4.85	16.40		232.0	Clear
9:14				4.72	0.072	9.6	4.87	16.38		246.3	Clear
3@3-5 m.			~50-gal	+/- 0.1	3%	10%	10%	3%		+/- 10 mV	

Sampling Information Sample Identity: VP-15 (65-70') Sample Time: 9:15 TRC Personnel: J. Moss

Analysis	Containers Number	Containers Size	Containers Type	Preservative	Sampling Method/Material	Comments / Observations
VOCs						
Total Cr						
Cr+6						
Perchlorate						
Methane						
Nitrate						
Fe+2						

Ground Water Sampling Log

Client: SMC
Project Number: 112434.00GWAT.002235
Site Name / Location: SMC / Newfield / Off-site locations in Vineland
Site Conditions / Weather:
Purge Method: SAT & submersible pump / packer assembly
Purge Equipment/Material: SAT
Headspace PID/FID (ppm): NA
Pump Intake (ftbtoc):

Well Identification: VP-15 (88-93')
Date: 10/13/2009
Depth to Water (ftbtoc): NA
Depth to Bottom (ftbtoc): NA
Standing Column (ft): NA
Well Diameter (in): 4.25"
Standing Volume (gal,liter): NA
Screened Interval (ftbtoc):

Purging Information Start purge at: 10:24 Well Casing Volumes: 1" = 0.04 gal/ft = 0.15 L/ft, 2" = 0.16 gal/ft = 0.62 L/ft, 4" = 0.65 gal/ft = 2.47 L/ft, 6" = 1.47 gal/ft = 5.56 L/ft

Time	DTW (ftbtoc)	Purge Rate (gpm,lpm)	Volume Purged (gal,liter)	pH	Specific Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (ºC)	Other	ORP (mV)	Comments / Observations (color, odor, etc.)
10:26				5.11	0.066	1129.0	4.52	16.13		210.8	Yellow-brown, silty
10:29				4.90	0.062	317.8	5.03	15.76		234.5	Yellow-brown, silty
10:31				4.77	0.061	141.8	5.31	15.59		250.5	Yellow-brown, silty, clearing
10:34				4.66	0.059	72.9	5.40	15.46		265.3	Slightly silty
10:38				4.61	0.059	42.4	5.64	15.35		281.1	Slightly silty
3@3-5 m.			~100-gal	+/- 0.1	3%	10%	10%	3%		+/- 10 mV	

Sampling Information Sample Identity: VP-15 (88-93') Sample Time: 10:40 TRC Personnel: J. Moss

Analysis	Containers Number	Containers Size	Containers Type	Preservative	Sampling Method/Material	Comments / Observations
VOCs						
Total Cr						
Cr+6						
Perchlorate						
Methane						
Nitrate						
Fe+2						

Ground Water Sampling Log

Client: SMC
Project Number: 112434.00GWAT.002235
Site Name / Location: SMC / Newfield / Off-site locations in Vineland
Site Conditions / Weather:
Purge Method: SAT & submersible pump / packer assembly
Purge Equipment/Material: SAT
Headspace PID/FID (ppm): NA
Pump Intake (ftbtoc):

Well Identification: VP-15 (114-119')
Date: 10/13/2009
Depth to Water (ftbtoc): NA
Depth to Bottom (ftbtoc): NA
Standing Column (ft): NA
Well Diameter (in): 4.25"
Standing Volume (gal,liter): NA
Screened Interval (ftbtoc):

Purging Information Start purge at: 11:50 Well Casing Volumes: 1" = 0.04 gal/ft = 0.15 L/ft, 2" = 0.16 gal/ft = 0.62 L/ft, 4" = 0.65 gal/ft = 2.47 L/ft, 6" = 1.47 gal/ft = 5.56 L/ft

Time	DTW (ftbtoc)	Purge Rate (gpm,lpm)	Volume Purged (gal,liter)	pH	Specific Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (ºC)	Other	ORP (mV)	Comments / Observations (color, odor, etc.)
11:54				4.50	0.037	1112.3	0.50	17.05		100.0	Gray, silty
11:58				4.30	0.033	668.2	0.41	17.04		97.8	Gray, silty
12:02				4.19	0.034	225.3	0.36	17.00		104.1	Gray, silty
12:05				4.14	0.036	92.1	0.36	16.93		104.9	Gray, slightly silty
12:08				4.13	0.036	55.4	0.35	16.88		106.4	Gray, slightly silty
12:13				4.15	0.036	65.2	0.32	16.83		107.7	Gray, slightly silty
3@3-5 m.			~50-gal	+/- 0.1	3%	10%	10%	3%		+/- 10 mV	

Sampling Information Sample Identity: VP-15 (114-119') Sample Time: 12:15 TRC Personnel: J. Moss

Analysis	Containers Number	Containers Size	Containers Type	Containers Preservative	Sampling Method/Material	Comments / Observations
VOCs						
Total Cr						
Cr+6						
Perchlorate						
Methane						
Nitrate						
Fe+2						

Ground Water Sampling Log

Client: SMC
Project Number: 112434.00GWAT.002235
Site Name / Location: SMC / Newfield / Off-site locations in Vineland
Site Conditions / Weather:
Purge Method: Whale pump
Purge Equipment/Material: SAT
Headspace PID/FID (ppm): NA
Pump Intake (ftbtoc):

Well Identification: VP-15A (15-20')
Date: 10/20/2009
Depth to Water (ftbtoc): NA
Depth to Bottom (ftbtoc): NA
Standing Column (ft): NA
Well Diameter (in): 4.25"
Standing Volume (gal,liter): NA
Screened Interval (ftbtoc):

Purging Information Start purge at: 15:05 Well Casing Volumes: 1" = 0.04 gal/ft = 0.15 L/ft, 2" = 0.16 gal/ft = 0.62 L/ft, 4" = 0.65 gal/ft = 2.47 L/ft, 6" = 1.47 gal/ft = 5.56 L/ft

Time	DTW (ftbtoc)	Purge Rate (gpm,lpm)	Volume Purged (gal,liter)	pH	Specific Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (ºC)	Other	ORP (mV)	Comments / Observations (color, odor, etc.)
15:09				5.73	0.554	165.3	5.92	17.48		122.1	Orange-brown, silty, slightly cloudy
15:14				5.64	0.560	118.1	6.01	17.44		119.7	Orange-brown, silty, slightly cloudy
15:18				5.62	0.564	85.2	5.94	17.42		112.7	Orange-brown, silty, slightly cloudy
15:23				5.60	0.525	265.4	5.62	17.37		114.5	Orange-brown, silty
15:28				5.59	0.554	112.0	5.63	17.34		128.5	Slightly cloudy
15:31				5.58	0.524	55.7	5.64	17.29		132.9	Clear
15:39				5.56	0.518	34.1	5.77	17.28		131.0	Clear
3@3-5 m.			~50-gal	+/- 0.1	3%	10%	10%	3%		+/- 10 mV	

Sampling Information Sample Identity: VP-15A (15-20') Sample Time: 15:40 TRC Personnel: J. Moss

Analysis	Containers Number	Containers Size	Containers Type	Containers Preservative	Sampling Method/Material	Comments / Observations
VOCs						
Total Cr						
Cr+6						
Perchlorate						
Methane						
Nitrate						
Fe+2						

Ground Water Sampling Log

Client: SMC
Project Number: 112434.00GWAT.002235
Site Name / Location: SMC / Newfield / Off-site locations in Vineland
Site Conditions / Weather: ~55-degrees, sunny
Purge Method: SAT & submersible pump / packer assembly
Purge Equipment/Material: SAT
Headspace PID/FID (ppm): NA
Pump Intake (ftbtoc):

Well Identification: VP-15A (38-43')
Date: 10/21/2009
Depth to Water (ftbtoc): NA
Depth to Bottom (ftbtoc): NA
Standing Column (ft): NA
Well Diameter (in): 4.25"
Standing Volume (gal,liter): NA
Screened Interval (ftbtoc):

Purging Information Start purge at: 8:36 Well Casing Volumes: 1" = 0.04 gal/ft = 0.15 L/ft, 2" = 0.16 gal/ft = 0.62 L/ft, 4" = 0.65 gal/ft = 2.47 L/ft, 6" = 1.47 gal/ft = 5.56 L/ft

Time	DTW (ftbtoc)	Purge Rate (gpm,lpm)	Volume Purged (gal,liter)	pH	Specific Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (ºC)	Other	ORP (mV)	Comments / Observations (color, odor, etc.)
8:39				4.98	0.084	656.3	3.92	13.99		148.9	Orange-brown, silty
8:42				4.85	0.084	92.5	3.88	14.48		181.8	Clear
8:45				4.80	0.084	79.1	3.92	14.50		196.8	Clear
8:50				4.75	0.084	44.6	4.01	14.53		214.3	Clear
3@3-5 m.			~100-gal	+/- 0.1	3%	10%	10%	3%		+/- 10 mV	

Sampling Information Sample Identity: VP-15A (38-43') Sample Time: 8:50 TRC Personnel: J. Moss

Analysis	Containers Number	Containers Size	Containers Type	Containers Preservative	Sampling Method/Material	Comments / Observations
VOCs						
Total Cr						
Cr+6						
Perchlorate						
Methane						
Nitrate						
Fe+2						

Ground Water Sampling Log

Client: SMC
Project Number: 112434.00GWAT.002235
Site Name / Location: SMC / Newfield / Off-site locations in Vineland
Site Conditions / Weather: ~60-degrees, sunny
Purge Method: SAT & submersible pump / packer assembly
Purge Equipment/Material: SAT
Headspace PID/FID (ppm): NA
Pump Intake (ftbtoc):

Well Identification: VP-15A (55-60')
Date: 10/21/2009
Depth to Water (ftbtoc): NA
Depth to Bottom (ftbtoc): NA
Standing Column (ft): NA
Well Diameter (in): 4.25"
Standing Volume (gal,liter): NA
Screened Interval (ftbtoc):

Purging Information Start purge at: 9:45 Well Casing Volumes: 1" = 0.04 gal/ft = 0.15 L/ft, 2" = 0.16 gal/ft = 0.62 L/ft, 4" = 0.65 gal/ft = 2.47 L/ft, 6" = 1.47 gal/ft = 5.56 L/ft

Time	DTW (ftbtoc)	Purge Rate (gpm,lpm)	Volume Purged (gal,liter)	pH	Specific Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (ºC)	Other	ORP (mV)	Comments / Observations (color, odor, etc.)
9:48				4.58	0.051	1377.4	3.84	15.01		199.9	Orange-brown, silty
9:53				4.49	0.050	220.7	4.14	14.62		237.7	Cloudy
10:20				4.52	0.049	43.0	4.20	14.44		268.5	Clear
3@3-5 m.			~125-gal	+/- 0.1	3%	10%	10%	3%		+/- 10 mV	

Sampling Information Sample Identity: VP-15A (55-60') Sample Time: 10:20 TRC Personnel: J. Moss

Analysis	Containers Number	Containers Size	Containers Type	Containers Preservative	Sampling Method/Material	Comments / Observations
VOCs						
Total Cr						
Cr+6						
Perchlorate						
Methane						
Nitrate						
Fe+2						

Ground Water Sampling Log

Client: SMC
Project Number: 112434.00GWAT.002235
Site Name / Location: SMC / Newfield / Off-site locations in Vineland
Site Conditions / Weather:
Purge Method: SAT & submersible pump / packer assembly
Purge Equipment/Material: SAT
Headspace PID/FID (ppm): NA
Pump Intake (ftbtoc):

Well Identification: VP-15A (77-82')
Date: 10/21/2009
Depth to Water (ftbtoc): NA
Depth to Bottom (ftbtoc): NA
Standing Column (ft): NA
Well Diameter (in): 4.25"
Standing Volume (gal,liter): NA
Screened Interval (ftbtoc):

Purging Information Start purge at: 11:16 Well Casing Volumes: 1" = 0.04 gal/ft = 0.15 L/ft, 2" = 0.16 gal/ft = 0.62 L/ft, 4" = 0.65 gal/ft = 2.47 L/ft, 6" = 1.47 gal/ft = 5.56 L/ft

Time	DTW (ftbtoc)	Purge Rate (gpm,lpm)	Volume Purged (gal,liter)	pH	Specific Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (ºC)	Other	ORP (mV)	Comments / Observations (color, odor, etc.)
11:18				4.91	0.050	209.3	4.72	15.24		188.0	Orange-brown, silty
11:21				4.52	0.047	79.0	5.62	14.82		230.9	Orange-brown, slightly silty
11:25				4.37	0.047	62.0	5.86	14.59		255.3	Slightly cloudy, then clear
11:27				4.39	0.046	90.0	5.72	14.83		261.1	Clear
3@3-5 m.			~50-gal	+/- 0.1	3%	10%	10%	3%		+/- 10 mV	

Sampling Information Sample Identity: VP-15A (77-82') Sample Time: 11:30 TRC Personnel: J. Moss

Analysis	Containers Number	Containers Size	Containers Type	Containers Preservative	Sampling Method/Material	Comments / Observations
VOCs						
Total Cr						
Cr+6						
Perchlorate						
Methane						
Nitrate						
Fe+2						

Ground Water Sampling Log

Client: SMC
Project Number: 112434.00GWAT.002235
Site Name / Location: SMC / Newfield / Off-site locations in Vineland
Site Conditions / Weather: ~65-degrees, sunny
Purge Method: SAT & submersible pump / packer assembly
Purge Equipment/Material: SAT
Headspace PID/FID (ppm): NA
Pump Intake (ftbtoc):

Well Identification: VP-15A (99-104')
Date: 10/21/2009
Depth to Water (ftbtoc): NA
Depth to Bottom (ftbtoc): NA
Standing Column (ft): NA
Well Diameter (in): 4.25"
Standing Volume (gal,liter): NA
Screened Interval (ftbtoc):

Purging Information Start purge at: 13:40 Well Casing Volumes: 1" = 0.04 gal/ft = 0.15 L/ft, 2" = 0.16 gal/ft = 0.62 L/ft, 4" = 0.65 gal/ft = 2.47 L/ft, 6" = 1.47 gal/ft = 5.56 L/ft

Time	DTW (ftbtoc)	Purge Rate (gpm,lpm)	Volume Purged (gal,liter)	pH	Specific Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (ºC)	Other	ORP (mV)	Comments / Observations (color, odor, etc.)
13:44				4.21	0.056	1380.3	5.53	15.31		199.2	Orange-brown, silty
13:47				3.73	0.055	72.4	6.38	14.82		248.3	Cloudy
13:50				3.68	0.055	22.0	6.51	14.56		261.6	Clear
13:54				3.67	0.054	9.2	6.60	14.37		271.6	Clear
3@3-5 m.			~110-gal	+/- 0.1	3%	10%	10%	3%		+/- 10 mV	

Sampling Information Sample Identity: VP-15A (99-104') Sample Time: 13:55 TRC Personnel: J. Moss

Analysis	Containers Number	Containers Size	Containers Type	Containers Preservative	Sampling Method/Material	Comments / Observations
VOCs						
Total Cr						
Cr+6						
Perchlorate						
Methane						
Nitrate						
Fe+2						

APPENDIX E

MONITORING WELL CONSTRUCTION LOGS

Supplemental Offsite Groundwater Investigation
Shieldalloy Metallurgical Corporation
Newfield, New Jersey

SOIL BORING / MONITORING WELL CONSTRUCTION LOG

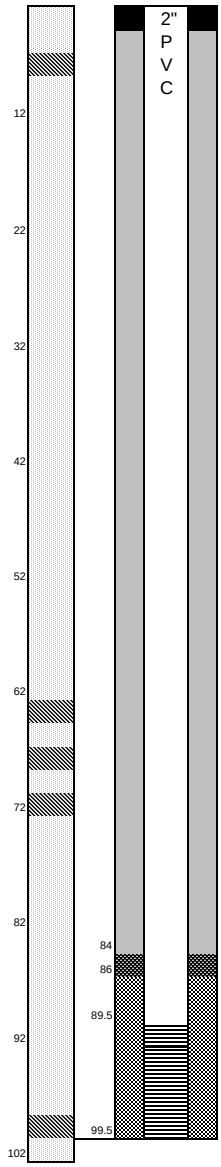
Project Name: SMC Offsite Ground Water Investigation
Project Number: 112434-00GWAT-002235
Project Location: Vineland, New Jersey
Boring Location: West Garden Road

Drilling Company: Unitech Drilling Co., Inc.
Drillers: Dan Evans and Joe Evans
TRC Inspector: Paul Cyr
Drill Equipment / Method: 1500 Midway Truck Rig
Mud Rotary / Pressure Tremie

Boring: SC-35D
Date Started: 10/29/2009
Date Completed: 10/29/2009
Depth to Water: NA
Horizontal Coordinates: E335051.78, N251029.52 (VP-15A)
Ground Elevation: NA
Inner Casing Elevation: NA

Depth (ftbgs)	Recovery/ Penetration (inches)	Split Spoon (inches)	Blow Counts	Soil Description
10-12	20/24	6	10	Light brown F SAND, trace M Sand
		12	14	and M Gravel
		18	15	Gray CLAY, trace C Gravel
		24	17	
20-22	8/18	6	25	Light brown F-M SAND, trace C
		12	30	Gravel
		18	50/5"	Spoon refusal at 21.5-ftbgs.
30-32	12/18	6	30	Light brown/orange F-M SAND,
		12	35	trace C Sand, trace F-M gravel
		18	50-5"	Spoon refusal at 31.5-ftbgs.
40-42	11/24	6	10	Red/orange/brown M-C SAND,
		12	15	little M-C Gravel, trace F sand
		18	19	and F gravel
		24	17	
50-52	20/20	6	24	Dark red/brown F SAND
		12	36	C GRAVEL, trace M Gravel
		18	50/7"	Spoon refusal at 51.7-ftbgs.
60-62	11/24	6	14	Gray CLAY and inter-bedded
		12	10	red/brown F SAND
		18	22	
		24	24	
70-72	9.5/18	6	10	Light brown F SAND, inter-bedded
		12	31	thin Clay layers
		18	50/5"	Red-brown F SAND, inter-bedded
				thin Clay layers
				Spoon refusal at 71.5-ftbgs.
80-82	11/24	6	15	Light brown F SAND, inter-bedded
		12	25	thin Silt layers
		18	36	
		24	40	
90-92	12/24	6	9	Light brown F SAND, trace C
		12	8	Gravel
		18	18	
		24	22	
100-102	19/24	6	10	Light brown F SAND, inter-bedded
		12	11	thin Clay layers
		18	13	
		24	15	

Lithology / Monitoring Well Construction



Legend
- Sand
- Sand and Clay
- # 0 Well Sand
- # 00 Well Sand
- Grout
- Screen (10-slot PVC)
- Concrete Pad
- PVC Riser

WELL CONSTRUCTION:
- 10-Slot PVC Screen (2") = 99.5-89.5 ftbgs
- PVC Riser (2") = 89.5 ftbgs-grade
- # 0 Well Sand = 99.5-86 ftbgs
- #00 Well Sand = 86-84 ftbgs
- Grout (bentonite/cement mixture) = 84-2 ftbgs
- Native Backfill = 2-0.5 ftbgs
- Concrete Pad = 0.5-grade
- Monitoring well secured with a locking sanitary plug.
- Monitoring well completed with a flush-mounted curb box.

NOTES:
- ftbgs - feet below ground surface.
- NA - Data not available at time of reporting.
- Horizontal datum (New Jersey State Plane Coordinates, NAD 83).
- Samples collected for geological description every 10 feet using split spoon (140 lb hammer dropped 30").
- Monitoring well developed using whale pumps in series and using surge and pump technique.

Supplemental Offsite Groundwater Investigation
Shieldalloy Metallurgical Corporation
Newfield, New Jersey

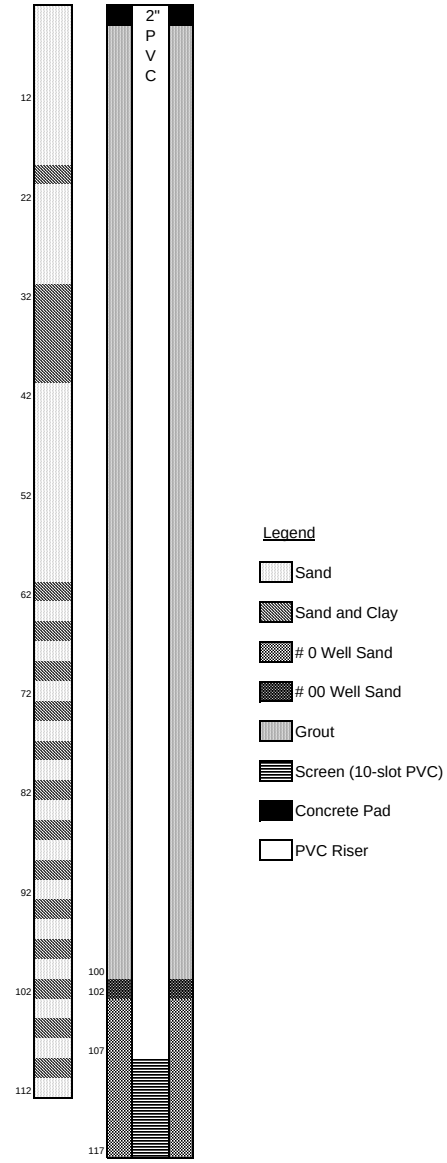
SOIL BORING / MONITORING WELL CONSTRUCTION LOG

Project Name: SMC Offsite Ground Water Investigation
Project Number: 112434-00GWAT-002235
Project Location: Vineland, New Jersey
Boring Location: Salem Avenue

Drilling Company: Unitech Drilling Co., Inc.
Drillers: Dan Evans and Joe Evans
TRC Inspector: Paul Cyr
Drill Equipment / Method: 1500 Midway Truck Rig
Mud Rotary / Pressure Tremie

Boring: SC-36D
Date Started: 11/3/2009
Date Completed: 11/4/2009
Depth to Water: NA
Horizontal Coordinates: E341283.30, N258484.52 (VP-13A)
Ground Elevation: NA
Inner Casing Elevation: NA

Depth (ftbgs)	Recovery/ Penetration (inches)	Split Spoon (inches)	Blow Counts	Soil Description
10-12	11/24	6	12	Red/orange/brown M-C SAND, trace
		12	16	C Gravel
		18	26	Red-brown M-C SAND
		24	29	Light brown - red-brown F SAND
20-22	8/24	6	16	Medium brown F SAND, thin Clay
		12	18	layer at 20-ftbgs.
		18	17	
		24	17	
30-32	24/24	6	22	Cobbles
		12	24	Red-brown F SAND
		18	17	Tan CLAY
		24	18	
40-42	15.5/24	6	20	Tan CLAY
		12	20	Red-brown F-M SAND
		18	29	
		24	37	
50-52	8/11	6	36	Red-brown M-C SAND, little M
		12	50/5"	Gravel, trace clay, trace C gravel
				Spoon refusal at 51-ftbgs.
60-62	23/24	6	13	Tan-medium brown CLAY, trace
		12	8	F Sand
		18	14	Medium brown F SAND
		24	20	Tan CLAY, trace F Sand
				Red-brown F SAND, trace clay
				Medium to light brown F SAND
70-72	19/24	6	8	Gray-brown CLAY and F SAND
		12	10	Medium brown F SAND, trace Clay
		18	7	Red-brown F SAND
		24	8	CLAY, trace F Sand
80-82	19/24	6	13	Tan CLAY
		12	7	Medium brown F SAND, trace Clay
		18	14	
		24	20	
90-92	14/24	6	16	Medium brown F SAND, trace Clay
		12	9	
		18	15	
		24	23	
100-102	18/24	6	13	Tan CLAY, trace M Gravel
		12	18	Red-brown F SAND, trace Clay
		18	26	
		24	26	
105-107	12/24	6	18	Cobbles, trace F Sand
		12	20	Tan CLAY, trace F Sand
		18	23	Red-brown F SAND, trace M Gravel,
		24	30	trace clay
110-112	12/24	6	9	Medium brown F SAND, trace Clay
		12	9	
		18	15	
		24	23	



WELL CONSTRUCTION:
- 10-Slot PVC Screen (2") = 117-107 ftbgs
- PVC Riser (2") = 107 ftbgs-grade
- # 0 Well Sand = 117-102 ftbgs
- #00 Well Sand = 102-100 ftbgs
- Grout (bentonite/cement mixture) = 100-1 ftbgs
- Native Backfill = 1-0.5 ftbgs
- Concrete Pad = 0.5-grade
- Monitoring well secured with a locking sanitary plug.
- Monitoring well completed with a flush-mounted curb box.

NOTES:
- ftbgs - feet below ground surface.
- NA - Data not available at time of reporting.
- Horizontal datum (New Jersey State Plane Coordinates, NAD 83).
- Samples collected for geological description every 10 feet using split spoon (140 lb hammer dropped 30").
- Monitoring well developed using whale pumps in series and using surge and pump technique.

TRC
Results you can rely on
21 Griffin Road North
Windsor, CT 06095
Telephone: 860-298-9692
Fax: 860-298-6399

BORING/WELL NUMBER: **SC40D**

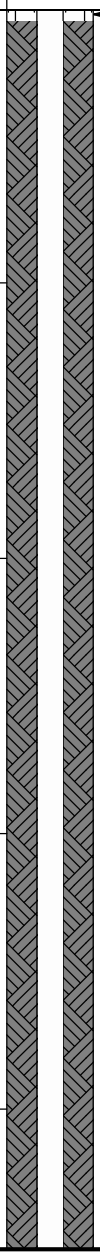
PROJECT INFORMATION		BORING/WELL INFORMATION			
Project Name:	Perchlorate RI	Boring Depth:	142	Hole Diameter:	4.25
Project Location:	Between 540 and 560 Salem Avenue, Vineland, NJ	Date Started:	4/4/11	Date Completed:	4/5/11
Project Number:	177208.0000.000003	Coordinate System:	New Jersey State Plane, NAD 83		
Client:	SMC	North:	258986	East:	342114
TRC Eng./Geol:	John Moss	Vertical Datum:	NAVD88	Ground Elevation:	97
Checked By:	Larry Butlien	Well Elevation (Top of Casing)	96.91 ft.		

DRILLING INFORMATION	
Drilling Contractor:	Uni-Tech Drilling
Driller(s):	Michael
Drilling Method:	Mud Rotary
Equipment/Model:	Failing 1500
Sampler:	2" split spoon

GROUND WATER OBSERVATIONS			
MEASUREMENT	At Time of Drilling	At End of Drilling	After Drilling
DATE			4/5/2011
DEPTH (ft.bgs.)			14.5
REFERENCE			Ground Surface
STABILIZATION			

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	PENETRATION (FT.)	RECOVERY (FT.)	BLOW COUNTS	LITHOLOGY	◆ VOC SCREENING RESULTS (ppm) (20 40 60 80)	MATERIAL DESCRIPTION
11–12	SS-1		2.0	1.5	14 20 22 23			Yellow-Brown Very Fine-Medium SAND, trace Gravel; thin band of Silty Sand at 10.5'
21–22	SS-2		2.0	1.3	20 36 34 36			Yellow-Brown Very Fine-Fine SAND; coarse Gravel at top of recovery
31–32	SS-3		2.0	0.8	15 22 27 32			Yellow-Brown Very Fine-Coarse SAND; coarse Gravel at top of recovery
41–42	SS-4		2.0	1.1	34 38 50 56			Yellow-Brown Very Fine-Coarse SAND, trace fine Gravel; coarse Gravel at top of recovery; thin Light Gray Clay lens at 41.5'

WELL DIAGRAM



SOIL BORING / WELL COMPLETION - TRC-STD US.GDT - 6/20/11 14:40 - H:\HAZMAT\SMC\NEWFIELD\PERCHLORATE\PERCHLORATE RI\ADDITIONAL WELL INSTALL - SC40D\SMC PERCHLORATE - SC40D.GPJ

TRC
Results you can rely on
21 Griffin Road North
Windsor, CT 06095
Telephone: 860-298-9692
Fax: 860-298-6399

PROJECT INFORMATION		BORING/WELL INFORMATION			
Project Name:	Perchlorate RI	Boring Depth:	142	Hole Diameter:	4.25
Project Location:	Between 540 and 560 Salem Avenue, Vineland, NJ	Date Started:	4/4/11	Date Completed:	4/5/11
Project Number:	177208.0000.000003	Coordinate System:	New Jersey State Plane, NAD 83		
Client:	SMC	North:	258986	East:	342114
TRC Eng./Geol:	John Moss	Vertical Datum:	NAVD88	Ground Elevation:	97
Checked By:	Larry Butlien	Well Elevation (Top of Casing)	96.91 ft.		

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	PENETRATION (FT.)	RECOVERY (FT.)	BLOW COUNTS	LITHOLOGY	VOC SCREENING RESULTS (ppm) (20 40 60 80)	MATERIAL DESCRIPTION	WELL DIAGRAM
46–50									
51–52	SS-5		1.4	0.8	45 50 50/5"			Yellow-Brown Very Fine-Medium SAND with some medium-coarse Gravel	
53–60								Brown Fine-Coarse SAND	Portland cement / bentonite grout mix
61–62	SS-6		2.0	0.8	32 32 30 26			Light Tan Very Fine-Medium SAND	
63–70								Red-Brown Very Fine-Coarse SAND; coarse Gravel at top of recovery	
71–80	SS-7		1.3	0.9	30 50 50/4"			Light Tan Fine-Medium SAND	
81–82	SS-8		1.3	0.7	24 29 50/4"			Light Tan Very Fine-Fine SAND	
83–90								Yellow-Brown Very Fine-Fine SAND with trace Light Gray Clay lenses	
91–95	SS-9		0.9	0.6	30 50/5"			Tan Very Fine-Fine SAND	

SOIL BORING / WELL COMPLETION - TRC-STD US.GDT - 6/20/11 14:40 - H:\HAZMAT\SMC\NEWFIELD\PERCHLORATE\PERCHLORATE RI\ADDITIONAL WELL INSTALL - SC40D\SMC PERCHLORATE - SC40D.GPJ

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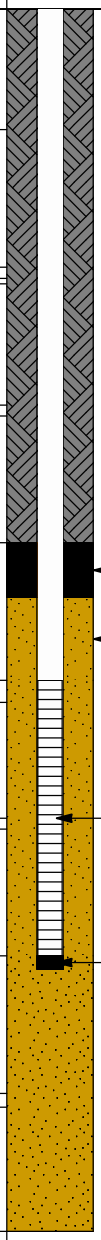
PROJECT INFORMATION		BORING/WELL INFORMATION			
Project Name:	Perchlorate RI	Boring Depth:	142	Hole Diameter:	4.25
Project Location:	Between 540 and 560 Salem Avenue, Vineland, NJ	Date Started:	4/4/11	Date Completed:	4/5/11
Project Number:	177208.0000.000003	Coordinate System:	New Jersey State Plane, NAD 83		
Client:	SMC	North:	258986	East:	342114
TRC Eng./Geol:	John Moss	Vertical Datum:	NAVD88	Ground Elevation:	97
Checked By:	Larry Butlien	Well Elevation (Top of Casing)	96.91 ft.		

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	PENETRATION (FT.)	RECOVERY (FT.)	BLOW COUNTS	LITHOLOGY	◆VOC SCREENING RESULTS (ppm) (20 40 60 80)	MATERIAL DESCRIPTION
97, 98, 99, 100								
101	SS-10		0.4	0.4	50/5"			Yellow-Brown Very Fine-Medium SAND with little Light Gray Clay lenses
102, 103, 104, 105								
106	SS-11		0.9	0.6	24 50/5"			Yellow-Brown Very Fine-Medium SAND
107, 108, 109, 110								Yellow-Brown Very Fine-Medium SAND with little Light Gray Clay lenses and Dark Brown/Red-Brown lenses
111	SS-12		0.4	0.4	50/5"			Tan Very Fine-Medium SAND, some Light Gray Clay at top of recovery
112, 113, 114, 115								
116	SS-13		1.3	0.8	22 28 50/4"			Yellow-Brown Very Fine-Medium SAND, little medium Gravel
117, 118, 119, 120								
121	SS-14		2.0	0.8	20 24 30 57			Yellow-Brown Very Fine-Medium SAND, little Light Gray Clay and coarse Sand at top of recovery
122, 123, 124, 125								
126	SS-15		0.8	0.4	30 50/4"			Orange-Brown Fine-Coarse SAND
127, 128, 129, 130								
131	SS-16		2.0	0.8	20 26 46 50			Tan Very Fine-Fine SAND, little fine Gravel, little Light Gray Clay
132, 133, 134, 135								
136	SS-17		1.7	1.0	24 34 55 17/2"			Tan Fine-Coarse SAND, trace Light Gray Clay lenses
137, 138, 139, 140								Orange-Brown Very Fine-Fine SAND, some Light Gray Clay lenses
141	SS-18		2.0	1.0	16 21 31 23			Orange-Brown Very Fine-Medium SAND with some fine Gravel
142, 143, 144, 145, 146								Bottom of borehole at 142.0 feet.



SOIL BORING / WELL COMPLETION - TRC-STD US.GDT - 6/20/11 14:40 - H:\HAZMAT\SMC\NEWFIELD\PERCHLORATE\PERCHLORATE RI\ADDITIONAL WELL INSTALL - SC40D\SMC PERCHLORATE - SC40D.GPJ

APPENDIX F

ROAD OPENING PERMITS

CITY VINELAND
ENGINEERING DEPARTMENT
APPLICATION AND PERMIT FOR RIGHT-OF-WAY OPENING

Applicant Name: TRC Environmental Corporation
Applicant Address: 21 Griffin Road North, Windsor, CT 06095
Applicant Phone Number: 860-298-6225
Street to be Opened: See attached table
BLOCK NO. See attached table LOT NO. See attached table
Purpose: Drilling for ground water sampling
Anticipated Start Date October 12, 2009 Estimated time for Completion 2 weeks
Name of Contractor Uni-Tech Drilling
Width of Opening (Ft.) 1 X Length of Opening (Ft.) 1 = Area (Sq. Ft.) 1x6 locations
Area (Sq. Ft.) 6 Divided by 9 = Area (Sq. Ft.) 0.67
Underground location Request No. See attached table

FEE SCHEDULE	FEE	TOTAL
Administration Fee	$25.00	$25.00
1). Minimum right-of-way opening for 16 Sq. Ft. or less	$50.00	$50.00
a). Greater than 16 Sq. Ft. but less than or equal to 50 Sq. Ft.	$100.00	
b). For every Sq. Ft. of opening greater than 50 Sq. Ft the fee shall be $1.00 per Sq. Ft.	$1.00	
2). Curb and or gutter installation		
a). 0-100' L.F.	$50.00	
b). Over 100 L.F. fee is $25.00 per 100' L.F.	$25.00	
3). Buried Cable minimum fee for up to 1,500 L.F	$50.00	
Over 1,500 L.F. is $10.00 per 1,000 L.F	Total:	$75.00

Maximum fee on any of the above is $500.00 unless otherwise determined by the City Engineer.
Performance Bond required YES _____ NO X
Performance Bond, $90.00 per Sq. Yd. X _____ S.Y. = AMOUNT $ _____
Must be Bond, Certified Check or Cashier Check

A Maintenance Bond shall be posted prior to the release of the performance bond, and shall remain in effect for two years.
Maintenance Bond = 10% of Performance Bond $ _____
Must be Bond, Certified Check or Cashier Check

As the applicant for this permit I accept all the terms and conditions of the City of Vineland Chapter Number 241. It is agreed that all restoration pertaining to this right-of-way opening shall be done by the applicant according to the standards set forth in this ordinance.

Sr. Project Hydrogeologist — Title (type or print)
Larry Buttrein — Signature of Applicant
10-5-09 — Date

----------FOR CITY USE ONLY----------

For City Engineer
APPROVED ☒ DENIED ☐
10-9-09 — Date

Date of Final Inspection: _____
Inspector's Approval: _____
COMMENTS: _____

• WARNING •
CALL BEFORE YOU DIG
1-800-272-1000
FOR UTILITY LOCATIONS

PERMIT NO. 12836

Sample Location Summary
Shieldalloy Metallurgical Corporation
Newfield, New Jersey
October 2009

Soil Boring Location ID	Approximate State Planar Coordinates		Street Address (Property Adjacent to Sample Location)	Block Number	Lot Number	Nearest Cross Street	Approximate Distance from Nearest Cross Street	Direction from Nearest Cross Street	Side of Street Location was Marked On	Size of Right-of-Way	NJ One Call #	Description of Location
	Northing	Easting										
Monitoring Wells												
VP-7	255290.06	345190.40	Strawberry Avenue	901	12 & 13	North East Boulevard	360 feet	East	Northern	50 feet	092782108	Located just north of edge of Strawberry Avenue
VP-8	255969.96	343697.27	West Arbor Avenue	702	3	North West Boulevard	1,080 feet	West	Southern	50 feet	092782115	Located just south of edge of West Arbor Avenue
Vertical Profiling												
VP-13A	258527.70	341278.11	Salem Avenue	202	36	West Weymouth Road	550 feet	Northeast	Northern	50 feet	092782148	Located just north of edge of Salem Avenue
VP-14	253179.69	340452.81	West Forest Grove Road	701	62	Nicilette Court	775 feet	East	Northern	50 feet	092782153	Located just north of edge of West Forest Grove Road
VP-15	252352.54	336510.54	Freddy Lane	604	3 & 6	West Forest Grove Road	1,000 feet	South	Southern	50 feet	092782162	Located just south of edge of Freddy Lane
VP-15A	250995.03	335101.55	West Garden Road	1101	13	North Mill Road	550 feet	East	Southern	50 feet	092782166	Located just south of edge of West Garden Road

COUNTY PERMIT NUMBER 09-165 Approval Date 9-30-09

APPLICATION AND PERMIT TO OPEN HIGHWAY IN THE COUNTY OF CUMBERLAND

Application hereby being made by the undersigned, permission is hereby given to the undersigned to make an opening ~~in~~ within the Cumberland County right-of-way approximately 10-feet off the road pavement along the northern side of West Weymouth Road or Street at a location adjacent to Block 501, Lot 7 of not more than 1 square feet, for the purpose of installing a soil boring, which may be completed as a monitoring well.

according to plan filed with the application of this permit.

The applicant agrees to fully comply with all resolutions, ordinances, rules and regulations of the County of Cumberland for the opening of County highways and particularly with the resolution dated August 9th, 1951 duly passed and advertised according to law by the Board of Chosen Freeholders of the County of Cumberland, a copy of which resolution the undersigned acknowledges receipt thereof at the time of receiving this permit.

The applicant agrees that the issuance of this permit shall constitute a valid contract between the County of Cumberland and the applicant.

The applicant likewise agrees that he will indemnify and save harmless the County from any loss or damage which may result by reason of the opening on behalf of the applicant of any street, road or highway owned or under the control of the County.

APPLICANT: TRC Environmental Corporation

By John Moss / John Moss

COUNTY OF CUMBERLAND

By [signature]

County Engineer or his authorized agent.

All rights of the applicant under this permit shall become void ninety (90) days from the date hereof unless extended by endorsement made hereon by the County Engineer or his authorized agent.

Deposit Received: $

Excavation by mechanical machinery or method is not granted unless the Cumberland County Engineer causes his signature to appear immediately below.

X _____

Tunnelling under the pavement is not authorized unless the Cumberland County Engineer causes his signature to appear immediately below.

_____

Note: Attached is the $1.00 permit application fee.

CITY VINELAND
ENGINEERING DEPARTMENT
APPLICATION AND PERMIT FOR RIGHT-OF-WAY OPENING

Applicant Name: TRC Environmental Corporation
Applicant Address: 21 Griffin Road North, Windsor, CT 06095
Applicant Phone Number: 860-298-6225
Street to be Opened: Salem Avenue
BLOCK NO. 202 LOT NO. 31 / 32
Purpose: Drilling for groundwater sampling
Anticipated Start Date April 4, 2011 Estimated time for Completion 3 days
Name of Contractor Uni-Tech Drilling
Width of Opening (Ft.) 1 X Length of Opening (Ft.) 1 = Area (Sq. Ft.) 1
Area (Sq. Ft.) 1 Divided by 9 = Area (Sq. Ft.) 0.11
Underground location Request No. SC40D

FEE SCHEDULE	**FEE**	**TOTAL**
Administration Fee	$25.00	$25.00
1). Minimum right-of-way opening for 16 Sq. Ft. or less	$50.00	$50.00
a). Greater than 16 Sq. Ft. but less than or equal to 50 Sq. Ft.	$100.00	
b). For every Sq. Ft. of opening greater than 50 Sq. Ft the fee shall be $1.00 per Sq. Ft.	$1.00	
2). Curb and or gutter installation		
a). 0-100' L.F.	$50.00	
b). Over 100 L.F. fee is $25.00 per 100' L.F.	$25.00	
3). Buried Cable minimum fee for up to 1,500 L.F	$50.00	
Over 1,500 L.F. is $10.00 per 1,000 L.F	Total:	$75.00

Maximum fee on any of the above is $500.00 unless otherwise determined by the City Engineer.
Performance Bond required YES _____ NO X
Performance Bond, $90.00 per Sq. Yd. X _____ S.Y. = AMOUNT $ _____
Must be Bond, Certified Check or Cashier Check

A Maintenance Bond shall be posted prior to the release of the performance bond, and shall remain in effect for two years.
Maintenance Bond = 10% of Performance Bond $ _____
Must be Bond, Certified Check or Cashier Check

As the applicant for this permit I accept all the terms and conditions of the City of Vineland Chapter Number 241. It is agreed that all restoration pertaining to this right-of-way opening shall be done by the applicant according to the standards set forth in this ordinance.

Project Manager	Lawrence J. Bettlin	3/23/11
Title (type or print)	Signature of Applicant	Date

FOR CITY USE ONLY

City Engineer — APPROVED ☒ DENIED ☐ — 3-30-11 Date

Date of Final Inspection: _____
Inspector's Approval: _____
COMMENTS: _____

• WARNING •
CALL BEFORE YOU DIG
1-800-272-1000
FOR UTILITY LOCATIONS

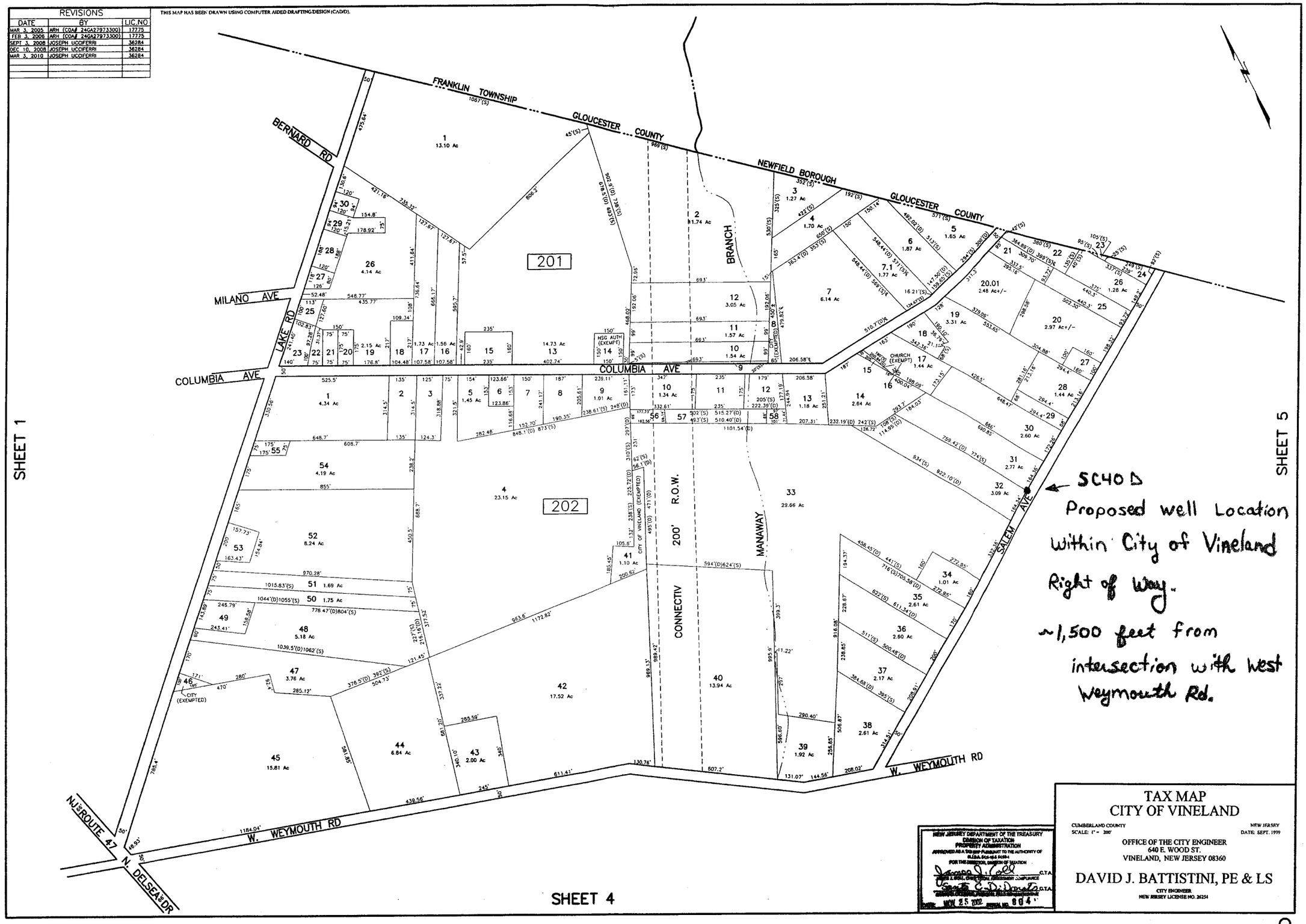
PERMIT NO. 12837

Sample Location Summary
Shieldalloy Metallurgical Corporation
Newfield, New Jersey
March 2011

Soil Boring Location ID	Approximate State Planar Coordinates		Street Proposed Boring is Marked On	Street Address (Property Adjacent to Sample Location)	Block Number	Lot Number	Nearest Cross Street	Approximate Distance from Nearest Cross Street	Direction from Nearest Cross Street	Side of Street Location was Marked On	Size of Right-of-Way	Description of Location
	Northing	Easting										
Monitoring Wells												
SC40D	259000.00	342108.00	Salem Avenue	Between 540 and 560 Salem Avenue, within City-owned right of way along edge of Salem Avenue	202	31 & 32	West Weymouth Road	1,500 feet	Northeast	Northern	50 feet	Located just north of edge of Salem Avenue

REVISIONS		
DATE	BY	LIC.NO
MAR 3, 2005	ARH (COA# 24GA27973300)	17775
FEB 3, 2006	ARH (COA# 24GA27973300)	17775
SEPT 3, 2008	JOSEPH UCCIFERRI	36284
DEC 10, 2008	JOSEPH UCCIFERRI	36284
MAR 3, 2010	JOSEPH UCCIFERRI	36284

THIS MAP HAS BEEN DRAWN USING COMPUTER AIDED DRAFTING/DESIGN (CAD/D).



NEW JERSEY DEPARTMENT OF THE TREASURY
DIVISION OF TAXATION
PROPERTY ADMINISTRATION
APPROVED AS A TAX MAP PURSUANT TO THE AUTHORITY OF
N.J.S.A. 54:4-19 & 54:59-1
FOR THE DIRECTOR, DIVISION OF TAXATION
James J. Coll C.T.A.
JAMES J. COLL, CHIEF, TAXPAYER COMPLIANCE
Santa C. DiDonato C.T.A.
SENIOR GENERAL PROPERTY ADMINISTRATIVE
DATE: MAY 25 2002 SERIAL NO. 804

TAX MAP
CITY OF VINELAND

CUMBERLAND COUNTY — NEW JERSEY
SCALE: 1" = 200' — DATE: SEPT. 1999

OFFICE OF THE CITY ENGINEER
640 E. WOOD ST.
VINELAND, NEW JERSEY 08360

DAVID J. BATTISTINI, PE & LS
CITY ENGINEER
NEW JERSEY LICENSE NO. 26254

APPENDIX G

ANALYTICAL LABORATORY REPORTS

(ELECTRONIC COPIES ON CD)

APPENDIX H

DATA VALIDATION REPORTS

Data Validation Memorandum

To: Larry Butlien

From: Elizabeth Denly

CC: John Moss

Date: January 7, 2010

Subject: Perchlorate Data Validation Review: Groundwater, Soil, Sediment, and Surface Water Samples: SMC/Newfield, NJ

SUMMARY

Full validation was performed on the data for 35 groundwater samples, 21 soil samples, six sediment samples, and six surface water samples collected at the SMC site in Newfield, New Jersey. The samples were collected from October 15, 2009 through November 19, 2009 and submitted to Accutest Laboratories in Dayton, New Jersey for analysis. The samples were analyzed for perchlorate using EPA Method 314.0. The laboratory reported the results under case numbers JA30457, JA30759, JA30998, JA31156, JA31353, JA31506, and JA33467.

The sample results were assessed using the *Region II Evaluation of Metals Data for the Contract Laboratory Program (CLP)*, Revision 13, SOP HW-2, September 2006; these data validation guidelines were modified to accommodate the method-specific criteria.

In general, the data are valid as reported and may be used for decision-making purposes with the following exceptions. Positive and nondetect results for perchlorate were qualified as estimated (J/UJ) in samples SED-2, SED-4, and SED-10 due to low percent solids. Select results were reported which were below the lowest calibration standard; these results were qualified as estimated (J). This issue has a minor impact on the data usability. All results are still usable for project objectives.

SAMPLES

Groundwater samples included in this review are listed below:

VP-13 (100-105')	VP-14 (80-85')	VP-14 (105-110')	VP-24 (105-110') (field duplicate of VP-14 [105-110'])	VP-14 (130-135')
VP-13A (62-67')	VP-13A (87-92')	SC22S	MWH-4	IWC-2
IWC-4	IWC-1	IWC-3	IWC-5	IWC-6 (field duplicate of IWC-5)
SC9S	SC33S (field duplicate of SC9S)	B	SC6S	RW6S
SC6D	RW6D	SC4S	SC18S	SC18D
SC1D	SC1S	SC3S	SC3D (R)	SC34D (field duplicate of SC3D [R])

RIW2	IW2	SC33D	SC34D	SC37D (field duplicate of SC34D)
FB101909	FB102109	FB102209	FB111909	

Soil samples included in this review are listed below:

SS-1 (5-7')	SS-1 (12-14')	SS-2 (1-3')	SS-2 (14-16')	SS-3 (0-2')
SS-3 (13-15')	SS-4 (2-4')	SS-4 (14-16')	SS-5 (5-7')	SS-5 (13-15')
SS-6 (1-3')	SS-6 (14-16')	SS-7 (6-8')	SS-7 (13-15')	SS-8 (3-4')
SS-8 (12-14')	SS-9 (6-8')	SS-9 (12-14')	SS-10 (2-4')	SS-10 (4-6')
SS-27 (6-8') (field duplicate of SS-07 [6-8'])	FB102609 (1)	FB102609 (2)		

Sediment samples included in this review are listed below:

SED-1A	SED-1	SED-2	SED-3	SED-4
SED-10 (field duplicate of SED-4)	FB102809			

Surface water samples included in this review are listed below:

SW-1A	SW-1	SW-2	SW-3	SW-4
SW-10 (field duplicate of SW-4)				

REVIEW ELEMENTS

Sample data were reviewed for the following parameters:

- Agreement of analyses conducted with chain-of-custody requests
- Data completeness
- Holding times and sample preservation
- Initial and continuing calibrations
- Reporting limit standards
- Instrument performance check standards
- Blanks
- Matrix spike (MS) results
- Laboratory duplicate results
- Laboratory control sample (LCS) results
- Field duplicate results
- Quantitation limits and sample results
- Target compound identification

DISCUSSION

Agreement of Analyses Conducted with Chain-of-Custody Requests

Sample reports were checked to verify that the results corresponded to analytical requests as designated on the chain-of-custody (COC). There were no discrepancies noted.

Data Completeness

The data packages were found to be complete as received from the laboratory with the following exception:

- The raw data associated with the sequence GN32151 on 11/10/09 from groundwater data package JA30998 were missing and submitted by the laboratory upon request during data validation.

Holding Times and Sample Preservation

All samples were analyzed within the method-specified holding time. The cooler temperatures upon sample receipt were within the acceptance criterion of $4 \pm 2^{\circ}C$.

Initial and Continuing Calibrations

All initial calibration criteria were met. The percent recoveries of perchlorate were within the acceptance criteria in all initial calibration verification (ICV) and continuing calibration verification (CCV) standards. All ICV and CCV perchlorate standards were analyzed at the method-specified frequency. All calibration checks associated with the specific conductivity analyses were also within the acceptance criteria.

Reporting Limit Standards

The percent recoveries of perchlorate were within the acceptance criteria in all reporting limit standards. The reporting limit standards were analyzed at the method-specified frequency and at the reporting limit of 3 µg/L.

Instrument Performance Check Standards

The instrument performance checks were analyzed at the method-specified frequency and at the required conductivity. The percent recoveries of perchlorate were within the acceptance criteria in all instrument performance check standards. The percent differences of the area/height ratio of perchlorate in the instrument performance check standard compared to the area/height ratio of perchlorate in the laboratory control sample were within the acceptance criteria in all instrument performance check standards.

Blanks

Perchlorate was not detected in any of the laboratory method blanks or field blanks.

MS Results

MS analyses were performed on groundwater samples VP-13A (87-92'), VP-14 (105-110'), IWC-1, B, SC3S, and SC34D, soil sample SS-01 (5-7'), and surface water sample SW-1A. All criteria were met in the matrix spike analyses.

Laboratory Duplicate Results

Laboratory duplicate analyses for perchlorate and specific conductivity were performed on groundwater samples VP-13A (87-92'), VP-14 (105-110'), IWC-1, B, SC3S, and SC34D, soil sample SS-01 (5-7'), and surface water sample SW-1A. All criteria were met in the laboratory duplicate analyses.

LCS Results

The percent recoveries of perchlorate were within the acceptance criteria in all LCS analyses.

Field Duplicate Results

Samples SC9S/SC33S, IWC-5/IWC-6, VP-14 (105-110')/VP-24 (105-110'), SC3D(R)/SC34D, and SC34D/SC37D were submitted as the groundwater field duplicate pairs with this sample set. Samples SW-4 and SW-10 were submitted as the surface water field duplicate pair with this sample set. Samples SED-4 and SED-10 were submitted as the sediment field duplicate pair with this sample set. Samples SS-07/6-8' and SS-27/6-8' were submitted as the soil field duplicate pair with this sample set.

The following tables summarize the relative percent differences (RPDs) of perchlorate and specific conductivity in the field duplicate pairs. All RPDs were either within the acceptance criteria or not calculable (NC) due to a nondetect result in one of the two samples. Qualification of the data on the basis of the field duplicate results was not required.

Analyte	VP-14 (105-110')	VP-24 (105-110')	RPD (%)
Perchlorate (µg/L)	6.2	5.9	5.0
Specific Conductivity (µhmos/cm)	334	327	2.1
Analyte	**IWC-5**	**IWC-6**	**RPD (%)**
Perchlorate (µg/L)	11.7	10.7	8.9
Specific Conductivity (µhmos/cm)	417	444	6.3
Analyte	**SC9S**	**SC33S**	**RPD (%)**
Perchlorate (µg/L)	8.2	8.0	2.5
Specific Conductivity (µhmos/cm)	445	449	0.90

Analyte	SC3D (R)	SC34D	RPD (%)
Perchlorate (µg/L)	141	136	3.6
Specific Conductivity (µhmos/cm)	638	631	1.1
Analyte	**Sc34D**	**SC37D**	**RPD (%)**
Perchlorate (µg/L)	152	150	1.3
Specific Conductivity (µhmos/cm)	1020	996	2.4

Analyte	SW-4	SW-10	RPD (%)
Perchlorate (µg/L)	ND	ND	NA
Specific Conductivity (µhmos/cm)	127	128	0.78
ND = Not detected NA = Not applicable			

Analyte	SED-4	SED-10	RPD (%)
Perchlorate (µg/kg)	10.9 J	7.7 U	NC
Specific Conductivity (µhmos/cm)	181	174	3.9

Analyte	SS-07/6-8'	SS-27/6-8'	RPD (%)
Perchlorate (µg/kg)	ND	ND	NA
Specific Conductivity (µhmos/cm)	105	96.8	8.1
ND = Not detected NA = Not applicable			

Quantitation Limits and Sample Results

Sample calculations were spot-checked; there were no errors noted.

Select results were reported which were below the lowest calibration standard level and quantitation limit (QL). These results were qualified by the laboratory with a "B"; the "B" was changed to a "J" during validation to indicate the value was estimated.

Three sediment samples exhibited percent solids content <50. The following samples were affected: SED-4 (21.9), SED-10 (21.5), and SED-2 (47.3). The positive and nondetect results for perchlorate in these samples were qualified as estimated (J/UJ).

It should be noted that the laboratory reported nondetect results down to the method detection limit (MDL) instead of the QL. The Form Is were manually changed during validation to reflect the QL instead of the MDL.

Samples SC3D (R) and SC34D were analyzed at 8-fold dilutions and samples SC34D and SC37D were analyzed at 6-fold dilutions due to the concentrations of perchlorate which exceeded the calibration range in the undiluted analysis.

None of the samples exhibited a specific conductivity above the laboratory's matrix conductivity threshold and therefore none of the samples required dilution or pretreatment due to conductivity.

Target Compound Identification

The following issues were noted in regards to the identification of perchlorate:

Sample SC18S: The chromatogram of the undiluted analysis of this sample exhibited a high level of interference and significant shift in the baseline at the time where perchlorate elutes. The laboratory stated that the absence of perchlorate in this undiluted analysis was confirmed by a 5-fold dilution of this sample. Upon request during validation, the laboratory submitted the raw data associated with the 5-fold dilution of this sample. The baseline shift was not evident in the 5-fold diluted analysis. It was the opinion of the validator that the nondetect result for perchlorate in this sample should therefore be reported from the 5-fold diluted analysis. The Form I for this sample was updated accordingly.

Samples SED-2 and SW-10 identified the presence of perchlorate at the incorrect retention time. Upon request, the laboratory was asked to verify the reported perchlorate results in these samples. The laboratory reported these results as nondetects upon verification and resubmitted the results.

Qualified Form Is

Ground Water

Report of Analysis

Client Sample ID:	VP-13(100-105')		
Lab Sample ID:	JA30457-1	Date Sampled:	10/15/09
Matrix:	AQ - Ground Water	Date Received:	10/15/09
		Percent Solids:	n/a
Project:	SMC Perchlorate Off-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	10.6	3.0	0.92	ug/l	1	10/15/09 18:11	MS	EPA 314
Specific Conductivity	139	0.50		umhos/cm	1	10/16/09	ST	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Report of Analysis

Client Sample ID:	VP-14(80-85')		
Lab Sample ID:	JA30759-1	Date Sampled:	10/19/09
Matrix:	AQ - Ground Water	Date Received:	10/19/09
		Percent Solids:	n/a
Project:	SMC Perchlorate Off-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	1.6 ~~B~~ J	3.0	0.92	ug/l	1	10/20/09 17:32	MS	EPA 314
Specific Conductivity	332	0.50		umhos/cm	1	10/21/09	BD	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Report of Analysis

Client Sample ID:	VP-14(105-110')		
Lab Sample ID:	JA30759-2	Date Sampled:	10/19/09
Matrix:	AQ - Ground Water	Date Received:	10/19/09
		Percent Solids:	n/a
Project:	SMC Perchlorate Off-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	6.2	3.0	0.92	ug/l	1	10/20/09 17:15	MS	EPA 314
Specific Conductivity	334	0.50		umhos/cm	1	10/21/09	BD	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Report of Analysis

Client Sample ID:	VP-24(105-110')		
Lab Sample ID:	JA30759-3	Date Sampled:	10/19/09
Matrix:	AQ - Ground Water	Date Received:	10/19/09
		Percent Solids:	n/a
Project:	SMC Perchlorate Off-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	5.9	3.0	0.92	ug/l	1	10/20/09 17:49	MS	EPA 314
Specific Conductivity	327	0.50		umhos/cm	1	10/21/09	BD	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Accutest Laboratories

Report of Analysis

3.5

Client Sample ID:	VP-14(130-135')		
Lab Sample ID:	JA30759-5	Date Sampled:	10/19/09
Matrix:	AQ - Ground Water	Date Received:	10/19/09
		Percent Solids:	n/a
Project:	SMC Perchlorate Off-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	12.5	3.0	0.92	ug/l	1	10/20/09 18:24	MS	EPA 314
Specific Conductivity	77.2	0.50		umhos/cm	1	10/21/09	BD	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Report of Analysis

Client Sample ID:	VP-13A(62-67')		
Lab Sample ID:	JA31156-1	Date Sampled:	10/22/09
Matrix:	AQ - Ground Water	Date Received:	10/23/09
		Percent Solids:	n/a
Project:	SMC Perchlorate Off-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	4.3	3.0	0.92	ug/l	1	10/26/09 18:58	MS	EPA 314
Specific Conductivity	156	0.50		umhos/cm	1	10/27/09	ST	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Report of Analysis

Client Sample ID:	VP13A(87-92')		
Lab Sample ID:	JA31156-3	Date Sampled:	10/23/09
Matrix:	AQ - Ground Water	Date Received:	10/23/09
		Percent Solids:	n/a
Project:	SMC Perchlorate Off-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	3.4	3.0	0.92	ug/l	1	10/26/09 18:41	MS	EPA 314
Specific Conductivity	127	0.50		umhos/cm	1	10/26/09	ST	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Accutest Laboratories

Report of Analysis

3.2

3

Client Sample ID:	SC22S		
Lab Sample ID:	JA30998-2	Date Sampled:	10/21/09
Matrix:	AQ - Ground Water	Date Received:	10/21/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	~~0.92~~ 3.0 U	3.0	0.92	ug/l	1	11/10/09 12:08	BD	EPA 314
Specific Conductivity	376	0.50		umhos/cm	1	11/03/09	RI	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Accutest Laboratories

Report of Analysis

3.3

Client Sample ID:	MWH-4		
Lab Sample ID:	JA30998-3	Date Sampled:	10/21/09
Matrix:	AQ - Ground Water	Date Received:	10/21/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	~~0.92~~ 3.0 U	3.0	0.92	ug/l	1	11/10/09 12:25	BD	EPA 314
Specific Conductivity	307	0.50		umhos/cm	1	11/03/09	RI	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Report of Analysis

Client Sample ID:	IWC-2		
Lab Sample ID:	JA30998-4	Date Sampled:	10/21/09
Matrix:	AQ - Ground Water	Date Received:	10/21/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	7.7	3.0	0.92	ug/l	1	11/11/09 10:38	MS	EPA 314
Specific Conductivity	688	0.50		umhos/cm	1	11/03/09	RI	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Report of Analysis

Client Sample ID:	IWC-4		
Lab Sample ID:	JA30998-5	Date Sampled:	10/21/09
Matrix:	AQ - Ground Water	Date Received:	10/21/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	4.6	3.0	0.92	ug/l	1	11/10/09 13:00	BD	EPA 314
Specific Conductivity	251	0.50		umhos/cm	1	11/03/09	RI	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	IWC-1		
Lab Sample ID:	JA30998-6	Date Sampled:	10/21/09
Matrix:	AQ - Ground Water	Date Received:	10/21/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	7.3	3.0	0.92	ug/l	1	10/28/09 17:05	MS	EPA 314
Specific Conductivity	651	0.50		umhos/cm	1	11/03/09	RI	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Accutest Laboratories

Report of Analysis

3.7

3

Client Sample ID:	IWC-3		
Lab Sample ID:	JA30998-7	Date Sampled:	10/21/09
Matrix:	AQ - Ground Water	Date Received:	10/21/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	2.5 ~~B~~ J	3.0	0.92	ug/l	1	11/10/09 13:17	BD	EPA 314
Specific Conductivity	224	0.50		umhos/cm	1	11/03/09	RI	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	IWC-5		
Lab Sample ID:	JA30998-8	Date Sampled:	10/21/09
Matrix:	AQ - Ground Water	Date Received:	10/21/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	11.7	3.0	0.92	ug/l	1	11/11/09 10:56	MS	EPA 314
Specific Conductivity	417	0.50		umhos/cm	1	11/03/09	RI	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	IWC-6		
Lab Sample ID:	JA30998-9	Date Sampled:	10/21/09
Matrix:	AQ - Ground Water	Date Received:	10/21/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	10.7	3.0	0.92	ug/l	1	11/11/09 11:13	MS	EPA 314
Specific Conductivity	444	0.50		umhos/cm	1	11/03/09	RI	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	SC-9S		
Lab Sample ID:	JA30998-10	Date Sampled:	10/21/09
Matrix:	AQ - Ground Water	Date Received:	10/21/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	8.2	3.0	0.92	ug/l	1	11/11/09 11:31	MS	EPA 314
Specific Conductivity	445	0.50		umhos/cm	1	11/03/09	RI	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	SC33S		
Lab Sample ID:	JA30998-11	Date Sampled:	10/21/09
Matrix:	AQ - Ground Water	Date Received:	10/21/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	8.0	3.0	0.92	ug/l	1	11/11/09 11:48	MS	EPA 314
Specific Conductivity	449	0.50		umhos/cm	1	11/03/09	RI	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Report of Analysis

Client Sample ID:	B		
Lab Sample ID:	JA30998-12	Date Sampled:	10/21/09
Matrix:	AQ - Ground Water	Date Received:	10/21/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	1.2 ~~B~~ J	3.0	0.92	ug/l	1	11/10/09 10:58	BD	EPA 314
Specific Conductivity	741	0.50		umhos/cm	1	11/03/09	RI	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Report of Analysis

Client Sample ID:	SC6S		
Lab Sample ID:	JA30998-13	Date Sampled:	10/21/09
Matrix:	AQ - Ground Water	Date Received:	10/21/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	6.4	3.0	0.92	ug/l	1	11/11/09 12:05	MS	EPA 314
Specific Conductivity	588	0.50		umhos/cm	1	11/03/09	RI	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	RW6S		
Lab Sample ID:	JA30998-14	Date Sampled:	10/21/09
Matrix:	AQ - Ground Water	Date Received:	10/21/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	12.9	3.0	0.92	ug/l	1	11/11/09 12:23	MS	EPA 314
Specific Conductivity	730	0.50		umhos/cm	1	11/03/09	RI	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	SC6D		
Lab Sample ID:	JA30998-15	Date Sampled:	10/21/09
Matrix:	AQ - Ground Water	Date Received:	10/21/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	9.8	3.0	0.92	ug/l	1	11/11/09 12:40	MS	EPA 314
Specific Conductivity	1070	0.50		umhos/cm	1	11/03/09	RI	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	RW6D		
Lab Sample ID:	JA30998-16	Date Sampled:	10/21/09
Matrix:	AQ - Ground Water	Date Received:	10/21/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	14.3	3.0	0.92	ug/l	1	11/11/09 15:48	MS	EPA 314
Specific Conductivity	937	0.50		umhos/cm	1	11/03/09	RI	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	SC4S		
Lab Sample ID:	JA30998-17	Date Sampled:	10/21/09
Matrix:	AQ - Ground Water	Date Received:	10/21/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	~~0.92~~ 3.0 U	3.0	0.92	ug/l	1	11/11/09 13:32	MS	EPA 314
Specific Conductivity	200	0.50		umhos/cm	1	11/03/09	RI	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	SC18S		
Lab Sample ID:	JA30998-18	Date Sampled:	10/21/09
Matrix:	AQ - Ground Water	Date Received:	10/21/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate [a]	15 ~~0.02~~ U	15 ~~2.0~~	0.92	ug/l	1	11/11/09 13:50	MS	EPA 314
Specific Conductivity	444	0.50		umhos/cm	1	11/03/09	RI	SM19 2510B/SW 9050A

(a) Background indicates possible interference, but reported results confirmed with 1:5 dilution.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Report of Analysis

Client Sample ID:	SC18D		
Lab Sample ID:	JA30998-19	Date Sampled:	10/21/09
Matrix:	AQ - Ground Water	Date Received:	10/21/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	3.8	3.0	0.92	ug/l	1	11/09/09 20:00	MS	EPA 314
Specific Conductivity	183	0.50		umhos/cm	1	11/03/09	RI	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	SC1D		
Lab Sample ID:	JA30998-20	Date Sampled:	10/21/09
Matrix:	AQ - Ground Water	Date Received:	10/21/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	46.3	3.0	0.92	ug/l	1	11/09/09 20:18	MS	EPA 314
Specific Conductivity	356	0.50		umhos/cm	1	11/03/09	RI	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Accutest Laboratories

Report of Analysis

3.21

3

Client Sample ID:	SC1S		
Lab Sample ID:	JA30998-21	Date Sampled:	10/21/09
Matrix:	AQ - Ground Water	Date Received:	10/21/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	1.8 B J	3.0	0.92	ug/l	1	11/09/09 20:35	MS	EPA 314
Specific Conductivity	235	0.50		umhos/cm	1	11/03/09	RI	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	SC3S		
Lab Sample ID:	JA30998-22	Date Sampled:	10/21/09
Matrix:	AQ - Ground Water	Date Received:	10/21/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	1.8 J	3.0	0.92	ug/l	1	11/09/09 19:43	MS	EPA 314
Specific Conductivity	263	0.50		umhos/cm	1	11/03/09	RI	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	SC3D(R)		
Lab Sample ID:	JA30998-23	Date Sampled:	10/21/09
Matrix:	AQ - Ground Water	Date Received:	10/21/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	141	24	7.4	ug/l	8	11/11/09 15:31	MS	EPA 314
Specific Conductivity	638	0.50		umhos/cm	1	11/03/09	RI	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Accutest Laboratories

Report of Analysis

3.24

3

Client Sample ID:	SC34D Field duplicate of SC 30(R)		
Lab Sample ID:	JA30998-24	Date Sampled:	10/21/09
Matrix:	AQ - Ground Water	Date Received:	10/21/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	136	24	7.4	ug/l	8	11/11/09 14:39	MS	EPA 314
Specific Conductivity	631	0.50		umhos/cm	1	11/03/09	RI	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	RIW2		
Lab Sample ID:	JA30998-25	Date Sampled:	10/21/09
Matrix:	AQ - Ground Water	Date Received:	10/21/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	4.1	3.0	0.92	ug/l	1	11/11/09 14:56	MS	EPA 314
Specific Conductivity	380	0.50		umhos/cm	1	11/03/09	RI	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	IW2		
Lab Sample ID:	JA30998-26	Date Sampled:	10/21/09
Matrix:	AQ - Ground Water	Date Received:	10/21/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	3.7	3.0	0.92	ug/l	1	11/09/09 21:45	MS	EPA 314
Specific Conductivity	300	0.50		umhos/cm	1	11/03/09	RI	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Report of Analysis

3.1

3

Client Sample ID:	SC33D		
Lab Sample ID:	JA33467-1	Date Sampled:	11/19/09
Matrix:	AQ - Ground Water	Date Received:	11/19/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	~~0.92~~ 3.0 U	3.0	0.92	ug/l	1	12/02/09 15:07	MS	EPA 314
Specific Conductivity	204	0.50		umhos/cm	1	12/03/09	BD	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Report of Analysis

Client Sample ID:	SC34D		
Lab Sample ID:	JA33467-2	Date Sampled:	11/19/09
Matrix:	AQ - Ground Water	Date Received:	11/19/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	152	18	5.5	ug/l	6	12/02/09 16:17	MS	EPA 314
Specific Conductivity	1020	0.50		umhos/cm	1	12/03/09	BD	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Report of Analysis

Client Sample ID:	SC37D		
Lab Sample ID:	JA33467-3	Date Sampled:	11/19/09
Matrix:	AQ - Ground Water	Date Received:	11/19/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	150	18	5.5	ug/l	6	12/02/09 16:52	MS	EPA 314
Specific Conductivity	996	0.50		umhos/cm	1	12/03/09	BD	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Report of Analysis

3.4

3

Client Sample ID:	FB101909		
Lab Sample ID:	JA30759-4	Date Sampled:	10/19/09
Matrix:	AQ - Field Blank Water	Date Received:	10/19/09
		Percent Solids:	n/a
Project:	SMC Perchlorate Off-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	~~0.92~~ 3.0 U	3.0	0.92	ug/l	1	10/20/09 18:07	MS	EPA 314
Specific Conductivity	4.3	0.50		umhos/cm	1	10/21/09	BD	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Accutest Laboratories

Report of Analysis

3.1

3

Client Sample ID:	FB102109		
Lab Sample ID:	JA30998-1	Date Sampled:	10/21/09
Matrix:	AQ - Field Blank Water	Date Received:	10/21/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	~~0.92~~ 3.0 U	3.0	0.92	ug/l	1	11/10/09 11:50	BD	EPA 314
Specific Conductivity	2.6	0.50		umhos/cm	1	11/03/09	RI	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Accutest Laboratories

Report of Analysis

3.2

3

Client Sample ID:	FB102209		
Lab Sample ID:	JA31156-2	Date Sampled:	10/22/09
Matrix:	AQ - Field Blank Water	Date Received:	10/23/09
		Percent Solids:	n/a
Project:	SMC Perchlorate Off-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	~~0.92~~ 3.0 U	3.0	0.92	ug/l	1	10/26/09 19:16	MS	EPA 314
Specific Conductivity	3.7	0.50		umhos/cm	1	10/26/09	ST	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Report of Analysis

3.4

3

Client Sample ID:	FB111909		
Lab Sample ID:	JA33467-4	Date Sampled:	11/19/09
Matrix:	AQ - Field Blank Water	Date Received:	11/19/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	~~0.92~~ 3.0 U	3.0	0.92	ug/l	1	12/02/09 13:58	MS	EPA 314
Specific Conductivity	3.0	0.50		umhos/cm	1	12/03/09	BD	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Soil

Accutest Laboratories

Report of Analysis

3.1

3

Client Sample ID:	SS-01(5-7')		
Lab Sample ID:	JA31353-1	Date Sampled:	10/26/09
Matrix:	SO - Soil	Date Received:	10/26/09
		Percent Solids:	93.2
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	~~1.6~~ 9.6 U	9.6	1.8	ug/kg	1	11/12/09 20:56	MS	EPA 314 M
Solids, Percent	93.2			%	1	11/10/09	RI	SM18 2540G
Specific Conductivity	16.8	0.50		umhos/cm	1	11/09/09	RI	SM19 2510B M

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Accutest Laboratories

Report of Analysis

3.2

3

Client Sample ID:	SS-01(12-14')		
Lab Sample ID:	JA31353-2	Date Sampled:	10/26/09
Matrix:	SO - Soil	Date Received:	10/26/09
		Percent Solids:	90.1
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	~~1.8~~ 10 U	10	1.8	ug/kg	1	11/12/09 21:14	MS	EPA 314 M
Solids, Percent	90.1			%	1	11/10/09	RI	SM18 2540G
Specific Conductivity	13.3	0.50		umhos/cm	1	11/09/09	RI	SM19 2510B M

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	SS-02(1-3')		
Lab Sample ID:	JA31353-3	Date Sampled:	10/26/09
Matrix:	SO - Soil	Date Received:	10/26/09
		Percent Solids:	91.6
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	2.1 ~~B~~ J	9.9	1.8	ug/kg	1	11/12/09 21:31	MS	EPA 314 M
Solids, Percent	91.6			%	1	11/10/09	RI	SM18 2540G
Specific Conductivity	195	0.50		umhos/cm	1	11/09/09	RI	SM19 2510B M

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Accutest Laboratories

Report of Analysis

3.4

3

Client Sample ID:	SS-02(14-16')		
Lab Sample ID:	JA31353-4	Date Sampled:	10/26/09
Matrix:	SO - Soil	Date Received:	10/26/09
		Percent Solids:	93.3
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	~~1.8~~ 9.7 U	9.7	1.8	ug/kg	1	11/12/09 21:49	MS	EPA 314 M
Solids, Percent	93.3			%	1	11/10/09	RI	SM18 2540G
Specific Conductivity	50.0	0.50		umhos/cm	1	11/09/09	RI	SM19 2510B M

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Accutest Laboratories

Report of Analysis

3.5

3

Client Sample ID:	SS-03(0-2')		
Lab Sample ID:	JA31353-5	Date Sampled:	10/26/09
Matrix:	SO - Soil	Date Received:	10/26/09
		Percent Solids:	84.6
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	~~1.8~~ 10 U	10	1.9	ug/kg	1	11/12/09 22:06	MS	EPA 314 M
Solids, Percent	84.6			%	1	11/10/09	RI	SM18 2540G
Specific Conductivity	1900	0.50		umhos/cm	1	11/09/09	RI	SM19 2510B M

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Accutest Laboratories

Report of Analysis

3.6

3

Client Sample ID:	SS-03(13-15')		
Lab Sample ID:	JA31353-6	Date Sampled:	10/26/09
Matrix:	SO - Soil	Date Received:	10/26/09
		Percent Solids:	94.6
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	8.6 ~~B~~ J	9.4	1.7	ug/kg	1	11/13/09 14:04	MS	EPA 314 M
Solids, Percent	94.6			%	1	11/10/09	RI	SM18 2540G
Specific Conductivity	48.5	0.50		umhos/cm	1	11/09/09	RI	SM19 2510B M

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Accutest Laboratories

Report of Analysis

3.7 3

Client Sample ID:	SS-04(2-4')		
Lab Sample ID:	JA31353-7	Date Sampled:	10/26/09
Matrix:	SO - Soil	Date Received:	10/26/09
		Percent Solids:	89.8
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	7.9 ~~B~~ J	9.9	1.8	ug/kg	1	11/13/09 14:22	MS	EPA 314 M
Solids, Percent	89.8			%	1	11/10/09	RI	SM18 2540G
Specific Conductivity	48.6	0.50		umhos/cm	1	11/09/09	RI	SM19 2510B M

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Accutest Laboratories

Report of Analysis

3.8

3

Client Sample ID:	SS-04(14-16')		
Lab Sample ID:	JA31353-8	Date Sampled:	10/26/09
Matrix:	SO - Soil	Date Received:	10/26/09
		Percent Solids:	89.2
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	4.2 ~~B~~ J	10	1.9	ug/kg	1	11/13/09 14:39	MS	EPA 314 M
Solids, Percent	89.2			%	1	11/10/09	RI	SM18 2540G
Specific Conductivity	27.7	0.50		umhos/cm	1	11/09/09	RI	SM19 2510B M

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Report of Analysis

Client Sample ID:	SS-05(5-7')		
Lab Sample ID:	JA31353-9	Date Sampled:	10/26/09
Matrix:	SO - Soil	Date Received:	10/26/09
		Percent Solids:	92.7
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	58.3	9.6	1.8	ug/kg	1	11/12/09 23:33	MS	EPA 314 M
Solids, Percent	92.7			%	1	11/10/09	RI	SM18 2540G
Specific Conductivity	76.2	0.50		umhos/cm	1	11/09/09	RI	SM19 2510B M

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Report of Analysis

Client Sample ID:	SS-05(13-15')		
Lab Sample ID:	JA31353-10	Date Sampled:	10/26/09
Matrix:	SO - Soil	Date Received:	10/26/09
		Percent Solids:	92.1
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	18.3	9.7	1.8	ug/kg	1	11/12/09 23:51	MS	EPA 314 M
Solids, Percent	92.1			%	1	11/10/09	RI	SM18 2540G
Specific Conductivity	49.0	0.50		umhos/cm	1	11/09/09	RI	SM19 2510B M

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	SS-06(1-3')		
Lab Sample ID:	JA31353-11	Date Sampled:	10/26/09
Matrix:	SO - Soil	Date Received:	10/26/09
		Percent Solids:	88.9
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	~~1.9~~ 10 U	10	1.9	ug/kg	1	11/13/09 00:08	MS	EPA 314 M
Solids, Percent	88.9			%	1	11/10/09	RI	SM18 2540G
Specific Conductivity	40.1	0.50		umhos/cm	1	11/09/09	RI	SM19 2510B M

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Accutest Laboratories

Report of Analysis

3.12

3

Client Sample ID:	SS-06(14-16')		
Lab Sample ID:	JA31353-12	Date Sampled:	10/26/09
Matrix:	SO - Soil	Date Received:	10/26/09
		Percent Solids:	92.7
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	2.9 ~~B~~ J	9.8	1.8	ug/kg	1	11/13/09 00:25	MS	EPA 314 M
Solids, Percent	92.7			%	1	11/10/09	RI	SM18 2540G
Specific Conductivity	20.4	0.50		umhos/cm	1	11/09/09	RI	SM19 2510B M

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	SS-07(6-8')		
Lab Sample ID:	JA31353-13	Date Sampled:	10/26/09
Matrix:	SO - Soil	Date Received:	10/26/09
		Percent Solids:	94.1
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	~~1.8~~ 9.6 U	9.6	1.8	ug/kg	1	11/13/09 00:43	MS	EPA 314 M
Solids, Percent	94.1			%	1	11/10/09	RI	SM18 2540G
Specific Conductivity	105	0.50		umhos/cm	1	11/09/09	RI	SM19 2510B M

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Accutest Laboratories

Report of Analysis

3.14

3

Client Sample ID:	SS-07(13-15')		
Lab Sample ID:	JA31353-14	Date Sampled:	10/26/09
Matrix:	SO - Soil	Date Received:	10/26/09
		Percent Solids:	92.3
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	3.0 ~~B~~ J	9.8	1.8	ug/kg	1	11/13/09 01:00	MS	EPA 314 M
Solids, Percent	92.3			%	1	11/10/09	RI	SM18 2540G
Specific Conductivity	23.0	0.50		umhos/cm	1	11/09/09	RI	SM19 2510B M

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Accutest Laboratories

Report of Analysis

3.15

3

Client Sample ID:	SS-08(3-4')		
Lab Sample ID:	JA31353-15	Date Sampled:	10/26/09
Matrix:	SO - Soil	Date Received:	10/26/09
		Percent Solids:	90.6
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	~~1.8~~ 9.9 U	9.9	1.8	ug/kg	1	11/13/09 01:18	MS	EPA 314 M
Solids, Percent	90.6			%	1	11/10/09	DD	SM18 2540G
Specific Conductivity	35.7	0.50		umhos/cm	1	11/09/09	RI	SM19 2510B M

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Accutest Laboratories

Report of Analysis

3.16

3

Client Sample ID:	SS-08(12-14')		
Lab Sample ID:	JA31353-16	Date Sampled:	10/26/09
Matrix:	SO - Soil	Date Received:	10/26/09
		Percent Solids:	93.4
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	~~1.8~~ 9.6 U	9.6	1.8	ug/kg	1	11/13/09 01:35	MS	EPA 314 M
Solids, Percent	93.4			%	1	11/10/09	DD	SM18 2540G
Specific Conductivity	21.8	0.50		umhos/cm	1	11/09/09	RI	SM19 2510B M

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Accutest Laboratories

Report of Analysis

3.17 3

Client Sample ID:	SS-09(6-8')		
Lab Sample ID:	JA31353-17	Date Sampled:	10/26/09
Matrix:	SO - Soil	Date Received:	10/26/09
		Percent Solids:	88.4
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	~~1.8~~ 10 U	10	1.8	ug/kg	1	11/13/09 01:52	MS	EPA 314 M
Solids, Percent	88.4			%	1	11/10/09	DD	SM18 2540G
Specific Conductivity	47.9	0.50		umhos/cm	1	11/09/09	RI	SM19 2510B M

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	SS-09(12-14')		
Lab Sample ID:	JA31353-18	Date Sampled:	10/26/09
Matrix:	SO - Soil	Date Received:	10/26/09
		Percent Solids:	90.2
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	~~1.8~~ 10 U	10	1.8	ug/kg	1	11/13/09 02:10	MS	EPA 314 M
Solids, Percent	90.2			%	1	11/10/09	DD	SM18 2540G
Specific Conductivity	33.0	0.50		umhos/cm	1	11/09/09	RI	SM19 2510B M

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	SS-10(2-4')		
Lab Sample ID:	JA31353-19	Date Sampled:	10/26/09
Matrix:	SO - Soil	Date Received:	10/26/09
		Percent Solids:	91.3
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	~~1.8~~ 9.8 U	9.8	1.8	ug/kg	1	11/13/09 02:45	MS	EPA 314 M
Solids, Percent	91.3			%	1	11/11/09	DD	SM18 2540G
Specific Conductivity	35.9	0.50		umhos/cm	1	11/09/09	RI	SM19 2510B M

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Accutest Laboratories

Report of Analysis

3.20

3

Client Sample ID:	SS-10(4-6')		
Lab Sample ID:	JA31353-20	Date Sampled:	10/26/09
Matrix:	SO - Soil	Date Received:	10/26/09
		Percent Solids:	96.5
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	~~1.7~~ 9.4 U	9.4	1.7	ug/kg	1	11/13/09 03:02	MS	EPA 314 M
Solids, Percent	96.5			%	1	11/10/09	DD	SM18 2540G
Specific Conductivity	17.4	0.50		umhos/cm	1	11/09/09	RI	SM19 2510B M

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	SS-27(6-8')		
Lab Sample ID:	JA31353-23	Date Sampled:	10/26/09
Matrix:	SO - Soil	Date Received:	10/26/09
		Percent Solids:	94.2
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	~~1.8~~ 9.6 U	9.6	1.8	ug/kg	1	11/13/09 21:02	MS	EPA 314 M
Solids, Percent	94.2			%	1	11/10/09	DD	SM18 2540G
Specific Conductivity	96.8	0.50		umhos/cm	1	11/13/09	BD	SM19 2510B M

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Accutest Laboratories

Report of Analysis

3.21

3

Client Sample ID:	FB102609(1)		
Lab Sample ID:	JA31353-21	Date Sampled:	10/26/09
Matrix:	AQ - Field Blank Soil	Date Received:	10/26/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	~~0.92~~ 3.0 U	3.0	0.92	ug/l	1	11/13/09 14:57	MS	EPA 314
Specific Conductivity	3.4	0.50		umhos/cm	1	11/06/09	RI	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	FB102609(2)		
Lab Sample ID:	JA31353-22	Date Sampled:	10/26/09
Matrix:	AQ - Field Blank Soil	Date Received:	10/26/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	~~0.92~~ 3.0 U	3.0	0.92	ug/l	1	11/13/09 12:55	MS	EPA 314
Specific Conductivity	3.0	0.50		umhos/cm	1	11/06/09	RI	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Sediment

Report of Analysis

Client Sample ID:	SED-1A		
Lab Sample ID:	JA31506-3	Date Sampled:	10/28/09
Matrix:	SO - Sediment	Date Received:	10/28/09
		Percent Solids:	73.0
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	~~2.3~~ 12 U	12	2.3	ug/kg	1	11/17/09 03:59	MS	EPA 314 M
Solids, Percent	73			%	1	11/11/09	DD	SM18 2540G
Specific Conductivity	34.5	0.50		umhos/cm	1	11/16/09	RI	SM19 2510B M

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Accutest Laboratories

Report of Analysis

3.5

3

Client Sample ID:	SED-1		
Lab Sample ID:	JA31506-5	Date Sampled:	10/28/09
Matrix:	SO - Sediment	Date Received:	10/28/09
		Percent Solids:	51.5
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	~~9.2~~ 18 U	18	3.2	ug/kg	1	11/17/09 04:34	MS	EPA 314 M
Solids, Percent	51.5			%	1	11/11/09	DD	SM18 2540G
Specific Conductivity	73.5	0.50		umhos/cm	1	11/16/09	RI	SM19 2510B M

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Accutest Laboratories

Report of Analysis

3.7 3

Client Sample ID:	SED-2		
Lab Sample ID:	JA31506-7	Date Sampled:	10/28/09
Matrix:	SO - Sediment	Date Received:	10/28/09
		Percent Solids:	47.3
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	~~17~~ 19 U J	19	3.5	ug/kg	1	11/17/09 04:52	MS	EPA 314 M
Solids, Percent	47.3			%	1	11/11/09	DD	SM18 2540G
Specific Conductivity	140	0.50		umhos/cm	1	11/16/09	RI	SM19 2510B M

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Accutest Laboratories

Report of Analysis

3.9

3

Client Sample ID:	SED-3		
Lab Sample ID:	JA31506-9	Date Sampled:	10/28/09
Matrix:	SO - Sediment	Date Received:	10/28/09
		Percent Solids:	71.7
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	~~2.3~~ 13 U	13	2.3	ug/kg	1	11/18/09 23:33	MS	EPA 314 M
Solids, Percent	71.7			%	1	11/11/09	DD	SM18 2540G
Specific Conductivity	120	0.50		umhos/cm	1	11/16/09	RI	SM19 2510B M

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	SED-4		
Lab Sample ID:	JA31506-11	Date Sampled:	10/28/09
Matrix:	SO - Sediment	Date Received:	10/28/09
		Percent Solids:	21.9
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	10.9 ~~B~~ J	41	7.6	ug/kg	1	11/17/09 05:27	MS	EPA 314 M
Solids, Percent	21.9			%	1	11/11/09	DD	SM18 2540G
Specific Conductivity	181	0.50		umhos/cm	1	11/16/09	RI	SM19 2510B M

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	SED-10		
Lab Sample ID:	JA31506-13	Date Sampled:	10/28/09
Matrix:	SO - Sediment	Date Received:	10/28/09
		Percent Solids:	21.5
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	~~7~~ 42 UJ	42	7.7	ug/kg	1	11/17/09 05:44	MS	EPA 314 M
Solids, Percent	21.5			%	1	11/11/09	DD	SM18 2540G
Specific Conductivity	174	0.50		umhos/cm	1	11/16/09	RI	SM19 2510B M

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Report of Analysis

3.1 3

Client Sample ID:	FB102809		
Lab Sample ID:	JA31506-1	Date Sampled:	10/28/09
Matrix:	AQ - Field Blank Soil	Date Received:	10/28/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	3.0 ~~0.92~~ U	3.0	0.92	ug/l	1	11/16/09 20:44	MS	EPA 314
Specific Conductivity	9.1	0.50		umhos/cm	1	11/16/09	RI	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Surface Water

Accutest Laboratories

Report of Analysis

Client Sample ID:	SW-1A		
Lab Sample ID:	JA31506-2	Date Sampled:	10/28/09
Matrix:	AQ - Surface Water	Date Received:	10/28/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	1.8 ~~B~~ J	3.0	0.92	ug/l	1	11/16/09 20:27	MS	EPA 314
Specific Conductivity	167	0.50		umhos/cm	1	11/17/09	BD	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Accutest Laboratories

Report of Analysis

3.4 3

Client Sample ID:	SW-1		
Lab Sample ID:	JA31506-4	Date Sampled:	10/28/09
Matrix:	AQ - Surface Water	Date Received:	10/28/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	~~0.92~~ 3.0 U	3.0	0.92	ug/l	1	11/16/09 21:19	MS	EPA 314
Specific Conductivity	111	0.50		umhos/cm	1	11/17/09	BD	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Accutest Laboratories

Report of Analysis

3.6

3

Client Sample ID:	SW-2		
Lab Sample ID:	JA31506-6	Date Sampled:	10/28/09
Matrix:	AQ - Surface Water	Date Received:	10/28/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	3.0 ~~0.92~~ U	3.0	0.92	ug/l	1	11/18/09 23:50	MS	EPA 314
Specific Conductivity	141	0.50		umhos/cm	1	11/17/09	BD	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Accutest Laboratories

Report of Analysis

3.8

3

Client Sample ID:	SW-3		
Lab Sample ID:	JA31506-8	Date Sampled:	10/28/09
Matrix:	AQ - Surface Water	Date Received:	10/28/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	~~0.92~~ 3.0 U	3.0	0.92	ug/l	1	11/16/09 21:54	MS	EPA 314
Specific Conductivity	127	0.50		umhos/cm	1	11/17/09	BD	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	SW-4		
Lab Sample ID:	JA31506-10	Date Sampled:	10/28/09
Matrix:	AQ - Surface Water	Date Received:	10/28/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	~~0.92~~ 3.0 U	3.0	0.92	ug/l	1	11/16/09 22:11	MS	EPA 314
Specific Conductivity	127	0.50		umhos/cm	1	11/17/09	BD	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result >= MDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	SW-10		
Lab Sample ID:	JA31506-12	Date Sampled:	10/28/09
Matrix:	AQ - Surface Water	Date Received:	10/28/09
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	3.0 U ~~0.92 B~~	3.0	0.92	ug/l	1	11/16/09 22:29	MS	EPA 314
Specific Conductivity	128	0.50		umhos/cm	1	11/17/09	BD	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Data Validation Worksheets

Data Validation Worksheet Cover Page

Site Name: SMC
Project No. 163230/01000/01130

PERCHLORATE DATA VALIDATION

The following data package has been validated:

Lab Name: Accutest-NJ
Lab Project No.: JA30457, JA30759, JA30998, JA31156, JA33467, JA31506, JA31353
No. of Samples/Matrix: see next page

Method No: EPA 314.0 aqueous solid EPA 314.0, modified
Sampling Date(s): see next page
Shipping Date(s): —
Date Rec'd By Lab: —

Sample IDs. see next page

Equipment Blank ID. see next page
Field Duplicate IDs. see FD worksheet

The method requirements and the Region II *Evaluation of Metals Data for the Contract Laboratory Program (CLP)* (Revision 13, SOP HW-2, September 2006) were used to evaluate the data.

Full validation was performed.

The data were evaluated based upon the following parameters:

-Overall Evaluation of Data
-Data Completeness
-Preservation & Technical Holding Times
-RL Standard Analysis
-Initial & Continuing Calibrations
-Blanks
-Matrix Spike Results
-Laboratory Duplicate Results
-Field Duplicates
-Laboratory Control Spikes
-Sample Quantitation
-Instrument Performance Checks

Definitions and Qualifiers:
A – Acceptable Data
J – Numerical value associated with compound is an estimated quantity
R – The data are rejected as unusable. The R replaces the numerical value or sample quantitation limit.
U – Compound not detected at that numerical sample quantitation limit
UJ – The sample quantitation limit is an estimated quantity.

Validator's Name E. Denly Company Name TRC Phone Number 978-656-3577
Date Validation Started 12/29/09 Date Validation Completed 1/8/10

Package Completeness and Deliverables

Missing Information	Date Lab Contacted	Date Received
see e-mails	12/30/09	1/4/10

JA30457: GW: VP-13 (100-105') : collected 10/15/09
JA30759: GW: VP-14 (80-85'), VP-14 (105-110'), VP-24 (105-110'), VP-14 (130-135'), FB101909: collected 10/19/09
JA30998: GW: FB102109, SC22S, HWH-4, IWC-2, IWC-4, IWC-1, IWC-3, IWC-5, IWC-6, SC-9S, SC33S, B, SC6S, RW6S, SC6D, RW6D, SC4S, SC18S, SC18D, SC01D, SC1S, SC3S, SC3D(R), SC34D, RIW2, IW2: collected 10/21/09
JA31156: GW: VP-13A (62-67'), FB102209, VP13A (87-92') : collected 10/22 & 10/23/09
JA33467: GW: SC33D, SC34D, SC37D, FB111909 : collected 11/19/09
JA31506: sediment: SED-1A, SED-1, SED-2, SED-3, SED-4, SED-10
SW: SW-1A, SW-1, SW-2, SW-3, SW-4, SW-10
FB102809
] collected 10/28/09
JA31353: soil: SS-1(5-7'), SS-1(12-14'), SS-2(1-3'), SS-2(14-16'), SS-3(0-2'), SS-3(13-15'), SS-4(2-4'), SS-4(14-16'), SS-5(5-7'), SS-5(13-15'), SS-6(1-3'), SS-6(14-16'), SS-7(6-8'), SS-7(13-15'), SS-8(3-4'), SS-8(12-14'), SS-9(6-8'), SS-9(12-14'), SS-10(2-4'), SS-10(4-6'), FB102609(1), FB102609(2), SS-27(6-8')] collected 10/26/09

Denly, Elizabeth (Lowell,MA-US)

From: Marie Meidhof [mariem@accutest.com]
Sent: Monday, January 04, 2010 4:30 PM
To: Denly, Elizabeth (Lowell,MA-US)
Cc: Butlien, Larry (Windsor,CT-US); Moss, John (Windsor,CT-US)
Subject: RE: SMC Perchlorate Data Validation Questions: JA30998

Liz,

The way this sample was reported was a result of a judgement call in the lab. We do report from the dilutions if we think that the interferences are affecting the reported results. In the case of sample JA30998-18, there were no peaks present in any of the analyses, but there was a signifcant shift in the baseline in the analysis of the undiluted sample. It was our judgement that if there was a peak, it still would have shown on top of the shifting baselline.

Please let me know if you need any more information on this.

Thank you,
Marie

From: Denly, Elizabeth (Lowell,MA-US) [mailto:edenly@TRCSOLUTIONS.com]
Sent: Wednesday, December 30, 2009 8:47 AM
To: Marie Meidhof
Cc: Butlien, Larry (Windsor,CT-US); Moss, John (Windsor,CT-US)
Subject: SMC Perchlorate Data Validation Questions: JA30998

Hi Marie,

Please have the lab get back to me on the following questions/issues:

1. The raw data associated with run GN32151 on 11/10/09 were missing from the package. Please provide.
2. Sample SC18S (JA30998-18): There is a high level of interference present at the time perchlorate elutes. There is a note on the chromatogram stating that no perchlorate peak is indicated and this was confirmed by a 1:5 dilution.
    a. Please provide the raw data associated with the 1:5 dilution.
    b. Please explain how perchlorate can be reported as a nondetect from the undiluted run because it was confirmed at a 5-fold dilution. Shouldn't the nondetect result be reported from the 5-fold dilution where the absence of perchlorate is definitively determined?

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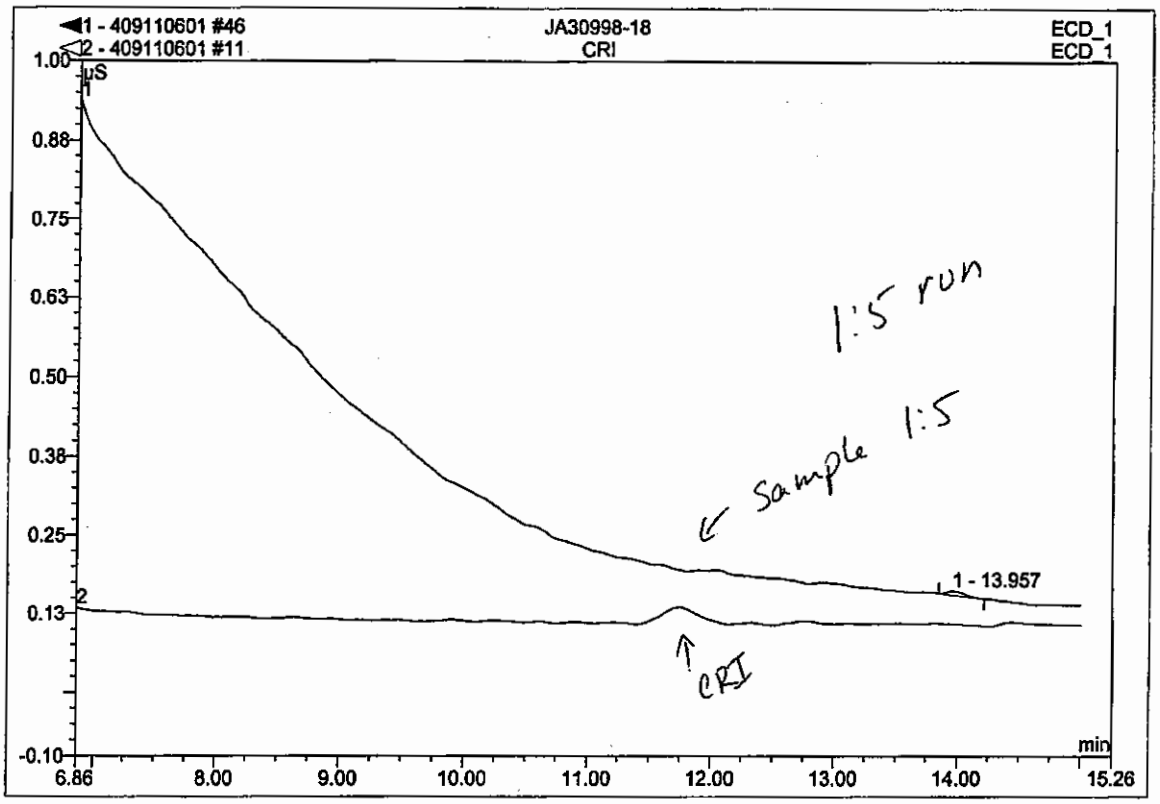
46 JA30998-18

Sample Name:	**JA30998-18**	*Injection Volume:*	**1000.0**
Vial Number:	**38**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**System 4 Perchlorate**	*Bandwidth:*	**n.a.**
Quantif. Method:	**System 4 Perchlorate**	*Dilution Factor:*	**5.0000**
Recording Time:	**11/6/2009 22:57**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount	Type
1	13.96	n.a.	0.006	0.001	100.00	n.a.	BMB
Total:			0.006	0.001	100.00	0.000	

Denly, Elizabeth (Lowell,MA-US)

From: Marie Meidhof [mariem@accutest.com]
Sent: Monday, January 04, 2010 4:33 PM
To: Denly, Elizabeth (Lowell,MA-US)
Cc: Butlien, Larry (Windsor,CT-US); Moss, John (Windsor,CT-US)
Subject: RE: SMC Perchlorate Data Validation: Request #2: JA30998

Liz,

The lab provided the following in response to your question.

This data is correct as reported. If they look carefully at the peak for JA30998-12, you can see that the software is showing the retention time from the start of the peak instead of the middle of the peak. This happens with small peaks when there isn't a clear inflection point at the beginning of the peak. However, the center of the peak for JA30998-12 lines up with the center of the peak for the matrix spike on this sample.

Please let me know if you need any additional information.

Thank you,
Marie

From: Denly, Elizabeth (Lowell,MA-US) [mailto:edenly@TRCSOLUTIONS.com]
Sent: Wednesday, December 30, 2009 11:01 AM
To: Marie Meidhof
Cc: Butlien, Larry (Windsor,CT-US); Moss, John (Windsor,CT-US)
Subject: SMC Perchlorate Data Validation: Request #2: JA30998

Hi Marie,

Please have the lab respond to the following questions/issues:

1. Sample B (JA30998-12):
    a. Perchlorate was identified at an incorrect retention time. Please have the lab recheck the data for this sample.
    b. The above issue may also affect the matrix spike recovery reported.
    c. The lab duplicate performed on this sample also identified perchlorate at an incorrect retention time. Please have the lab recheck the data for this analysis.

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Denly, Elizabeth (Lowell,MA-US)

From: Marie Meidhof [mariem@accutest.com]
Sent: Monday, January 04, 2010 4:35 PM
To: Denly, Elizabeth (Lowell,MA-US)
Cc: Butlien, Larry (Windsor,CT-US); Moss, John (Windsor,CT-US)
Subject: RE: SMC Perchlorate Data Validation: Request #3: JA31506
Attachments: gn32348_additional_data.pdf

Liz,

Both reported peaks were less than the RL and the retention times were within the retention time window. If you overlay the peaks with the CRI from the beginning of the run, the retention times line up. That being said, if you look at the CCV's and peaks later in the run, they have shifted out slightly. I requantitated the two samples using the CCV retention time and then both peaks are less than the MDL.

It is in the lab's judgement that none of the peaks are probably perchlorate. Both samples have significant baseline noise around the perchlorate retention time,

We will reissue this data with the < MDL results. Attached please find the chromatograms.

Please let me know if you have any additional questions.

Thank you,
Marie

From: Denly, Elizabeth (Lowell,MA-US) [mailto:edenly@TRCSOLUTIONS.com]
Sent: Wednesday, December 30, 2009 12:38 PM
To: Marie Meidhof
Cc: Butlien, Larry (Windsor,CT-US); Moss, John (Windsor,CT-US)
Subject: SMC Perchlorate Data Validation: Request #3: JA31506

Hi Marie,

Please have the lab respond to the following questions/issues:

Samples SED-2 (JA31506-7) and SW-10 (JA31506-12): Perchlorate was identified at an incorrect retention time. Please have the lab recheck the data for these samples.

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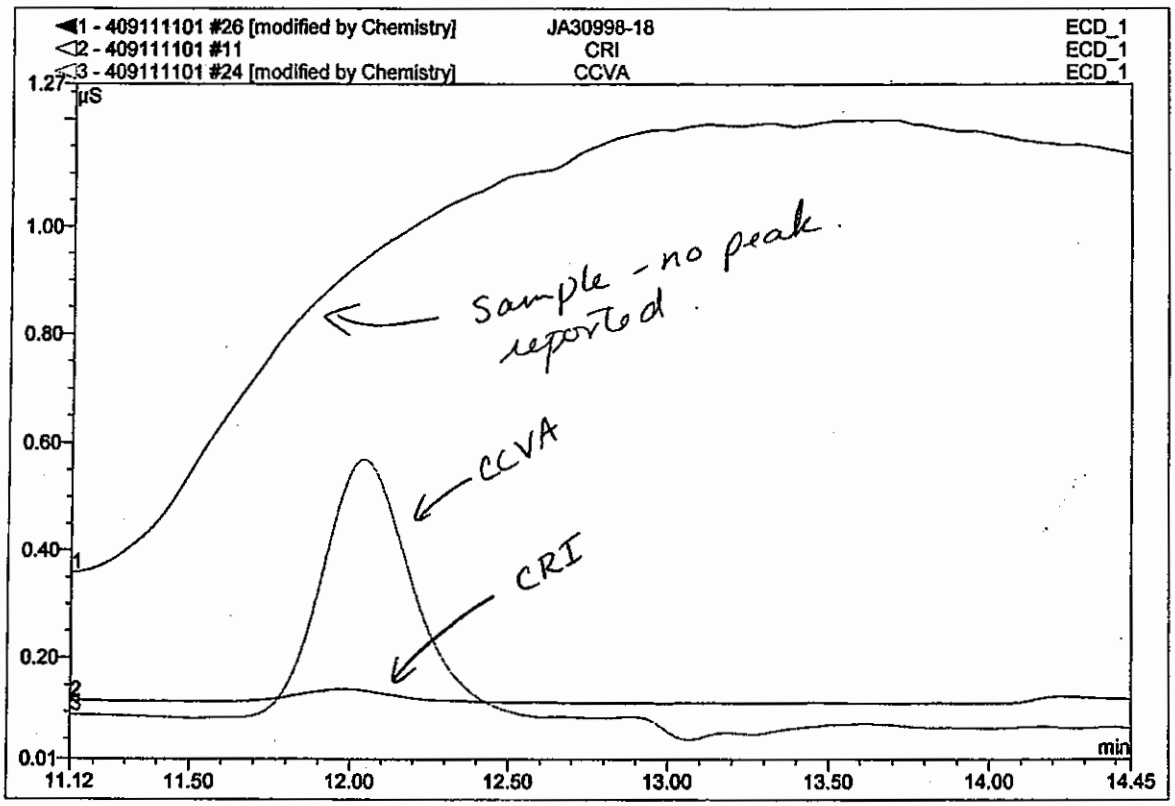
26 JA30998-18

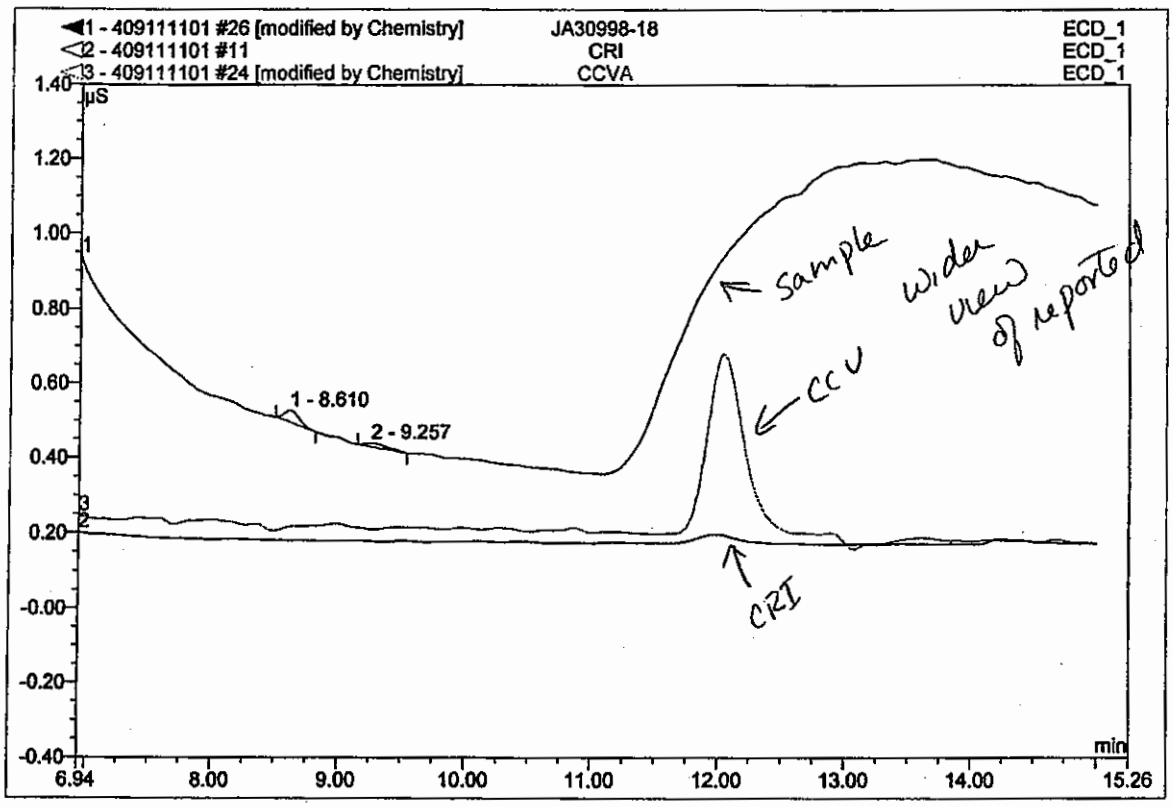
Sample Name:	**JA30998-18**	*Injection Volume:*	**1000.0**
Vial Number:	**20**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**System 4 Perchlorate**	*Bandwidth:*	**n.a.**
Quantif. Method:	**System 4 Perchlorate**	*Dilution Factor:*	**1.0000**
Recording Time:	**11/11/2009 13:50**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount	Type
1	8.61	n.a.	0.031	0.004	66.32	n.a.	BMB
2	9.26	n.a.	0.010	0.002	33.68	n.a.	BMB
Total:			0.041	0.006	100.00	0.000	

26 JA30998-18

Sample Name:	**JA30998-18**	*Injection Volume:*	**1000.0**
Vial Number:	**20**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**System 4 Perchlorate**	*Bandwidth:*	**n.a.**
Quantif. Method:	**System 4 Perchlorate**	*Dilution Factor:*	**1.0000**
Recording Time:	**11/11/2009 13:50**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



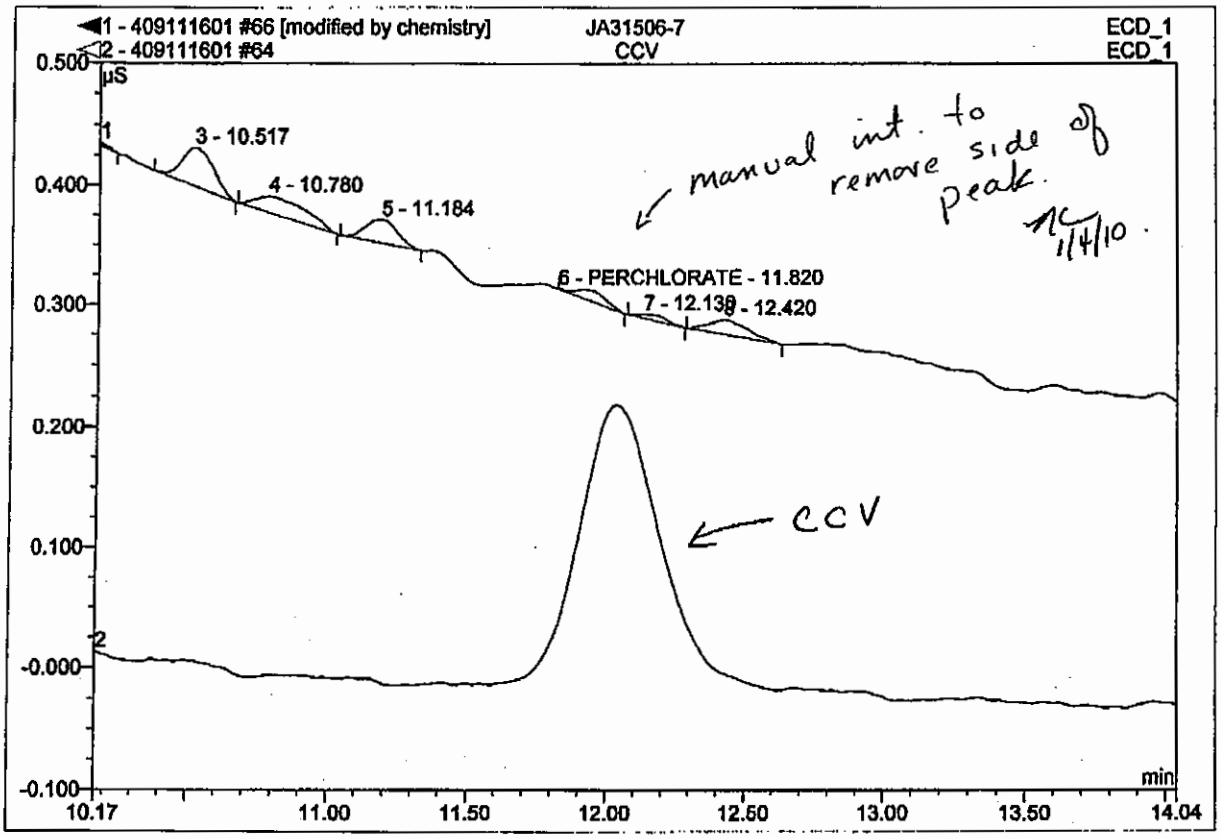
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount	Type
1	8.61	n.a.	0.031	0.004	66.32	n.a.	BMB
2	9.26	n.a.	0.010	0.002	33.68	n.a.	BMB
Total:			0.041	0.006	100.00	0.000	

12	14.83	n.a.	0.024	0.005	6.63	n.a.	BMB
Total:			0.258	0.068	100.00	0.457	

GN 32348
Additional data

66 JA31506-7

Sample Name:	**JA31506-7**	*Injection Volume:*	**1000.0**
Vial Number:	**61**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**System 4 Perchlorate**	*Bandwidth:*	**n.a.**
Quantif. Method:	**System 4 Perchlorate**	*Dilution Factor:*	**1.0000**
Recording Time:	**11/17/2009 4:52**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

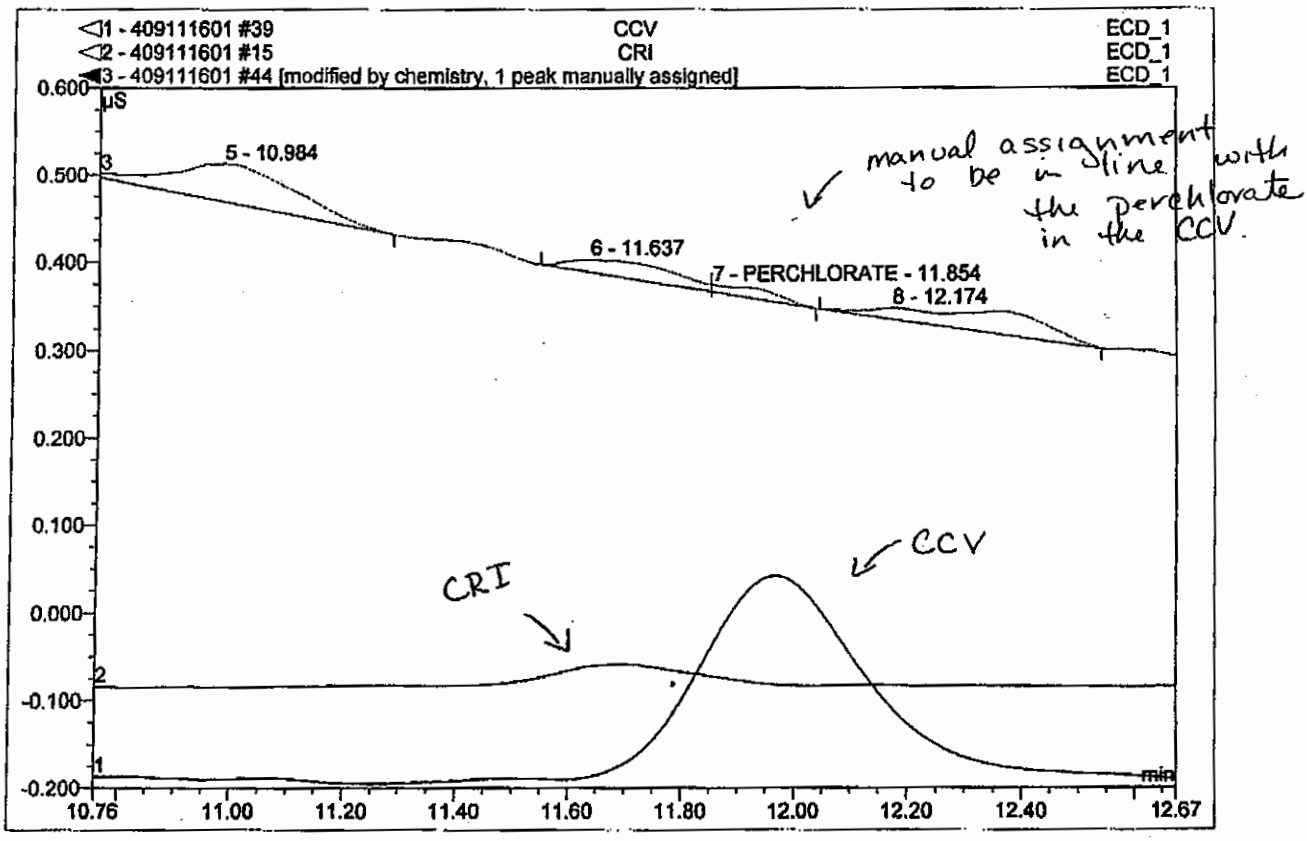


No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount	Type
1	9.29	n.a.	0.011	0.003	10.29	n.a.	BMB
2	9.89	n.a.	0.033	0.009	30.95	n.a.	BMB
3	10.52	n.a.	0.032	0.004	15.12	n.a.	BMB
4	10.78	n.a.	0.014	0.003	11.33	n.a.	BMB
5	11.18	n.a.	0.020	0.003	9.33	n.a.	BMB
6	11.82	PERCHLORATE	0.000	0.001	4.05	0.380	BMB*
7	12.13	n.a.	0.003	0.001	1.83	n.a.	BMB*
8	12.42	n.a.	0.012	0.002	7.18	n.a.	BMB
9	14.73	n.a.	0.018	0.003	9.92	n.a.	BMB
Total:			0.144	0.028	100.00	0.380	

GN32348 Additional data

44 JA31506-12

Sample Name:	**JA31506-12**	*Injection Volume:*	**1000.0**
Vial Number:	**40**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**System 4 Perchlorate**	*Bandwidth:*	**n.a.**
Quantif. Method:	**System 4 Perchlorate**	*Dilution Factor:*	**1.0000**
Recording Time:	**11/16/2009 22:29**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount	Type
1	8.92	n.a.	0.023	0.003	4.17	n.a.	BMB
2	9.09	n.a.	0.006	0.002	3.19	n.a.	BMB
3	9.67	n.a.	0.000	0.003	5.13	n.a.	BMB
4	10.42	n.a.	0.046	0.013	19.23	n.a.	BMB
5	10.98	n.a.	0.044	0.012	17.00	n.a.	BMB
6	11.64	n.a.	0.015	0.004	5.68	n.a.	BM *
7	11.85	PERCHLORATE	0.008	0.001	2.00	0.457	MB*^
8	12.17	n.a.	0.013	0.007	9.56	n.a.	BMB
9	12.86	n.a.	0.021	0.003	4.90	n.a.	BMB
10	13.81	n.a.	0.023	0.006	8.73	n.a.	BMB
11	14.32	n.a.	0.036	0.009	13.78	n.a.	BMB

I. PRESERVATION AND HOLDING TIMES – Circle sample numbers with exceeded holding times or omitted preservation. Circle all exceeded holding times.

List temperature(s) of coolers upon receipt at the laboratory: SA31353: 3.0 °C

	Sample ID	Matrix	Date Sampled	Conductivity Analysis Date	Perchlorate Analysis Date	# Days from Sampling To Analysis	Actions		
SA31353 -1	SS-01 (5-7')	Soil	10/26/09	11/9/09	11/12/09 2016		ND	16.8	
-2	SS-01 (12-14')				11/12/09 2114		ND	13.3	
-3	SS-02 (1-3')				11/12/09 2131		11.98	195.4	
-4	SS-02 (14-16')				11/12/09 2149		~~11.21~~ ND	~~50~~	~~left~~
-5	SS-03 (0-2')				11/12/09 2206		ND	1904	reported run: 11/13/09 1404 ✓
-6	SS-03 (13-15')				11/12/09 2224		11.98	48.5	also run 11/13/09 1422 ✓
-7	SS-04 (2-4')				11/12/09 2241		11.97	48.6	also run 11/13/09 1439 ✓
-8	SS-04 (14-16')				11/12/09 2258		11.95	27.7	
-9	SS-05 (5-7')				11/12/09 2333		11.97	76.2	
-10	SS-05 (13-15')				11/12/09 2351		11.96	49.0	
-11	SS-06 (1-3')				11/13/09 0008		ND	40.1	
-12	SS-06 (14-16')				11/13/09 0025		11.92	20.4	?
-13	SS-07 (6-8')				11/13/09 0043		ND	104.9	
-14	SS-07 (13-15')				11/13/09 0100		11.93	23.0	?
-15	SS-08 (3-4')				11/13/09 0118		ND	35.7	
-16	SS-08 (12-14')				11/13/09 0135		ND	21.8	
-17	SS-09 (6-8')				11/13/09 0152		ND	47.9	
-18	SS-09 (12-14')				11/13/09 0210		ND	33.0	
-19	SS-10 (2-4')				11/13/09 0245		ND	35.9	

Required Preservation: Cool, 4 degrees
Holding Time Criteria: 28 days from date sampled to date analyzed

List field samples which exhibited a conductance greater than the lab's matrix conductivity threshold.

NA

Were these samples diluted or pretreated?

NA

If dilutions were performed due to conductance, was the dilution factor estimated by dividing measured conductance by MCT? NA YES NO
If samples were pretreated, was conductance measured after pretreatment to ensure it is below MCT? YES NO

- all soils prepped 11/9/09 (1-20)
~~1-23~~ 23 prepped 11/11/09

I. PRESERVATION AND HOLDING TIMES – Circle sample numbers with exceeded holding times or omitted preservation. Circle all exceeded holding times.

List temperature(s) of coolers upon receipt at the laboratory: _____

Sample ID	Matrix	Date Sampled	Conductivity Analysis Date	Perchlorate Analysis Date	# Days from Sampling To Analysis	Actions	
SA31353 -20 SS-10(4'6')	soil	10/26/09	11/9/09	11/13/09 0302		ND	17.4
-21 FB102609(1)	Aqueous		11/6/09	11/13/09 1452		ND	3.4
-22 FB102609(2)				11/12/09 1802		ND	3.0
-23 SS-27(6'8')	soil		11/13/09	11/13/09 2102		~~11.9~~ ND	96.8

dilution @ 11/13/09 1255 ND ~~11/13/09 1554 ND~~

Required Preservation: **Cool, 4 degrees**
Holding Time Criteria: **28 days from date sampled to date analyzed**

List field samples which exhibited a conductance greater than the lab's matrix conductivity threshold.

NA

Were these samples diluted or pretreated?

NA

If dilutions were performed due to conductance, was the dilution factor estimated by dividing measured conductance by MCT? NA YES NO
If samples were pretreated, was conductance measured after pretreatment to ensure it is below MCT? NA YES NO

↓ RT shift

Perchlorate Worksheets
EPA Method 314.0

TRC
December 2009
Revision 0

I. PRESERVATION AND HOLDING TIMES – Circle sample numbers with exceeded holding times or omitted preservation. Circle all exceeded holding times.

List temperature(s) of coolers upon receipt at the laboratory: SA33467: 3.4°C, SA31506: 3.0°C

	Sample ID	Matrix	Date Sampled	Conductivity Analysis Date	Perchlorate Analysis Date	# Days from Sampling To Analysis	Actions	conductivity	
SA33467 -1	SC330	GW	11/19/09	12/3/09	12/2/09 1117		ND	204	
-2	SC340				12/2/09 1410 1x		1246	1021	-run @ 1:6 12/2/09 1617
-3	SC370				12/2/09 1545		1242	996	12/2/09 1652
-4	FB111909				12/2/09 1338		ND	3.0	
SA31506 -1	FB102809	Aq	10/28/09	11/16/09	11/16/09 2044		ND	9.1	
-2	SW-1A	SW		11/17/09	11/16/09 2027		11.89	167	
-3	SED-1A	SED		11/16/09	11/17/09 0359		ND	34.5	
-4	SW-1	SW		11/17/09	11/16/09 2119		ND	111	
-5	SED-1	SED		11/16/09	11/17/09 0434		ND	23.5	
-6	SW-2	SW		11/17/09	11/16/09 437		ND	141	-rerun for confirmation on 11/18/09 2350
-7	SED-2	SED		11/16/09	11/17/09 0452		ND	140 (2)	
-8	SW-3	SW		11/17/09	11/16/09 2154		ND	127	
-9	SED-3	SED		11/16/09	11/17/09 0509		ND	119.7	-rerun for confirmation on 11/18/09 2333
-10	SW-4	SW		11/17/09	11/16/09 2228		ND	128	
-11	SED-4	SED		11/16/09	11/17/09 0527		~~ND~~ 11.85	180.6	
-12	SW-10	SW		11/17/09	11/16/09 2239		~~ND~~ 11.64	128 (1)	
-13	SED-10	SED		11/16/09	11/17/09 0544		ND	1402	

Required Preservation: Cool, 4 degrees
Holding Time Criteria: 28 days from date sampled to date analyzed

List field samples which exhibited a conductance greater than the lab's matrix conductivity threshold.

NA

Were these samples diluted or pretreated?

NA

If dilutions were performed due to conductance, was the dilution factor estimated by dividing measured conductance by MCT? NA YES NO
If samples were pretreated, was conductance measured after pretreatment to ensure it is below MCT? NA YES NO

Sediment: SA31506: ~33g used to 100mL DI water: prepped 11/13/09
(1) perchlorate 10'd at wrong RT
(2) report form for perchlorate shows "4.7 B" but should be ND per raw data → perchlorate 10'd at wrong RT

✓ vs. Form I₁

Perchlorate Worksheets
EPA Method 314.0

TRC
December 2009
Revision 0

I. PRESERVATION AND HOLDING TIMES – Circle sample numbers with exceeded holding times or omitted preservation. Circle all exceeded holding times.

List temperature(s) of coolers upon receipt at the laboratory: JA30457: 3.2°C, JA30759: 2.4°C, JA30998: 3.4°C

	Sample ID	Matrix	Date Sampled	Conductivity Analysis Date	Perchlorate ~~Metals~~ Analysis Date	# Days from Sampling To Analysis	Actions	Conductivity
JA30457-1	VP-13 (100-105')	GW	10/15/09	10/16/09 ✓	10/15/09 1811		12.16	139 uS/CM
JA30759-1	VP-14 (80-85')	GW	10/19/09	10/21/09	10/20/09 1832		11.79	332
-2	VP-14 (105-110')				10/20/09 1715		11.80	334
-3	VP-24 (105-110')				10/20/09 1749		11.82	327
-4	FB101909				10/20/09 1807		ND	4.3
-5	VP-14 (130-135')				10/20/09 1824		11.84	77
JA30998-1	FB 10 21 09	GW	10/21/09	11/3/09	11/10/09 1150		ND	2.6
-2	SE225				11/10/09 1208		ND	376
-3	MWH-4				11/10/09 1225		ND	307
-4	IWC-2				11/11/09 1038		11.98	688
-5	IWC-4				11/10/09 ~~1243~~/1300		11.92	251
-6	IWC-1			11/3/09	10/28/09 1705		11.92	651
-7	IWC-3				11/10/09 1312		(11.88) (2) YES	221
-8	IWC-5 (1)				11/11/09 1056		11.96	417
-9	IWC-6 (1)				11/11/09 1113		11.95	444
-10	SC-95				11/11/09 1131		11.97	445
-11	SC-335				11/11/09 1148		11.95	449
-12	B			11/3/09	11/10/09 1058			740 (2)
-13	SC65				11/11/09 1205		11.97	588

→ initially run on 11/10/09 1243 but interfering peak present upon initial 11/10/09 reported

Required Preservation: Cool, 4 degrees
Holding Time Criteria: 28 days from date sampled to date analyzed

List field samples which exhibited a conductance greater than the lab's matrix conductivity threshold.
JA30457: none JA30759: none JA30998: none JA31[illegible]: none, JA31467: none, JA31353: none JA31506: none

Were these samples diluted or pretreated? NA

If dilutions were performed due to conductance, was the dilution factor estimated by dividing measured conductance by MCT? NA YES NO
If samples were pretreated, was conductance measured after pretreatment to ensure it is below MCT? NA YES NO

~~(2) RT seems off → double check~~

(1) not filtered due to colloidal fouling of filters
(2) peak ID'd as perchlorate at wrong RT → double check; may need to recalculate MS also

I. PRESERVATION AND HOLDING TIMES – Circle sample numbers with exceeded holding times or omitted preservation. Circle all exceeded holding times.

List temperature(s) of coolers upon receipt at the laboratory: SA31156: 3.4°C

	Sample ID	Matrix	Date Sampled	Conductivity Analysis Date	Perchlorate Analysis Date	# Days from Sampling To Analysis	Actions		
SA30998 -14	RW6S	GW	10/21/09	11/3/09	11/11/09 1223		11.98	730	
-15	SC6D				11/11/09 1240		11.95	1071	
-16	RW6D				11/11/09 1258	11/11/09 1514 a	11.97 12.00	937	→ rerun due to tailing in initial run; confirms initial run
-17	SC4S				11/11/09 1332		ND	2000	
-18	SC18S				11/11/09 1350		ND (4)	444	
-19	SC18D				11/9/09 2000		11.94	183	
-20	SC1D				11/9/09 2018		11.93	356	
-21	SC1S				11/9/09 2035		11.98	263	
-22	SC3S				11/9/09 1943		11.92	259	
-23	SC3D(R)				11/9/09 2053 (2)	11/11/09 1421 8x	11.93 12.01	638	→ also run on 11/11/09 1531 @ 1:8 & agrees w/ 1st 1:8 run
-24	SC34D				11/9/09 2110 (2)	11/11/09 1439 8x	11.93 12.00	631	
-25	RIW2				11/9/09 2127 (3)	11/10/09 1456 1x	11.97 12.03	380	
-26	IW2				11/9/09 2145		11.98	300	
SA31156 -1	VP-13A (62-67')		10/22/09	10/27/09	10/26/09 1858		11.97	156	
-2	PB102209			10/28/09	10/26/09 1916		ND	~~283~~ 3.7	
-3	VP-13A (87-92')		10/23/09	10/26/05	10/26/09 1941		11.95	127	

Required Preservation: Cool, 4 degrees
Holding Time Criteria: 28 days from date sampled to date analyzed

List field samples which exhibited a conductance greater than the lab's matrix conductivity threshold.

NA

Were these samples diluted or pretreated?

NA

If dilutions were performed due to conductance, was the dilution factor estimated by dividing measured conductance by MCT? NA YES NO
If samples were pretreated, was conductance measured after pretreatment to ensure it is below MCT? NA YES NO

(2) over calibration; run not used; rerun 11/11/09 @ 1:8
(3) potential carryover; lab reran on 11/10/09 & initial run confirmed to be OK
(4) large hump at time perchlorate elutes; note on chromatogram says no perchlorate peak indicated; confirmed w/ 1:5 dilution on prior run: need to see diluted run → not sure this 1:1 run can be reported
- how can perchlorate be confirmed ND @ 1:1 w/ @ 1:5 dilution?

II. INSTRUMENT CALIBRATION

Initial Calibration: 5 standards; %RSD <15 (must use peak areas)
Initial Calibration Verification: 90-110% (mid-point concentration; run after every ICAL)
Reporting Limit Standard: 75-125% (concentration at RL; run at beginning of every analysis batch)
Continuing Calibration Verification: 85-115% (concentration alternate between mid and high standards; run prior to samples, every 10 samples and at end of analysis)
List all standards which are outside of the acceptance criteria.

Date	IC/ICV/RL/CCV	Recovery	Samples Affected	Action
SA31353 11/3/09: ICAL:	0, 3, 6, 10, 25, 50 ug/L	r=0.999;	(y=0.0030x)	
ICV: 11/12/09	0920: % Rec	12.03		
RL std: 11/12/09	1013: % Rec	12.05		
CCV: 11/12/09	1047: % Rec	12.02	(25 ug/L)	
CCV: 11/12/09	1601: % Rec	12.02	(25 ug/L)	
CCVA: 11/12/09	1820: % Rec	12.10	(50 ug/L)	
CCV: 11/12/09	1837: % Rec	12.04	(25 ug/L)	
RL std: 11/12/09	1929: % Rec	12.03		
CCVA: 11/12/09	2004: % Rec	11.96	(50 ug/L)	
CCV: 11/12/09	2316: % Rec	11.96	(25 ug/L)	
CCVA: 11/13/09	0227: % Rec	11.96	(50 ug/L)	
CCV: 11/13/09	0319: % Rec	12.00	(25 ug/L)	
SA31353 11/3/09: ICAL:	same as above			
ICV: 11/13/09	1018: % Rec	11.92		
RL std: 11/13/09	1053: % Rec	11.97		
CCV: 11/13/09	1128: % Rec	11.94	(25 ug/L)	
CCVA: 11/13/09	1312: % Rec	11.92	(50 ug/L)	
CCV: 11/13/09	1549: % Rec	11.90	(25 ug/L)	
CCV: 11/13/09	1918: % Rec	11.96	(25 ug/L)	
RL std: 11/13/09	2010: % Rec	11.96		
CCVA: 11/13/09	2045: % Rec	11.99	(50 ug/L)	
CCV: 11/13/09	2356: % Rec	12.33	(25 ug/L)	

Conductivity: Calibration check must be performed with each analysis batch using 1410 uS/cm standard. Conductivity reading must be between 1380 and 1440.

II. INSTRUMENT CALIBRATION

Initial Calibration: 5 standards; %RSD <15 (must use peak areas)
Initial Calibration Verification: 90-110% (mid-point concentration; run after every ICAL)
Reporting Limit Standard: 75-125% (concentration at RL; run at beginning of every analysis batch)
Continuing Calibration Verification: 85-115% (concentration alternate between mid and high standards; run prior to samples, every 10 samples and at end of analysis)
List all standards which are outside of the acceptance criteria.

	Date	IC/ICV/RL/CCV	Recovery	Samples Affected	Action
JA33467		ICAL: 12/1/09: 0, 3, 6, 10, 25, 50 ug/L: r=0.999 (curve: y=0.0038x)		-211 JA33467 samples	
		ICV: 12/2/09 1046: 70 RPL 12.56			
		RL std: 12/2/09 1121: 70 RPL 12.16			
		CCV: 12/2/09 1156: 70 RPL 12.53 (25 ug/L)			
		CCVA: 12/2/09 1323: 70 RPL 12.48 (50 ug/L)			
		CCV: 12/2/09 1634: 70 RPL 12.43 (25 ug/L)			
		CCVA: 12/2/09 1709: 70 RPL 12.43 (50 ug/L)			
JA31506		ICAL: 11/16/09: 0, 3, 6, 10, 25, 50 ug/L: r=0.999 (curve: y=0.0030x)		-211 JA31506 samples	
		ICV: 11/16/09 1314: 70 RPL 11.66			
		RL std: 11/16/09 1349: 70 RPL 11.69			
		CCV: 11/16/09 1424: 70 RPL 11.71 (25 ug/L)			
		CCVA: 11/16/09 1750: 70 RPL 11.86 (50 ug/L)			
		CCV: 11/16/09 2102: 70 RPL 11.97 (25 ug/L)			
		CCVA: 11/16/09 2321: 70 RPL 11.96 (50 ug/L)			
		CCV: 11/16/09 2338: 70 RPL 11.96 (25 ug/L)			
		RL std: 11/17/09 0031: 70 RPL 12.01			
		CCVA: 11/17/09 0105: 70 RPL (50 ug/L): 11.99			
		CCV: 11/17/09 0417: 70 RPL (25 ug/L): 12.03			
		CCVA: 11/17/09 0732: 70 RPL (50 ug/L): 11.99			
JA31506		ICAL: 11/18/09: 0, 3, 6, 10, 25, 50 ug/L: r=0.999 (curve: y=0.0037x)		remns of SW-2 & SED-3	
		ICV: 11/18/09 1652: 70 RPL 11.75			
		RL std: 11/18/09 1727: 70 RPL 11.82			

Conductivity: Calibration check must be performed with each analysis batch using 1410 uS/cm standard. Conductivity reading must be between 1380 and 1440.

CCV: 11/18/09 1802: 70 RPL 11.82 (25 ug/L)
CCVA: 11/18/09 2056: 70 RPL 11.86 (50 ug/L)
CCV: 11/19/09 0007: 70 RPL 11.84 (25 ug/L)

II. INSTRUMENT CALIBRATION

Initial Calibration: 5 standards; %RSD <15 (must use peak areas)
Initial Calibration Verification: 90-110% (mid-point concentration; run after every ICAL)
Reporting Limit Standard: 75-125% (concentration at RL; run at beginning of every analysis batch)
Continuing Calibration Verification: 85-115% (concentration alternate between mid and high standards; run prior to samples, every 10 samples and at end of analysis)
List all standards which are outside of the acceptance criteria.

	Date	IC/ICV/RL/CCV	Recovery	Samples Affected	Action
JA30998	ICAL: 11/3/09	: 0, 3, 6, 10, 25, 50 ug/L:	r=0.999 (y=0.0030x)	SC3S (-22), SC18D(-19), SC21D (20), SC21S (21) SC3D(R(23), SC34D (24), RIW2(25), IW2(26)	
	ICV: 11/9/09	1043: % R ok 11.57			
	CCV2: 11/9/09	1224: % R ok 11.78	(25 ug/L)		
	RL std: 11/9/09	1816: % R ok 11.85			
	CCVA: 11/9/09	1851: % R ok 11.85	(50 ug/L)		
	CCV: 11/9/09	2202: % R ok 11.97	(25 ug/L)		
JA30998	ICAL: 11/3/09	: same as above		IWC-2, IWC-3, IWC-6, SC-9S, SC-33S, SC6S, RW6S, SC6D, RW6D, SC4S, SC18S	
	ICV: 11/11/09	0854: % R ok 11.98			
	RL std: 11/11/09	0929: % R ok 11.98			
	CCV: 11/11/09	1004: % R ok 11.97	(25 ug/L)		
	CCVA: 11/11/09	1315: % R ok 12.04	(50 ug/L)		
	CCV: 11/11/09	1606: % R ok 11.98	(25 ug/L)		
JA31156	ICAL: 10/26/09	: 0, 3, 6, 10, 25, 50 ug/L:	r=0.999 (y=0.0025x)	all samples in JA31156	
	ICV: 10/26/09	1622: % R ok 11.83			
	RL std: 10/26/09	1656: % R ok 11.87			
	CCV: 10/26/09	1731: % R ok 11.88	(25 ug/L)		
	CCVA: 10/26/09	2025: % R ok 11.97	(50 ug/L)		
JA30998	ICAL: 11/3/09	: same as above		FB102109, SC22S, MWH-4, IWC-4, IWC-3, B	
	ICV: 11/10/09	0914: % R ok 11.97			
	RL std: 11/10/09	0949: % R ok 12.00			
	CCV: 11/10/09	1023: % R ok 11.93	(25 ug/L)		
	CCVA: 11/10/09	1335: % R ok 11.86	(50 ug/L)		
	CCV: 11/10/09	2125: % R ok 12.03	(25 ug/L)		

Conductivity: Calibration check must be performed with each analysis batch using 1410 uS/cm standard. Conductivity reading must be between 1380 and 1440.

CCVA: 11/11/09 0036: % R ok 12.03 (50 ug/L)

-all raw data associated w/ run ~~GW32151 in JA30998 missing from package~~ ES

II. INSTRUMENT CALIBRATION

Initial Calibration: 5 standards; %RSD <15 (must use peak areas)
Initial Calibration Verification: 90-110% (mid-point concentration; run after every ICAL)
Reporting Limit Standard: 75-125% (concentration at RL; run at beginning of every analysis batch)
Continuing Calibration Verification: 85-115% (concentration alternate between mid and high standards; run prior to samples, every 10 samples and at end of analysis)
List all standards which are outside of the acceptance criteria.

	Date	IC/ICV/RL/CCV	Recovery	Samples Affected	Action
SA30457	ICAL: 10/14/09	0, 3, 6, 10, 25, 50 ug/L	r = 0.998 (y = 0.0028 x)	all in SA30457	
	ICV: 10/15/09	0911 : % R ok 12.16			
	RL std: 10/15/09	0946 : % R ok 12.16			
	CCV: 10/15/09	1626 : % R ok 12.15 (25 ug/L)			
	CCVA: 10/15/09	1828 : % R ok 12.13 (50 ug/L)			
SA 30759	ICAL: 10/19/09	0, 3, 6, 10, 25, 50 ug/L	r = 0.999 (y = 0.0028 x)	all in SA30759	
	ICV: 10/20/09	1007 : % R ok 11.81			
	RL std: 10/20/09	1042 : % R ok 11.79			
	CCV: 10/20/09	1117 : % R ok 11.75 (25 ug/L)			
	CCVA: 10/20/09	1537 : % R ok 11.70 (50 ug/L)			
	~~ICV2: 10/20/09 1622~~				
	CCV: 10/20/09	1916 : % R ok (25 ug/L) 11.96			
SA 30998	ICAL: 10/27/09	0, 3, 6, 10, 25, 50 ug/L	r = 0.999 (y = 0.0027 x)	IWC-1 (-6)	
	ICV: 10/28/09	0930 : % R ok 11.93			
	CCVA: 10/28/09	1446 : % R ok 11.80 (50 ug/L)			
	RL std: 10/28/09	1538 : % R ok 11.90			
	CCV : 10/28/09	1613 : % R ok 11.90 (25 ug/L)			
	CCVA: 10/28/09	1925 : % R ok 11.99 (50 ug/L)			

Conductivity: Calibration check must be performed with each analysis batch using 1410 uS/cm standard. Conductivity reading must be between 1380 and 1440.

SA30457: ✓ ok 10/16/09
SA30759: ✓ ok 10/21/09
SA30998: ✓ ok 11/3/09
~~SA30998~~
SA31156: ✓ ok 10/26/09
✓ ok 10/27/09
SA31506: ✓ ok 11/16/09
✓ ok 11/17/09
SA31353: ✓ ok 11/6/09
✓ ok 11/9/09

III. BLANK ANALYSIS

List the blank contamination found above ½ the RL below.

1. Laboratory: Method and Instrument Blanks

Run ID	Date Analyzed	Matrix	Blank ID	Concentration (units)	
GPS1074/GN31237	10/15/09 0928	Aqueous	GPS1074	ND	JA30457
GPS1193/GN31381	10/20/09 1024	Aqueous	GPS1193	ND	JA30759
GPS1310/GN32654	10/28/09 1521	Aqueous	GPS1310	ND	JA30998
GPS1409/GN32251	11/10/09 0931		GPS1409		
GPS1409/GN32209	11/11/09 0911		GPS1409		
GPS1498/GN32125	11/9/09 1359		GPS1498		
GPS1498/GN32209	11/11/09 0911		GPS1498		

1. Was pre-treatment required for any field samples? YES NO
2. If yes, was pre-treatment performed on a separate portion of the method blank? YES NO

Field: Equipment (Rinsate) Blanks

	Date Analyzed	Matrix	Blank ID	Concentration (units)	
JA30457	10/20/09 1207	Aqueous	FB101909	ND	(1)
JA30998	11/10/09		FB102109	ND	(1)
JA31156	10/26/09		FB102209	ND	(1)
JA31467	12/2/09		FB111909	ND	(1)
JA31506	11/16/09		FB102809	ND	(1)
JA31353	11/13/09		FB102609 (1)		
			FB102609 (2)		

JA30457: No field blank

(1) Lab reported ND down to MDL; will change to RL on Form I during DV

III. BLANK ANALYSIS

List the blank contamination found above ½ the RL below.

1. Laboratory: Method and Instrument Blanks

Run ID	Date Analyzed	Matrix	Blank ID	Concentration (units)	
GP51301/GN31601	10/26/09 1639	Aqueous	GP51300	ND	JA31156
GP51802/GN32834	12/2/09 1104	↓	GP51802	ND	JA33467
GP51564/GN32318	11/16/09 1643	Solid	GP51564	ND	JA31506
GP51565/GN32318	11/16/09 1900	Aqueous	GP51565	↓	↓
GP51565/GN32409	11/18/09 1710	↓	GP51565	↓	↓
GP51486/GN32251	11/12/09 1912	Solid	GP51486	ND	JA31353
GP51526/GN32290	11/13/09 1952	↓	GP51526	↓	↓

1. Was pre-treatment required for any field samples? YES NO
2. If yes, was pre-treatment performed on a separate portion of the method blank? YES NO

Field: Equipment (Rinsate) Blanks

GP51549/GN32290	11/13/09 1835	Aqueous	GP51549	ND	JA31353
GP51565/GN32290	11/13/09 1035	↓	GP51565	↓	↓

Date Analyzed	Matrix	Blank ID	Concentration (units)
All ND			

2. Blank Actions – List the maximum concentrations of perchlorate detected.

Type of Blank	Date Blank Originated	Max. Conc (units)	Action Level (units)	Analyte QL (units)	Samples Affected	Action
	none	detected				

IV. INSTRUMENT PERFORMANCE CHECK (IPC)

REQUIREMENTS:

IPC must be analyzed at the beginning of each run.
The percent difference of the area/height ratio of the IPC compared to the area/height ratio of the LCS must be <25.
The percent recovery of perchlorate must be 80-120%.
The retention time of perchlorate must not shift more than 5%.

What is the lab's Matrix Conductivity Threshold established during the IDC? ~~see~~ 6 4290

What was the conductance of the IPC? 4240 (JA30457) 4290 (JA30759) 4290 (JA30998: IWC-1) 4290 (JA30998-11/11/09) 11/12/09
4290 (JA31353)
4160 (JA31506: 11/16/09)
4160 (JA31506: 11/18/09)
4160 (JA33467: 12/2/09)
~~4290 (JA3135~~
4290 (JA31156: 10/26/09)
4290 (JA31353: 11/13/09)

Is the conductance of the IPC confirmed prior to analysis? YES NO ? JA30457; JA30457
Is the conductance within ±10% of the MCT? YES NO

List any IPC requirements that were not achieved.

	Date	%D/%R/RT	Associated Samples	Action
JA30457	10/15/09 0854	: %R ok; %D ok	RT = 12.12 min	all samples in JA30457
JA30759	10/20/09 0950	%R ok; %D ok	RT = 11.81 min	all samples in JA30759
JA30998	10/28/09 1504	%R ok; %D ok	RT = 11.78 min	IWC-1 (-6)
JA30998	11/9/09 1026	%R ok; %D ok	RT = 11.58 min	see 11/9/09 CCVs
↓	11/9/09 1741	%R ok; %D ok	RT = 11.75 min	↓
JA30998	11/11/09 0830	%R ok; %D ok	RT = 11.96 min	see 11/11/09 CCVs
JA31156	10/26/09 1604	%R ok; %D ok	RT = 11.75 min	all samples in JA31156
JA30998	11/10/09 0856	%R ok; %D ok	RT = 11.95 min	see 11/10/09 CCVs
JA33467	12/2/09 1029	%R ok; %D ok	RT = 12.53 min	all samples in JA33467
JA31506	11/16/09 1257	%R ok; %D ok	RT = 11.61 min	all samples in JA31506
↓	11/16/09 2036	%R ok; %D ok	RT = 11.92 min	↓
	11/18/09 1635	%R ok; %D ok	RT = 11.70 min	reruns of SW-2 & SED-3
JA31353	11/12/09 0902	%R ok; %D ok	RT = 12.00 min	
	11/12/09 1855	%R ok; %D ok	RT = 11.94 min	
	11/13/09 1001	%R ok; %D ok	RT = 11.87	
	11/13/09 1935	%R ok; %D ok	RT = 11.92 min	

V. MATRIX SPIKE - List all matrix spike analytes that are outside method QC acceptance criteria.

Was a matrix spike analysis performed on all samples that were pretreated? YES NO NA
Were samples spiked prior to pretreatment? YES NO NA
List associated samples which were pretreated. NA

Sample ID VP13A (87-92') Matrix GW
VP-14 (105-110') GW
IWC-1, B, SC35 GW
SC34D GW
SW-1A SW
SS-01 (5-7') SOIL

Criteria: For analyte levels <4x spike levels, acceptance limits are 80 – 120%

SA30457: none on project samples
-no project-specific MS for sediment in SA31506

	MS ID	MS % Recovery	Action
SA30759	VP-14 (105-110') 10/26/09 1640	70 R	11.75
SA30998	IWC-1 10/28/09 1631		11.88
	B ~~11/9/09 1908~~ 11/10/09 1116		~~11.89~~ 11.94
	SC35 11/9/09 1908		11.89
SA31156	VP13A (87-92') 10/26/09 1806		11.92
SA33467	SC34D 12/2/09 1415 1x 12/2/09 1542 10x		12.42
SA31506	SW-1A 11/16/09 1952		11.92
SA31353	SS-01 (5-7') 11/12/09 2022		11.97

Validation Actions:

Aqueous:

If %R <30; Reject (R) associated results
If %R 30-74; Estimate (J/UJ) positive and nondetect results.
If %R 126-150; Estimate (J) positive results.
If %R >150%; Reject (R) positive results.

Soils:

If %R <10; Reject (R) all associated results.
If %R 10-74; Estimate (J/UJ) positive and nondetect results.
If %R 126-200; Estimate (J) positive results.
If %R >200%; Reject (R) positive results.

If concentration of analyte ≥ 4x spike added, disregard spike recoveries

SS-01 (5-7')

VI. LABORATORY DUPLICATE RESULTS - List all laboratory duplicate analytes that are outside method QC acceptance criteria.

SW-1A
VP13A (87-92')

Sample ID VP-14 (105-110')
IWC-1, B, SC35
SC34D

Matrix GW
SW
GW
GW
GW

Criteria: RPD ≤ 15

SA30457: none on project samples
-no project specific lab dup for sediment in SA31506

SA30759
SA30998
SA31506
SA33467
SA31506
SA31353

Lab Duplicate Sample ID	RL	Sample Concentration	Duplicate Concentration	RPD (%)	Action
10/20/09 1653 VP-14 (105-110')	3 ug/L	6.2 ug/L	11.78 6.2 ug/L	0	Lab dup also done for conductivity: RPD ok
10/27/09 1248 IWC-1		7.3 ug/L	11.90 7.6 ug/L	4.0	
~~11/9/09 1937~~ 11/10/09 1137 B		1.2 ug/L	11.90 1.1 ug/L	8.7 (1)	
11/9/09 1926 SC35		1.8 ug/L	1.6 ug/L	11.8	
10/26/09 1723 VP13A (87-92')		3.4 ug/L	11.93 4.2 ug/L	21.1	-ok since perchlorate <5x QL
12/2/09 1600 6x SC34D		152 ug/L	12.43 148 ug/L	2.7	
11/16/09 2010 SW-1A		1.8 ug/L	11.76 2.0 ug/L	10.5	
11/2/09 2039 SS-01 (5-7')		ND	ND		

Validation Actions:

Aqueous:

If the sample and duplicate are both ≥5x RL and RPD >50; Estimate (J) positive results.

If the sample and/or duplicate results <5x RL, RPD >50, and the difference between the results is >RL; Estimate (J) positive results.

Soils:

If the sample and duplicate are both ≥5x RL and RPD >100; Estimate (J) positive results.

If the sample and/or duplicate results <5xRL, RPD >100, and the difference between the results is >2x RL; Estimate (J) positive results.

(1) both original & dup: perchlorate 10'd at wrong RT → need lab to double check

VII. LABORATORY CONTROL SPIKES - List all LCS analytes that are outside method QC acceptance criteria.

Acceptance Limits:
85 – 115%

Was one LCS prepared and analyzed with each batch? YES NO
If field samples were pretreated, was a separate portion of the LCS also pretreated? NA YES NO

LCS ID Date Prepped	% Recovery	Action
JA30457: GP51074 → 25 ug/L (10/15/09 1003 12.14) & 8 ug/L (10/15/09 1038 12.14): both 70Rs ok		
JA30759: GP51193 → 25 ug/L (10/20/09 1059 11.34) & 8 ug/L (10/20/09 1622 11.35): both 70Rs ok		
✓ JA30998: GP51310 (GN 31652) → 25 ug/L (10/28/09 1156 11.88) & 8 ug/L (10/28/09 1152 11.90): both 70Rs ok		affects ICW-1
✓ JA30998: GP51409 (GN 32151) → 25 ug/L (11/10/09 11.96) & 8 ug/L (11/10/09 1041 11.930): both 70Rs ok		see 11/10/09 CCVs for affected samples
✓ JA30998: GP51409 (GN 32209) → 25 ug/L (11/11/09 0946) & 8 ug/L (11/11/09 1021): both 70Rs ok		see 11/11/09 CCVs for affected samples
✓ JA30998: GP51498 (GN 32125) → 25 ug/L (11/9/09 1833 11.85): 70R ok		see 11/9/09 CCV for affected samples
✓ JA30998: GP51498 (GN 32209) → 25 ug/L (11/11/09 0946): 70R ok		see 11/11/09 CCVs for affected samples
JA31156: GP51300 → 25 ug/L (10/26/09 1714 11.86) & 8 ug/L (10/26/09 1749 11.90): both 70Rs ok		affects all samples in JA31156
JA33467: GP51802 → 25 ug/L (12/2/09 1138 12.53): 70R ok & 8 ug/L (12/2/09 1243 12.52): 70R ok		
JA31506: GP51564 → 75.8 ug/kg (11/16/09 1701 11.94): 70R ok		
GP51565 → 25 ug/L (11/16/09 1917 11.89) & 8 ug/L (11/16/09 1441 11.72): both 70Rs ok		
JA31353: GP51486 (11/12/09 1947): 75.8 ug/kg: 70Rs ok 11.98	GP51549 (11/13/09 1110): 25 ug/L: 70R ok 11.96	8 ug/L: 11/13/09 1145: 70R ok 11.96
GP51526 (11/13/09 2032): 75.8 ug/kg: 11.97	GP51567: 25 ug/L: ↓	

Perchlorate Worksheets SS-07 (6-8') SS-27 (6-8')
EPA Method 314.0 SED-4 SED-10
SW-4 JA30457: no field dupes
SW-10
SC34D SC37D

TRC
December 2009
Revision 0

VIII. FIELD DUPLICATE PRECISION

SC3D(R) SC34D

Sample ID VP-14 (105-110') Duplicate Sample ID VP-24 (105-110') Matrix GW

IWC-5 IWC-6

Criteria: RPD ≤ 30% for aqueous samples and ≤ 50% for solid samples

SC9S SC33S

Field Duplicate Sample IDs	RL	Sample Concentration	Duplicate Concentration	RPD (%)	Action
		VP-14 (105-110')	VP-24 (105-110')		
Perchlorate	3 ug/L	6.2 ug/L	5.9 ug/L	5.0	
Specific Conductivity		334 umhos/cm	327 umhos/cm	2.1	
		IWC-5	IWC-6		
Perchlorate	3 ug/L	11.7 ug/L	10.7 ug/L	8.9	
Specific Conductivity		417 umhos/cm	444 umhos/cm	6.3	
		SC9S	SC33S		
Perchlorate	3 ug/L	8.2 ug/L	8.0 ug/L	2.5	
Specific Conductivity		445 umhos/cm	449 umhos/cm	0.90	
		SC3D(R)	SC34D		
Perchlorate	24 ug/L	141 ug/L	136 ug/L	3.6	
Specific Conductivity		638 umhos/cm	631 umhos/cm	1.1	
		SC34D	SC37D		
Perchlorate	18 ug/L	152 ug/L	150 ug/L	1.3	
Specific Conductivity		1020 umhos/cm	996 umhos/cm	2.4	
		SW-4	SW-10 → both ND perchlorate		

Validation Actions: Spec. conductivity 127 umhos/cm 128 umhos/cm 0.78%

Aqueous:

If the sample and duplicate are both ≥ 5x RL and RPD >50; Estimate (J) positive results.

If the sample and/or duplicate results <5x RL, RPD >50 and the difference between the results is >RL; Estimate (J) positive results.

Soils:

If the sample and duplicate are both ≥ 5x RL and RPD >100; Estimate (J) positive results.

If the sample and/or duplicate results <5x RL, RPD >100 and the difference between the results is >2x RL; Estimate (J) positive results.

perchlorate 41 ug/kg SED-4 SED-10
specific conductivity 10.9 J ug/kg 7.7 U ug/kg NC
181 umhos/cm 174 umhos/cm 3.9

SS-07 (6-8) SS-27 (6-8): both ND for perchlorate
specific conductivity 105 umhos/cm 96.8 umhos/cm 8.1

IX. SAMPLE QUANTITATION

Recalculate from the raw data, the concentrations for one positive detect and one reported quantitation limit for a nondetect in a diluted sample.

Sample ID: see below
Reported Value: ↓
Sample ID:
Reported Quantitation Limit:

-all final conc. slightly off due to rounding from lab

SA30457: area = 0.030 curve: y = 0.0028 x (VP-13 (100-105'):
0.030 = 0.0028(x) (x) = 10.71 ug/L (reported conc = 10.6 ug/L)

SA30759: VP-14 (105-110')
area = 0.017 curve: y = 0.0028x)
0.017 = 0.0028(x) (x) = 6.1 ug/L (reported conc = 6.2 ug/L)

SA30998: SC3D (R)
area = 0.052 curve: y = 0.0030(x)
0.052 = 0.0030(x) (x) = 17.33 x 8 (DF) = 139 ug/L (reported conc = 141 ug/L)

SA31156: VP-13A (62-67')
area = 0.011 curve: y = 0.0025(x)
0.011 = 0.0025(x) (x) = 4.4 ug/L (reported conc = 4.3 ug/L)

List soil/sediment samples with 10-50% solids: SA31506: SED-4 (21.9), SED-10 (21.5%), SED-2 (47.3%) SA31353: all ok
Positive and nondetect results for all samples with 10-50% solids must be qualified as estimated (J/UJ).
List sample numbers with <10% solids: NA
All results for samples with <10% solids must be rejected.

SA30457: NA
SA30759: NA
SA30998: NA
SA31156: NA
SA33467: NA

SA33467: SC3D
area = 0.094 y = 0.0038(x)
0.094 = 0.0038(x) (x) = 24.7 x 6 (DF) = 148 ug/L (reported conc = 150 ug/L)

SA31506: SED-4
area = 0.002 y = 0.0030(x)
0.002 = 0.0030(x) (x) = 0.667 ug/L x 0.1 L / 0.03317 kg x 1 / 0.219 = 9.2 ug/kg
(reported conc = 10.9 ug/kg)

SA31353: SS-05 (5-7')
area = 0.054 y = 0.0030x
0.054 = 0.0030(x)
(x) = 18 ug/L
18 ug/L x 0.1 L / 0.03355 x 1 / 0.927 = 57.9 ug/L (reported conc = 58.3 ug/L)

SED-3: ND
3 ug/L x 0.1 L / 0.03314 x 1 / 0.717 = 12.6 = 13 ug/kg ✓

X. REPORTED QUANTITATION LIMITS

Did the laboratory achieve the required quantitation limits for each sample? (Yes) No
If no, discuss the reasons below.

Sample ID	QLs Not Achieved	Reason
JA30457: ok; no dilutions		
JA30759: ok; no dilutions		
-① VP14 (20-25'): 1.6 B reported for perchlorate: change "B" to "J"		
② FB101909: ND reported at MDL: change to RL of 3ug/L		
JA30998:		
IWC-3, B, SC15, SC35: "B" values reported for perchlorate: change "B" to "J"		
SC45, SC185, ~~ND FB102109~~, SC22F, ~~MW1-4~~: ND reported at MDL: change to RL of 3ug/L		
SC30(R), SC34D: 8x due to perchlorate over cal in 1x		
JA31156: FB102209: ND reported at MDL: change to RL of 3ug/L		
-no dilutions		
JA33467: SS33D, FB111909: ND reported at MDL: change to RL of 3ug/L		
-no dilutions		
JA31506: no dilutions ~~-F~~		
-FB102809, SED-1A, SW-1, SED-1, SW-2, SW-3, SED-3, SW-4, ~~SW-10~~ SED-10: ND reported at MDL: change to RL		
-SW-1A, SED-2, SED-4, SW-10: "B" values reported for perchlorate: change "B" to "J"		
JA31353: no dilutions:		

-SS-01(5-7'), SS-01(12-14'), SS-02(14-16'), SS-03(0-2'), SS-06(1-3'), SS-07(6-8'), SS-08(3-4'), SS-08(12-14'), SS-09(6-8'), SS-09(12-14'), SS-10 (2-4'), SS-10(4-6'), FB102609(1), FB102609(2), SS-27 (6-8'), ND, reported at MDL; change to RL

-SS-02(1-3'), SS-03(13-15'), SS-04(2-4'), SS-04(14-16'), SS-06(14-16'), SS-07(13-15'). "B" values reported: change "B" to "J"

Data Validation Memorandum

To: Larry Butlien

From: Elizabeth Denly

CC: John Moss

Date: October 11, 2010

Subject: Perchlorate Data Validation Review: Groundwater Samples: SMC/Newfield, NJ

SUMMARY

Full validation was performed on the data for 11 groundwater samples and one field blank collected at the SMC site in Newfield, New Jersey. The samples were collected on September 8, 2010 and submitted to Accutest Laboratories in Dayton, New Jersey for analysis. The samples were analyzed for perchlorate using EPA Method 314.0. The laboratory reported the results under case number JA55820.

The sample results were assessed using the *Region II Evaluation of Metals Data for the Contract Laboratory Program (CLP)*, Revision 13, SOP HW-2, September 2006; these data validation guidelines were modified to accommodate the method-specific criteria.

In general, the data are valid as reported and may be used for decision-making purposes with the following exceptions. Select results were reported which were below the lowest calibration standard; these results were qualified as estimated (J). This issue has a minor impact on the data usability. All results are still usable for project objectives.

SAMPLES

Groundwater samples included in this review are listed below:

SC10S	SC10D	SC6S	SC18S	SC1D
SC1S	SC3S	SC3D (R)	SC21S	SC21D
SC24S	FB090810			

REVIEW ELEMENTS

Sample data were reviewed for the following parameters:

- Agreement of analyses conducted with chain-of-custody requests
- Data completeness
- Holding times and sample preservation
- Initial and continuing calibrations
- Reporting limit standards
- Instrument performance check standards
- Blanks

- Matrix spike (MS) results
- Laboratory duplicate results
- Laboratory control sample (LCS) results
- Field duplicate results
- Quantitation limits and sample results
- Target compound identification

DISCUSSION

Agreement of Analyses Conducted with Chain-of-Custody Requests

Sample reports were checked to verify that the results corresponded to analytical requests as designated on the chain-of-custody (COC). There were no discrepancies noted.

Data Completeness

The data packages were found to be complete as received from the laboratory.

Holding Times and Sample Preservation

All samples were analyzed within the method-specified holding time. The cooler temperature upon sample receipt was within the acceptance criterion of 4 ± 2 °C.

Initial and Continuing Calibrations

All initial calibration criteria were met. The percent recoveries of perchlorate were within the acceptance criteria in all initial calibration verification (ICV) and continuing calibration verification (CCV) standards. All ICV and CCV perchlorate standards were analyzed at the method-specified frequency. All calibration checks associated with the specific conductivity analyses were also within the acceptance criteria.

Reporting Limit Standards

The percent recoveries of perchlorate were within the acceptance criteria in the reporting limit standard. The reporting limit standard was analyzed at the method-specified frequency and at the reporting limit of 3 µg/L.

Instrument Performance Check Standards

The instrument performance check was analyzed at the method-specified frequency and at the required conductivity. The percent recovery of perchlorate was within the acceptance criteria in the instrument performance check standard. The percent difference of the area/height ratio of perchlorate in the instrument performance check standard compared to the area/height ratio of perchlorate in the laboratory control sample was within the acceptance criteria in the instrument performance check standard.

Blanks

Perchlorate was not detected in the laboratory method blank or field blank.

MS Results

MS analyses were performed on sample SC34D (from case number JA55826). All criteria were met.

Laboratory Duplicate Results

Laboratory duplicate analyses for perchlorate were performed on sample SC34D (from case number JA55826). Laboratory duplicate analyses for specific conductivity were performed on sample SC6S. All criteria were met in the laboratory duplicate analyses.

LCS Results

The percent recoveries of perchlorate were within the acceptance criteria in all LCS analyses.

Field Duplicate Results

There were no field duplicate pairs submitted with this sample set. No validation action was required on this basis.

Quantitation Limits and Sample Results

Sample calculations were spot-checked; there were no errors noted.

Select results were reported which were below the lowest calibration standard level and quantitation limit (QL). These results were qualified by the laboratory with a "B"; the "B" was changed to a "J" during validation to indicate the value was estimated.

It should be noted that the laboratory reported nondetect results down to the method detection limit (MDL) instead of the QL. The Form Is were manually changed during validation to reflect the QL instead of the MDL.

Sample SC3D(R) was analyzed at a 6-fold dilution due to the concentration of perchlorate which would have exceeded the calibration range if not diluted.

None of the samples exhibited a specific conductivity above the laboratory's matrix conductivity threshold and therefore none of the samples required dilution or pretreatment due to conductivity.

Target Compound Identification

All criteria were met.

Qualified Form Is

Report of Analysis

Client Sample ID:	FB090810		
Lab Sample ID:	JA55820-1	Date Sampled:	09/08/10
Matrix:	AQ - Field Blank Water	Date Received:	09/08/10
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	3.0 ~~0.58~~ U	3.0	0.58	ug/l	1	09/10/10 13:26	MS	EPA 314
Specific Conductivity	2.6	0.50		umhos/cm	1	09/22/10	ST	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Report of Analysis

Client Sample ID:	SC10S		
Lab Sample ID:	JA55820-2	Date Sampled:	09/08/10
Matrix:	AQ - Ground Water	Date Received:	09/08/10
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	3.0 ~~0.58~~ U	3.0	0.58	ug/l	1	09/10/10 14:01	MS	EPA 314
Specific Conductivity	472	0.50		umhos/cm	1	09/22/10	ST	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Report of Analysis

Client Sample ID:	SC10D		
Lab Sample ID:	JA55820-3	Date Sampled:	09/08/10
Matrix:	AQ - Ground Water	Date Received:	09/08/10
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	8.5	3.0	0.58	ug/l	1	09/10/10 14:18	MS	EPA 314
Specific Conductivity	772	0.50		umhos/cm	1	09/22/10	ST	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Report of Analysis

Client Sample ID:	SC6S		
Lab Sample ID:	JA55820-4	Date Sampled:	09/08/10
Matrix:	AQ - Ground Water	Date Received:	09/08/10
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	19.6	3.0	0.58	ug/l	1	09/10/10 14:35	MS	EPA 314
Specific Conductivity	514	0.50		umhos/cm	1	09/22/10	ST	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Report of Analysis

3.5

3

Client Sample ID:	SC18S		
Lab Sample ID:	JA55820-5	Date Sampled:	09/08/10
Matrix:	AQ - Ground Water	Date Received:	09/08/10
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	3.0 ~~0.58~~ U	3.0	0.58	ug/l	1	09/10/10 14:53	MS	EPA 314
Specific Conductivity	285	0.50		umhos/cm	1	09/22/10	ST	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Report of Analysis

Client Sample ID:	SC1D		
Lab Sample ID:	JA55820-6	Date Sampled:	09/08/10
Matrix:	AQ - Ground Water	Date Received:	09/08/10
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	44.5	3.0	0.58	ug/l	1	09/10/10 15:10	MS	EPA 314
Specific Conductivity	393	0.50		umhos/cm	1	09/22/10	ST	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Report of Analysis

3.7 3

Client Sample ID:	SC1S		
Lab Sample ID:	JA55820-7	Date Sampled:	09/08/10
Matrix:	AQ - Ground Water	Date Received:	09/08/10
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	0.69 ~~B~~ J	3.0	0.58	ug/l	1	09/10/10 15:27	MS	EPA 314
Specific Conductivity	168	0.50		umhos/cm	1	09/22/10	ST	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Report of Analysis

Client Sample ID:	SC3S		
Lab Sample ID:	JA55820-8	Date Sampled:	09/08/10
Matrix:	AQ - Ground Water	Date Received:	09/08/10
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	13.0	3.0	0.58	ug/l	1	09/10/10 15:45	MS	EPA 314
Specific Conductivity	402	0.50		umhos/cm	1	09/22/10	ST	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Report of Analysis

Client Sample ID:	SC3D(R)		
Lab Sample ID:	JA55820-9	Date Sampled:	09/08/10
Matrix:	AQ - Ground Water	Date Received:	09/08/10
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	143	18	3.5	ug/l	6	09/10/10 16:02	MS	EPA 314
Specific Conductivity	581	0.50		umhos/cm	1	09/22/10	ST	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Report of Analysis

Client Sample ID:	SC21S		
Lab Sample ID:	JA55820-10	Date Sampled:	09/08/10
Matrix:	AQ - Ground Water	Date Received:	09/08/10
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	3.0 ~~0.58~~ U	3.0	0.58	ug/l	1	09/10/10 16:19	MS	EPA 314
Specific Conductivity	171	0.50		umhos/cm	1	09/22/10	ST	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Report of Analysis

Client Sample ID:	SC21D		
Lab Sample ID:	JA55820-11	Date Sampled:	09/08/10
Matrix:	AQ - Ground Water	Date Received:	09/08/10
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	32.8	3.0	0.58	ug/l	1	09/10/10 16:37	MS	EPA 314
Specific Conductivity	228	0.50		umhos/cm	1	09/22/10	ST	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Report of Analysis

Client Sample ID:	SC24S		
Lab Sample ID:	JA55820-12	Date Sampled:	09/08/10
Matrix:	AQ - Ground Water	Date Received:	09/08/10
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	2.1 ~~B~~ J	3.0	0.58	ug/l	1	09/10/10 17:11	MS	EPA 314
Specific Conductivity	640	0.50		umhos/cm	1	09/22/10	ST	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Data Validation Worksheets

Data Validation Worksheet Cover Page

Site Name: SMC
Project No. 177208.00002

PERCHLORATE DATA VALIDATION

The following data package has been validated:

Lab Name: Accutest-NJ
Lab Project No.: JA55820

No. of Samples/Matrix: 12/Aqueous

Method No: EPA 314
Sampling Date(s): 9/8/10
Shipping Date(s): N/A; courier service used
Date Rec'd By Lab: 9/8/10

Sample IDs. F SC10S, SC10D, SC6S, SC18S, SC1D, SC1S, SC3S, SC3D(R), SC21S, SC21D, SC24S

Equipment Blank ID. FB090810
Field Duplicate IDs. —

The method requirements and the Region II *Evaluation of Metals Data for the Contract Laboratory Program (CLP)* (Revision 13, SOP HW-2, September 2006) were used to evaluate the data.

Full validation was performed.

The data were evaluated based upon the following parameters:

- -Overall Evaluation of Data
- -Data Completeness
- -Preservation & Technical Holding Times
- -RL Standard Analysis
- -Initial & Continuing Calibrations
- -Blanks
- -Matrix Spike Results
- -Laboratory Duplicate Results
- -Field Duplicates
- -Laboratory Control Spikes
- -Sample Quantitation
- -Instrument Performance Checks

Definitions and Qualifiers:
A – Acceptable Data
J – Numerical value associated with compound is an estimated quantity
R – The data are rejected as unusable. The R replaces the numerical value or sample quantitation limit.
U – Compound not detected at that numerical sample quantitation limit
UJ – The sample quantitation limit is an estimated quantity.

Validator's Name E. Denly Company Name TRC Phone Number 978-658-3577
Date Validation Started 10/9/10 Date Validation Completed 10/11/10

Package Completeness and Deliverables

Missing Information	Date Lab Contacted	Date Received

I. PRESERVATION AND HOLDING TIMES – Circle sample numbers with exceeded holding times or omitted preservation. Circle all exceeded holding times.

List temperature(s) of coolers upon receipt at the laboratory: 2.2°C

Sample ID	Matrix	Date Sampled	Conductivity Analysis Date	Perchlorate Analysis Date	# Days from Sampling To Analysis		Actions
FB090810	AQ	9/8/10	9/22/10	9/10/10 1326	~~[illegible]~~ 14	~~[illegible]~~ 2	✓
SC10S	GW			9/10/10 1401			✓
SC10D				9/10/10 1418			✓
SC6S				9/10/10 1435			✓
SC18S				9/10/10 1453			✓
SC1D				9/10/10 1510			✓
SC1S				9/10/10 1527			✓
SC3S				9/10/10 1545			✓
SC30(R)				9/10/10 1602			6x ✓
SC21S				9/10/10 1619			✓
SC21D				9/10/10 1637			✓
SC24S				9/10/10 1730			✓

Required Preservation: **Cool, 4 degrees**
Holding Time Criteria: **28 days from date sampled to date analyzed**

List field samples which exhibited a conductance greater than the lab's matrix conductivity threshold. NA

Were these samples diluted or pretreated? NA

If dilutions were performed due to conductance, was the dilution factor estimated by dividing measured conductance by MCT? NA YES NO
If samples were pretreated, was conductance measured after pretreatment to ensure it is below MCT? NA YES NO

II. INSTRUMENT CALIBRATION

Initial Calibration: 5 standards; %RSD <15 (must use peak areas)
ICV **Initial Calibration Verification:** 90-110% (mid-point concentration; run after every ICAL)
CRI **Reporting Limit Standard:** 75-125% (concentration at RL; run at beginning of every analysis batch)
CCV **Continuing Calibration Verification:** 85-115% (concentration alternate between mid and high standards; run prior to samples, every 10 samples and at end of analysis)
List all standards which are outside of the acceptance criteria.

Date	IC/ICV/RL/CCV	Recovery	Samples Affected	Action
9/10/10 0924	GN42159-ICV1 0924	% R ok	✓	
0959	GN42159-CRI1	% R ok	✓	
1033	GN42159-CCV1		✓	
1344	GN42159-CCVA1		✓	
1654	GN42159-CCV2		✓	
1728	GN42159-CCVA2		✓	
ICAL: 9/3/10	perchlorate			
sp. cmd. CCV: ok	-pre sample		9/22/10	
CCV: ok	-post sample			

✓ Conductivity: Calibration check must be performed with each analysis batch using 1410 uS/cm standard. Conductivity reading must be between 1380 and 1440.

ICAL: 3ppb, 6ppb, 10ppb, 25ppb, 50ppb

9/3/10 1123 : 3ppb 11.918
9/3/10 1140 : 6ppb 11.904
9/3/10 1157 : 10ppb 11.881
9/3/10 1214 : 25ppb 11.854
9/3/10 1232 : 50ppb 11.814

r = 0.999346
Area vs. conc

y = 0.0031x

-recalculated slope = 0.003093 ✓

III. BLANK ANALYSIS

List the blank contamination found above ½ the RL below.

1. Laboratory: Method and Instrument Blanks

Date Analyzed	Matrix	Blank ID	Concentration (units)
9/10/10 0941	Aqueous	GP554311 GN42159	ND

1. Was pre-treatment required for any field samples? YES NO
2. If yes, was pre-treatment performed on a separate portion of the method blank? YES NO

Field: Equipment (Rinsate) Blanks

Date Analyzed	Matrix	Blank ID	Concentration (units)
9/10/10 1326	Aqueous	FB090810	ND

2. Blank Actions – List the maximum concentrations of perchlorate detected.

Type of Blank	Date Blank Originated	Max. Conc. (units)	Action Level (units)	Analyte QL (units)	Samples Affected	Action

IV. INSTRUMENT PERFORMANCE CHECK (IPC)

REQUIREMENTS:

✓ **IPC must be analyzed at the beginning of each run.**
✓ **The percent difference of the area/height ratio of the IPC compared to the area/height ratio of the LCS must be <25.**
✓ **The percent recovery of perchlorate must be 80-120%.** true value = 25 ug/L
✓ **The retention time of perchlorate must not shift more than 5%.**

What is the lab's Matrix Conductivity Threshold established during the IDC? ~~4360~~ 4290

What was the conductance of the IPC? 4360 umhos/cm
Is the conductance of the IPC confirmed prior to analysis? YES NO ~~not ok~~
Is the conductance within ±10% of the MCT? YES NO

List any IPC requirements that were not achieved.

Date	%D/%R/RT	Associated Samples	Action
GN4259-IPC1 9/10/10 0907	%R ok		
Area: 0.076 / Slope 0.0031 = 24.57 ug/L (lab's value: 24.82 ug/L) ✓ ok			
RT perch = 11.851 min ✓ w/in 5% of ICAL RTs			
area IPC / height = 0.076 / 0.220 = 0.345			
area LCS / height = 0.074 / 0.238 = 0.311		0.345 − 0.311 / 0.311 × 100 = 10.9% → %D	

V. MATRIX SPIKE - List all matrix spike analytes that are outside method QC acceptance criteria.

Was a matrix spike analysis performed on all samples that were pretreated? YES NO
Were samples spiked prior to pretreatment? YES NO
List associated samples which were pretreated.

Sample ID SC 340 (from JA55826) Matrix GW

Criteria: For analyte levels <4x spike levels, acceptance limits are 80 – 120%

MS ID	MS % Recovery	Action
JA55826-4	%R ok ✓	

Validation Actions:

Aqueous:

If %R <30; Reject (R) associated results
If %R 30-74; Estimate (J/UJ) positive and nondetect results.
If %R 126-150; Estimate (J) positive results.
If %R >150%; Reject (R) positive results.

Soils:

If %R <10; Reject (R) all associated results.
If %R 10-74; Estimate (J/UJ) positive and nondetect results.
If %R 126-200; Estimate (J) positive results.
If %R >200%; Reject (R) positive results.

If concentration of analyte ≥ 4x spike added, disregard spike recoveries

VI. LABORATORY DUPLICATE RESULTS - List all laboratory duplicate analytes that are outside method QC acceptance criteria.

Sample ID SC34D (from JA55826) Matrix GW

Criteria: RPD ≤ 15

	Lab Duplicate Sample ID	RL	Sample Concentration	Duplicate Concentration	RPD (%)	Action
perchlorate	JA55826-4 9610	1108	158 ug/L	155 ug/L	1.9 ✓	project sample
sp. cond.	SC6S		514 umhos/cm	509 umhos/cm	1.0	

Validation Actions:

Aqueous:

If the sample and duplicate are both ≥5x RL and RPD >50; Estimate (J) positive results.

If the sample and/or duplicate results <5x RL, RPD >50, and the difference between the results is >RL; Estimate (J) positive results.

Soils:

If the sample and duplicate are both ≥5x RL and RPD >100; Estimate (J) positive results.

If the sample and/or duplicate results <5xRL, RPD >100, and the difference between the results is >2x RL; Estimate (J) positive results.

VII. LABORATORY CONTROL SPIKES - List all LCS analytes that are outside method QC acceptance criteria.

Acceptance Limits:
85 – 115%

Was one LCS prepared and analyzed with each batch? YES NO
If field samples were pretreated, was a separate portion of the LCS also pretreated? YES NO

LCS ID Date Prepped	% Recovery	Action
GP55431 / GN42159 9/10/10 1016 25ug/L	%Rch ✓	
9/10/10 1050 8ug/L	↓ ✓	

VIII. FIELD DUPLICATE PRECISION

Sample ID _____ Duplicate Sample ID _____ Matrix_____

Criteria: RPD ≤ 30% for aqueous samples and ≤ 50% for solid samples

Field Duplicate Sample IDs	RL	Sample Concentration	Duplicate Concentration	RPD	Action
	none w/ this set				

Validation Actions:

Aqueous:

If the sample and duplicate are both ≥ 5x RL and RPD >50; Estimate (J) positive results.

If the sample and/or duplicate results <5x RL, RPD >50 and the difference between the results is >RL; Estimate (J) positive results.

Soils:

If the sample and duplicate are both ≥ 5x RL and RPD >100; Estimate (J) positive results.

If the sample and/or duplicate results <5x RL, RPD >100 and the difference between the results is >2x RL; Estimate (J) positive results.

IX. SAMPLE QUANTITATION

Recalculate from the raw data, the concentrations for one positive detect and one reported quantitation limit for a nondetect in a diluted sample.

Sample ID: SC3D(R)
Reported Value: 143 ug/L
Sample ID: SC18S
Reported Quantitation Limit: 3.0 ug/L

-all final conc. slightly off from lab due to rounding

SC3D(R)

curve: y = 0.003093 x

$$A_{red} = \frac{0.073}{0.003093} = 23.602 \frac{ug}{L} \times DF\ 6 = 141.6 = 142\ ug/L$$ ✓ok

SC18S

low std = 3 ug/L = QL

List soil/sediment samples with 10-50% solids: NA
Positive and nondetect results for all samples with 10-50% solids must be qualified as estimated (J/UJ).
List sample numbers with <10% solids: NA
All results for samples with <10% solids must be rejected.

X. REPORTED QUANTITATION LIMITS

Did the laboratory achieve the required quantitation limits for each sample? (Yes) No
If no, discuss the reasons below.

Sample ID	QLs Not Achieved	Reason
-all NDs reported down to MDL → Change to RL of 3ug/L → FB090810, SC10S, SC18S, SC21S		
-all "B" values changed to "S" → SC1S, SC24S		

Data Validation Memorandum

To: Larry Butlien

From: Elizabeth Denly

CC:
Date: June 6, 2011

Subject: Perchlorate Data Validation Review: Groundwater Samples: SMC/Newfield, NJ

SUMMARY

Full validation was performed on the data for two groundwater samples and one field blank collected at the SMC site in Newfield, New Jersey. The samples were collected on April 29, 2011 and submitted to Accutest Laboratories in Dayton, New Jersey for analysis. The samples were analyzed for perchlorate using EPA Method 314.0. The laboratory reported the results under case number JA74509.

The sample results were assessed using the *Region II Evaluation of Metals Data for the Contract Laboratory Program (CLP)*, Revision 13, SOP HW-2, September 2006; these data validation guidelines were modified to accommodate the method-specific criteria.

In general, the data are valid as reported and may be used for decision-making purposes and project objectives. Qualification of the data was not required.

SAMPLES

Samples included in this review are listed below:

SC40D	SC49D	FB042911

REVIEW ELEMENTS

Sample data were reviewed for the following parameters:

- Agreement of analyses conducted with chain-of-custody requests
- Data completeness
- Holding times and sample preservation
- Initial and continuing calibrations
- Reporting limit standards
- Instrument performance check standards
- Blanks
- Matrix spike (MS) results
- Laboratory duplicate results
- Laboratory control sample (LCS) results
- Field duplicate results
- Quantitation limits and sample results

- Target compound identification

DISCUSSION

Agreement of Analyses Conducted with Chain-of-Custody Requests

Sample reports were checked to verify that the results corresponded to analytical requests as designated on the chain-of-custody (COC). There were no discrepancies noted.

Data Completeness

The data package was found to be complete as received from the laboratory.

Holding Times and Sample Preservation

All samples were analyzed within the method-specified holding time. The cooler temperature upon sample receipt was within the acceptance criterion of 4± 2°C.

Initial and Continuing Calibrations

All initial calibration criteria were met. The percent recoveries of perchlorate were within the acceptance criteria in all initial calibration verification (ICV) standards. The percent recoveries (128/123) of perchlorate in the ending higher concentration continuing calibration verification (CCV) standards were above the acceptance criteria. Since the percent recoveries were within the acceptance criteria in the ending lower concentration CCVs and the concentrations in the associated samples were at the lower end of the curve, validation action was not required.

All ICV and CCV perchlorate standards were analyzed at the method-specified frequency. All calibration checks associated with the specific conductivity analyses were within the acceptance criteria.

Reporting Limit Standards

The percent recoveries of perchlorate were within the acceptance criteria in the reporting limit standards. The reporting limit standards were analyzed at the method-specified frequency and at the reporting limit of 3 µg/L.

Instrument Performance Check Standards

The instrument performance checks were analyzed at the method-specified frequency and at the required conductivity. The percent recovery of perchlorate was within the acceptance criteria in the instrument performance check standards. The percent difference of the area/height ratio of perchlorate in the instrument performance check standards compared to the area/height ratio of perchlorate in the laboratory control samples was within the acceptance criteria in the instrument performance check standards.

Blanks

Perchlorate was not detected in the laboratory method blank or field blank.

MS Results

MS analysis was performed on sample SC40D. All criteria were met.

Laboratory Duplicate Results

Laboratory duplicate analyses for perchlorate and specific conductivity were performed on sample SC40D. All criteria were met.

LCS Results

The percent recoveries of perchlorate were within the acceptance criteria in all LCS analyses.

Field Duplicate Results

Samples SC40D and SC49D were submitted as the field duplicate pair with this sample set. The following tables summarize the relative percent differences (RPDs) of perchlorate and specific conductivity in the field duplicate pair.

Analyte	SC40D	SC49D	RPD (%)
Perchlorate (µg/L)	4.0	3.9	2.5
Specific Conductivity (µhmos/cm)	364	358	1.7

Quantitation Limits and Sample Results

Sample calculations were spot-checked; there were no errors noted.

It should be noted that the laboratory reported nondetect results down to the method detection limit (MDL) instead of the quantitation limit (QL). The Form Is were manually changed during validation to reflect the QL instead of the MDL.

None of the samples exhibited a specific conductivity above the laboratory's matrix conductivity threshold and therefore none of the samples required dilution or pretreatment due to conductivity.

Target Compound Identification

All criteria were met.

Qualified Form Is

Report of Analysis

Client Sample ID:	FB042911		
Lab Sample ID:	JA74509-1	Date Sampled:	04/29/11
Matrix:	AQ - Field Blank Water	Date Received:	04/29/11
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	3.0 ~~0.73~~ U	3.0	0.73	ug/l	1	05/05/11 13:02	MS	EPA 314
Specific Conductivity	12.6	0.50		umhos/cm	1	05/13/11	SA	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Report of Analysis

Client Sample ID:	SC40D		
Lab Sample ID:	JA74509-2	Date Sampled:	04/29/11
Matrix:	AQ - Ground Water	Date Received:	04/29/11
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	4.0	3.0	0.73	ug/l	1	05/05/11 12:45	MS	EPA 314
Specific Conductivity	364	0.50		umhos/cm	1	05/13/11	SA	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Report of Analysis

Client Sample ID:	SC49D		
Lab Sample ID:	JA74509-3	Date Sampled:	04/29/11
Matrix:	AQ - Ground Water	Date Received:	04/29/11
		Percent Solids:	n/a
Project:	SMC Perchlorate On-Site Investigation, Newfield, NJ		

General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Perchlorate	3.9	3.0	0.73	ug/l	1	05/10/11 14:00	AE	EPA 314
Specific Conductivity	358	0.50		umhos/cm	1	05/13/11	SA	SM19 2510B/SW 9050A

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
B = Indicates a result > = MDL but < RL

Data Validation Worksheets

Data Validation Worksheet Cover Page

Site Name: SMC
Project No. 177208.000040

PERCHLORATE DATA VALIDATION

The following data package has been validated:

Lab Name: Accutest-NJ
Lab Project No.: SA74509
No. of Samples/Matrix: 3/Aqueous

Method No: EPA 314
Sampling Date(s): 4/29/11
Shipping Date(s): NA, courier used
Date Rec'd By Lab: 4/29/11

Sample IDs. FB 042911, SC40D, SC49D

Equipment Blank ID. FB042911
Field Duplicate IDs. None

The method requirements and the Region II *Evaluation of Metals Data for the Contract Laboratory Program (CLP)* (Revision 13, SOP HW-2, September 2006) were used to evaluate the data.

Full validation was performed.

The data were evaluated based upon the following parameters:

- -Overall Evaluation of Data
- -Data Completeness
- -Preservation & Technical Holding Times
- -RL Standard Analysis
- -Initial & Continuing Calibrations
- -Blanks
- -Matrix Spike Results
- -Laboratory Duplicate Results
- -Field Duplicates
- -Laboratory Control Spikes
- -Sample Quantitation
- -Instrument Performance Checks

Definitions and Qualifiers:
A – Acceptable Data
J – Numerical value associated with compound is an estimated quantity
R – The data are rejected as unusable. The R replaces the numerical value or sample quantitation limit
U – Compound not detected at that numerical sample quantitation limit
UJ – The sample quantitation limit is an estimated quantity

Validator's Name E. Denly Company Name TRC Phone Number 978-656-3572
Date Validation Started 6/4/11 Date Validation Completed 6/4/11

Package Completeness and Deliverables

Missing Information	Date Lab Contacted	Date Received
-none		

I. PRESERVATION AND HOLDING TIMES –

Circle sample numbers with exceeded holding times or omitted preservation.
Circle all exceeded holding times.

List temperature(s) of coolers upon receipt at the laboratory: 1.2°C

Sample ID	Matrix	Date Sampled	Conductivity Analysis Date	Perchlorate Analysis Date	# Days from Sampling To Analysis	Actions
FB4 4 29 11	AQ	4/29/11	5/13/11	5/5/11 1300	6	
SC49D	GW	↓	5/13/11	5/5/11 1245	6	
SC49D	GW	↓	5/13/11	5/10/11 1400	11	

Required Preservation: Cool, 4 degrees
Holding Time Criteria: 28 days from date sampled to date analyzed

List field samples which exhibited a conductance greater than the lab's matrix conductivity threshold.
none

Were these samples diluted or pretreated?
NA

If dilutions were performed due to conductance, was the dilution factor estimated by dividing measured conductance by MCT? YES NO NA
If samples were pretreated, was conductance measured after pretreatment to ensure it is below MCT? YES NO NA

II. INSTRUMENT CALIBRATION

Initial Calibration: 5 standards; %RSD <15 (must use peak areas) ✓
Initial Calibration Verification: 90-110% (mid-point concentration; run after every ICAL) ✓
Reporting Limit Standard: 75-125% (concentration at RL; run at beginning of every analysis batch) ✓
Continuing Calibration Verification: 85-115% (concentration alternate between mid and high standards; run prior to samples, every 10 samples and at end of analysis) ✓
List all standards which are outside of the acceptance criteria.

	Date	IC/ICV/RL/CCV	Recovery	Samples Affected	Action	
GN50477	5/5/11	ICV - 25ug/L	%R ok	FB042911, SC40D		0.058/0.002366 = 24.51 = 98% R
		CRI1 - 3ug/L	↓			
		CCV1 - 25ug/L	↓			
		CCVA1 - 50ug/L	↓			0.127/0.002366 = 53.7 = 107% R
		CCV2 - 25ug/L	↓			0.065/0.002366 = 27.5 = 110% R
		CCVA2 - 50ug/L	128%		none; conc. in SC40D 4ug/L → closer to 25ug/L which was ok	0.150/0.002366 = 63.4 = 127% R
GN50648	5/10/11	ICV - 25ug/L	%R ok	SC49D		0.061/0.002421 = 25.2 = 101%
		CRI1 - 3ug/L	↓			
		CCV1 - 25ug/L	↓			
		CCVA1 - 50ug/L	↓			0.133/0.002421 = 54.9 = 110%
		CCV2 - 25ug/L	↓			
		CCVA2 - 50ug/L	123%		none; does not bracket project sample	0.148/0.002421 = 61.1 = 122%

Conductivity: Calibration check must be performed with each analysis batch using 1410 uS/cm standard. Conductivity reading must be between 1380 and 1440.

GN50477 : STD1 → 6 : 5/4/11 : 0, 3, 6, 10, 25, 50 ppb : r = 0.999
GN50648 : STD1 → 6 : 5/10/11 : ↓ : r = 0.999

5/5/11 : GN50477 : cond. check ok
~~5/10/11~~

III. BLANK ANALYSIS

List the blank contamination found above ½ the RL below.

1. Laboratory: Method and Instrument Blanks

Date Analyzed	Matrix	Blank ID	Concentration (units)
5/5/11 1136	AQ	GN50477	none detected
5/10/11 1234	↓	GN50648	↓

1. Was pre-treatment required for any field samples? YES NO
2. If yes, was pre-treatment performed on a separate portion of the method blank? YES NO

Field: Equipment (Rinsate) Blanks

Date Analyzed	Matrix	Blank ID	Concentration (units)
5/5/11	AQ	FB042911	none detected

2. Blank Actions – List the maximum concentrations of perchlorate detected.

Type of Blank	Date Blank Originated	Max. Conc. (units)	Action Level (units)	Analyte QL (units)	Samples Affected	Action
		none	detected			

J

IV. INSTRUMENT PERFORMANCE CHECK (IPC)

REQUIREMENTS:

IPC must be analyzed at the beginning of each run. 25ug/L

✓ **The percent difference of the area/height ratio of the IPC compared to the area/height ratio of the LCS must be <25.** ✓

✓ **The percent recovery of perchlorate must be 80-120%.** ✓

✓ **The retention time of perchlorate must not shift more than 5%.** ✓

What is the lab's Matrix Conductivity Threshold established during the IDC? 4290

What was the conductance of the IPC? 4030 umhos/cm

Is the conductance of the IPC confirmed prior to analysis? YES NO

Is the conductance within ±10% of the MCT? YES NO

$y = 0.002366x$

List any IPC requirements that were not achieved.

	Date	%D/%R/RT	Associated Samples	Action
GN50477	5/5/11	%R out	FB042911, SC40D	→
GN50648	5/10/11	↓	SC49D	

Area = 0.055
$0.055 = 0.002366x$ $x = 23.24$ ppb = 93%R
(lab reported 23.352 ppb and 93.6%R)

GN50477: RT perchlorate = 11.694 min
GN50648: RT perchlorate = 11.404 min
> within 5% of ICAL RT,

Area = $\frac{0.057}{0.002421}$ = 23.54 ppb = 94%

GN50477: $\frac{\text{Area}}{\text{Height}}$ IPC $\frac{0.055}{0.160} = 0.344$ %D = 2.1%

$\frac{\text{Area}}{\text{Height}}$ BS $\frac{0.060}{0.178} = 0.337$

GN50648: $\frac{\text{Area}}{\text{Height}}$ IPC $\frac{0.057}{0.168} = 0.339$ %D = 1.7%

$\frac{\text{Area}}{\text{Height}}$ BS $\frac{0.060}{0.180} = 0.333$

V. MATRIX SPIKE - List all matrix spike analytes that are outside method QC acceptance criteria.

Was a matrix spike analysis performed on all samples that were pretreated? YES NO (NA)
Were samples spiked prior to pretreatment? YES NO (NA)
List associated samples which were pretreated. none

Sample ID SC40D Matrix GW

Criteria: For analyte levels <4x spike levels, acceptance limits are 80 – 120%

MS ID	MS % Recovery	Action
SC40D	ok	

0.073/0.0023666 = 30.854
30.854 - 4 = 26.85 / 25 = 107%
(126 repeated 107%)

Validation Actions:

Aqueous:

If %R <30; Reject (R) associated results
If %R 30-74; Estimate (J/UJ) positive and nondetect results.
If %R 126-150; Estimate (J) positive results.
If %R >150%; Reject (R) positive results.

Soils:

If %R <10; Reject (R) all associated results.
If %R 10-74; Estimate (J/UJ) positive and nondetect results.
If %R 126-200; Estimate (J) positive results.
If %R >200%; Reject (R) positive results.

If concentration of analyte ≥ 4x spike added, disregard spike recoveries

✓

VI. LABORATORY DUPLICATE RESULTS - List all laboratory duplicate analytes that are outside method QC acceptance criteria.

Sample ID SC40D Matrix GW

Criteria: RPD ≤ 15

perchlorate cp. cmd.

Lab Duplicate Sample ID	RL	Sample Concentration	Duplicate Concentration	RPD (%)	Action
SC40D	3.0 ug/L	4.0 ug/L	5.3 ug/L	28.0	ok since results <5xRL
↓		3.61 ug/L	3.77 ug/L	3.5	

Validation Actions:

Aqueous:

If the sample and duplicate are both ≥5x RL and RPD >50; Estimate (J) positive results.

If the sample and/or duplicate results <5x RL, RPD >50, and the difference between the results is >RL; Estimate (J) positive results.

Soils:

If the sample and duplicate are both ≥5x RL and RPD >100; Estimate (J) positive results.

If the sample and/or duplicate results <5xRL, RPD >100, and the difference between the results is >2x RL; Estimate (J) positive results.

J

VII. LABORATORY CONTROL SPIKES - List all LCS analytes that are outside method QC acceptance criteria.

Acceptance Limits:
85 – 115%

Was one LCS prepared and analyzed with each batch? YES NO
If field samples were pretreated, was a separate portion of the LCS also pretreated? YES NO NA

LCS ID Date Prepped	% Recovery	Action
GN50477 - 8 ug/L - 25 ug/L	%R ok in each	
GN50648 - 8 ug/L - 25 ug/L	↓	

0.060/0.002366 = 25.36 = 101%
0.060/0.002421 = 24.78 = 99%

✓

VIII. FIELD DUPLICATE PRECISION none submitted

Sample ID _____ Duplicate Sample ID _____ Matrix_____

Criteria: RPD ≤ 30% for aqueous samples and ≤ 50% for solid samples

Field Duplicate Sample IDs	RL	Sample Concentration	Duplicate Concentration	RPD	Action

Validation Actions:

Aqueous:

If the sample and duplicate are both ≥ 5x RL and RPD >50; Estimate (J) positive results.

If the sample and/or duplicate results <5x RL, RPD >50 and the difference between the results is >RL; Estimate (J) positive results.

Soils:

If the sample and duplicate are both ≥ 5x RL and RPD >100; Estimate (J) positive results.

If the sample and/or duplicate results <5x RL, RPD >100 and the difference between the results is >2x RL; Estimate (J) positive results.

IX. SAMPLE QUANTITATION

Recalculate from the raw data, the concentrations for one positive detect and one reported quantitation limit for a nondetect in a diluted sample.

Sample ID: SC40D
Reported Value: 4.0 ug/L
Sample ID: FB042911
Reported Quantitation Limit: 3.0 ug/L

SC40D: $\frac{\text{area: } 0.009}{\text{slope: } 0.002366} = 3.8$ ug/L (ok; most likely due to area/slope rounding)

FB042911:

low std = 3 ug/L = QL

List soil/sediment samples with 10-50% solids: NA
Positive and nondetect results for all samples with 10-50% solids must be qualified as estimated (J/UJ).
List sample numbers with <10% solids: NA
All results for samples with <10% solids must be rejected.

X. REPORTED QUANTITATION LIMITS

Did the laboratory achieve the required quantitation limits for each sample? (Yes) No
If no, discuss the reasons below.

Sample ID	QLs Not Achieved	Reason
-no dilutions performed		
-NDs reported down to MDL → changed to reflect RL of 3ug/L		
	→ only affects FB042911	

APPENDIX I

HAZSITE LABORATORY RESULTS (CD ONLY IN NJDEP COPIES)

EQuIS USEPA REGION II LABORATORY RESULTS (CD ONLY IN USEPA COPIES)

APPENDIX J

SOIL MASS FLUX AND GROUNDWATER MASS BALANCE CALCULATION

SHEET NO. 1 OF 4
PROJECT NO.
DATE 3/12/10
BY DAVID HAY
CHK'D

TRC

SUBJECT SMC POTASSIUM PERCHLORATE

SOIL MOISTURE CONCENTRATION

Log Koc $KClO_4$ = 1.687
Koc = 48.64 L/Kg

Kd = Koc x foc ASSUME TYPICAL ORGANIC CARBON fraction = 2%

Kd = 48.64 x 0.02 = 0.97 L/Kg

$$Kd = \frac{[Soil]\ \mu g/Kg}{[WATER]\ \mu g/L} = 0.97\ L/Kg$$

Soil concentration = 58.3 µg/Kg

∴ WATER concentration = 59.93 µg/L

A

SHEET NO. 2 OF 4
PROJECT NO.
DATE 3/12/10
BY DAVID HAY
CHK'D

TRC

SUBJECT SMC POTASSIUM PERCHLORATE

SOIL CONCENTRATION = 58.3 µg/Kg

What is soil concentration on a per unit volume basis?

DRY SAND bulk density = 1.60 g/cm3
DRY SAND and gravel bulk density = 1.73 g/cm3
1 Kg soil = 1000 g

1000 g ÷ 1.6 g/cm3 = 625 cm3
1000 g ÷ 1.73 g/cm3 = 578 cm3
AVERAGE volume of 1 Kg soil = 600 cm3
600 cm3 = 0.021 FT3
58.3 µg/0.021 FT3 = 2776 µg/FT3

What is specific mass (mass/unit area) of vadose zone contamination?

VADOSE ZONE IS 15 FT thick
2776 µg/FT3 X 15 FT = 41640 µg/FT2
That is mass available to be released to GW per unit area of contaminated soil.

What is the travel length of GW beneath soil contamination?

ASSUME 1000 FT2 soil contamination
ASSUME Roughly cylindrical distribution to GW

$\pi R^2 = 1000\ FT^2$
R = 17.84 FT
DIAMETER = 35.7 FT = MAXIMUM TRAVEL LENGTH

A

SHEET NO. 3 OF 4
PROJECT NO.
DATE 3/12/10
BY DAVID HAY
CHK'D

TRC

SUBJECT SMC POTASSIUM PERCHLORATE

What is the total volume of water in which mass released from the vadose zone contamination mixes on a per unit volume basis (includes recharge through contaminated soil)?

The mixing zone assumption is a 10 ft thick column of water under a unit area of contaminated soil

GW flow: $Q\ (FT^3) = KAi$; $K = 85.5$ FT/DAY, $A = 10\ FT^2$
$i = 0.0025$ (conservative for concentration calc)
$Q = 2.14\ FT^3/DAY$

30-yr (1971-2000) avg. annual precip at Atlantic City International Airport = 40.59 in.
Recharge rate of 21.6% of precip. = 8.77 in/yr = 0.002 FT/DAY
Volumetric recharge rate per unit area = 0.002 FT^3/DAY

Total recharge per unit volume of GW traversing maximum length of contaminated zone is dependent upon GW seepage velocity

$V_s = \frac{Ki}{\theta}$; assume θ (eff. porosity) is 0.30, which is conservatively high/near total porosity, yielding minimum seepage velocity/maximum time of GW traverse (maximum mass to GW)

$V_s = 0.7125$ FT/DAY

Maximum travel length 35.7 FT ÷ 0.7125 FT/DAY
$\Rightarrow$ 50.10 DAYS

50.10 DAYS × 0.002 FT^3/DAY = 0.10 FT^3 recharge

∴ Total mixing volume = 0.10 FT^3 + 2.14 FT^3 = 2.24 FT^3 (63.4L)

PROJECT NO.

DATE 3/12/10

BY DAVID HAY

CHK'D

SUBJECT SMC POTASSIUM PERCHLORATE

What is the total mass required to be leached from the vadose zone during the GW traverse beneath the maximum travel length of 35.7 ft to produce 5 ug/L in GW?

$$\frac{X\ ug/L}{63.4L} = 5\ ug/L\ ;\ X = 317\ ug$$

What is the mass flux corresponding to the 50.10 days of traverse?

$$317\ ug \div 50.10\ DAYS = 6.33\ ug/DAY$$

What is the concentration of the recharge water (soil moisture) required to yield 5 ug/L GW at the end of the traverse?

$$6.33\ ug/DAY \div 0.002\ \frac{FT^3}{DAY}\left(0.057\ \frac{L}{DAY}\right) = 111\ ug/L$$

Compare 111 ug/L to soil moisture concentration of 59.93 ug/L calculated with Kd.

Conclusion: The soil concentration of 58.3 ug/Kg is too low to produce 5 ug/L in GW

SHEET NO. _____ OF _____

PROJECT NO. _____

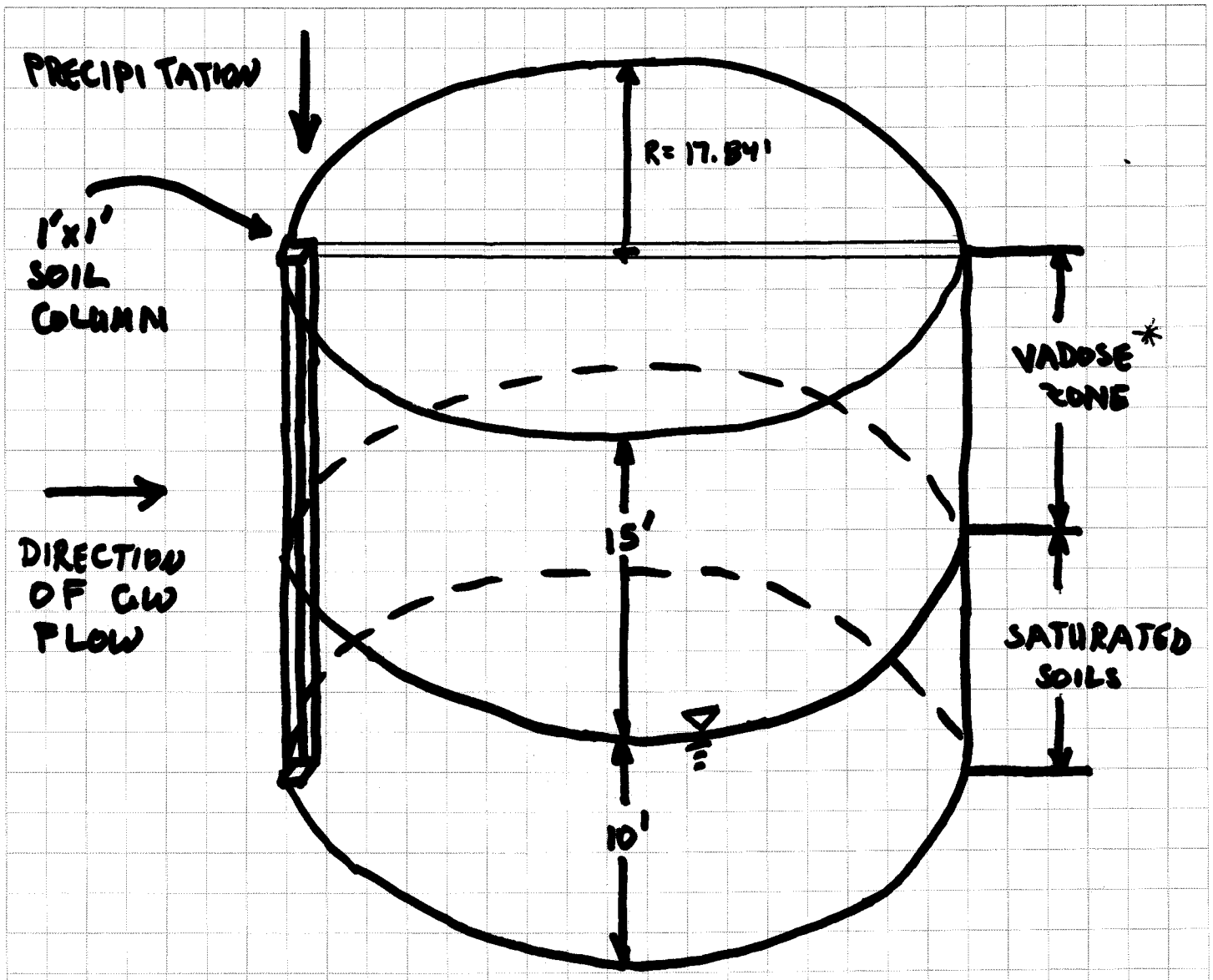
DATE 3/15/2010

BY B. KLINE

CHK'D _____

TRC

SUBJECT SMC POTASSIUM PERCHLORATE



* Assume the upper 15 ft. of the vadose zone is soil contaminated with 58.3 mg/kg perchlorate

A

would result in < 10% of the reference dose recommended by the National Academy of Sciences (Sanchez et al. 2005a&b). A controlled laboratory study investigating food chain transfer found that perchlorate has a limited ability to bioaccumulate in aquatic systems (Park et al. 2005).

Key physicochemical properties of the three most common perchlorate salts, estimated using EPI-Suites 2000 Software (developed by the United States Environmental Protection Agency [USEPA]), and are provided in Table 1. Because the three perchlorate salts are estimated to have low vapor pressures (3.96×10^{-26} - 4.34×10^{-18} mm Hg at 25 °C; [USEPA 2000]), partitioning to air will be limited. Additionally, all are highly soluble in water (0.15×10^5 to 21×10^5 mg/L at 25 °C) and have been identified in both surface and groundwater.

Table 1. Summary of Physical-Chemical Properties of Perchlorate

Physical Property	Cations associated with Perchlorate anion		
	$NH_4(ClO_4)$	$Na(ClO_4)$	$K(ClO_4)$
CAS No.	7790-98-9	7601-89-0	7778-74-7
Percent Perchlorate Ion by Weight	84.67%	81.22%	71.8%
Molecular weight	117.49	122.44	138.54
Color	White	White	White
Physical state	Crystalline solid	Crystalline solid	Powder
Melting point[a]	266.8 °C	302.6 °C	302.6 °C
Boiling point[a]	616.0 °C	692.7 °C	692.7 °C
Odor	No data	Odorless	Odorless
Solubility in water at 25 °C (g/L)[b]	2.1×10^2	2.0×10^2	15×10^1
Partition coefficients [a]:			
Log K_{ow}	-5.84	-7.18	-7.18
Log K_{oc}	1.985	1.687	1.687
Henry's Law constant at 25 °C (atm-m^3/mole)[a]	2.8×10^{-11}	9.15×10^{-19}	2.17×10^{-19}
Vapor pressure at 25 °C (mm Hg)[a]	4.34×10^{-18}	1.47×10^{-25}	3.96×10^{-26}
Conversion factors (% is ClO_4^- ion by weight)	1 ppm = 4.80 mg/m^3 1 mg/m^3 = 0.208ppm (84.7%)	1 ppm = 5.0 mg/m^3 1 mg/m^3 = 0.20ppm (81.2%)	1 ppm = 5.66 mg/m^3 1 mg/m^3 = 0.177ppm (71.8%)

[a]Values estimated with EPA EPI Software (USEPA 2000)

[b]HSDB 2006

APPENDIX K

USEPA CORRESPONDENCE

12th Floor East Tower
Centre Square
1500 Market Street
Philadelphia, PA 19102

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215.665.5748 FAX

www.TRCsolutions.com

August 15, 2010

Ms. Sherrel Henry
USEPA - Region II
290 Broadway, 19th Floor
New York, NY 10007-1866

Re: Groundwater Monitoring Event Notification
Perchlorate Remedial Investigation
Shieldalloy Metallurgical Corporation Facility - Newfield, NJ

Dear Ms. Henry:

As a follow-up to our project kickoff meeting held in your offices on June 9, 2010, TRC Environmental Corporation (TRC) is pleased to present this notification and schedule for conducting a second round of groundwater sampling for the perchlorate remedial investigation (RI) at Shieldalloy Metallurgical Corporation's (SMC) facility in Newfield, New Jersey. The perchlorate RI is required to be conducted by SMC as part of Operable Unit 3 (OU3) of the Administrative Settlement Agreement and Order on Consent (AOC) and Scope of Work (SOW) signed by SMC, TRC and USEPA and executed on April 28, 2010. OU3 requires the investigation and delineation of perchlorate contamination in groundwater, soil, sediment and surface water attributable to the SMC facility.

During the project kickoff meeting, USEPA indicated that they would require at least two rounds of groundwater sampling in order to adequately review the OU3 groundwater perchlorate RI results. In accordance with the USEPA and NJDEP-approved Draft Final Perchlorate RI Work Plan dated October 2008, TRC collected one complete round of groundwater samples from the current array of site wells during Fall 2009. During the project kickoff meeting, USEPA indicated that they would require the collection of a second round of groundwater samples under the existing perchlorate RI work plan (i.e., a new work plan under the OU3 AOC/SOW would not be necessary).

Existing Monitoring Well Sampling/Analysis

TRC recommends groundwater sampling of select monitoring wells and extraction wells that were sampled as part of the Fall 2009 perchlorate RI groundwater sampling. The second round of groundwater sampling will assist in confirming the distribution of perchlorate within the shallow, intermediate, and deep zones of the aquifer. Data from the second round of groundwater sampling will also assist in delineating the northern extent of the perchlorate plume, where perchlorate was detected at 5.3 parts per billion (ppb) in monitoring well SC36D, which slightly exceeds the 5 ppb New Jersey action level. Lastly, the second round of groundwater sampling will satisfy the USEPA's request to have at least two rounds of groundwater sampling results presented in the RI report.

The proposed wells to be included in the second round of sampling include 13 shallow zone wells, 6 intermediate zone wells and 16 deep zone wells, as follows:

Shallow Zone Wells	Intermediate Zone Wells	Deep Zone Wells
K	IWC-4	SC1D
Layne	SC1S	SC2D(R)
SC10S	SC3S	SC3D(R)
SC11S(R)	SC6S	SC10D
SC14S	SC33D	SC12D
SC16S	W4	SC17D
SC17S		SC20D
SC18S		SC21D
SC21S		SC26D
SC22S		SC28D
SC24S		SC30D
SC25S		SC32D
W2(R)		SC34D
		SC35D
		SC36D
		W3D

Groundwater Data Validation, Update RI Report Preparation

Once the groundwater sampling results are received from the laboratory, TRC will conduct full data validation of 25% of the laboratory results in accordance with the approved perchlorate RI work plan. Once validated, the data will be evaluated and then included into the draft perchlorate RI report.

Schedule

As discussed during the kickoff meeting, in order to replicate a groundwater sampling event during so-called “low water table” conditions, TRC will collect the second round of groundwater samples during the late August- early September 2010 time-frame. It is anticipated that two to three field days will be necessary to collect the groundwater samples.

Following the receipt of sample results around early October 2010, TRC will conduct data validation on the sample results as discussed above. Data validation will be completed on or about early November 2010 with the draft perchlorate RI report submitted for EPA review by the end of December 2010.

We will plan to proceed, unless the EPA has an objection. If you should have any questions regarding this information, please do not hesitate to contact me at (215) 850-1126.

Regards,

TRC

Patrick J. Hansen, PE
Project Coordinator

Attachment
cc: D. White, SMC
L. Butlien, TRC

Chappell, Jessica (Windsor,CT-US)

From: Hansen, Patrick (Philadelphia, PA-US)
Sent: Friday, August 27, 2010 10:59 AM
To: 'Henry.Sherrel@epamail.epa.gov'
Cc: 'White, David'; Butlien, Larry (Windsor,CT-US); Faecher, Marc (Millburn,NJ-US); Smith, Robert (Windsor,CT-US)
Subject: RE: SMC--quarterly progress report; additional perchlorate GW sampling notice

Thank you Sherrel.

We plan to perform this sampling the week of Sept 7. If you would like to observe, kindly drop us a line.

Thanks for your attention to this.

Have a nice weekend!

PJ Hansen
Project Coordinator

From: Henry.Sherrel@epamail.epa.gov [mailto:Henry.Sherrel@epamail.epa.gov]
Sent: Friday, August 27, 2010 9:33 AM
To: Hansen, Patrick (Philadelphia, PA-US)
Cc: 'White, David'; Butlien, Larry (Windsor,CT-US); Faecher, Marc (Millburn,NJ-US); Smith, Robert (Windsor,CT-US)
Subject: Re: SMC--quarterly progress report; additional perchlorate GW sampling notice

PJ,

TRC recommendation for groundwater sampling of the selected monitoring wells and extraction wells that were sampled as part of the Fall 2009 perchlorate RI groundwater sampling is acceptable to EPA. Please inform me of the actual days that sampling will be performed. Thank you

Regards,

Sherrel Henry, Project Manager
U.S. EPA- Region 2
290 Broadway, 20th Floor
New York, NY 10007-1866
Phone: (212) 637-4273
Fax: (212) 637-3966
Email:henry.sherrel@epa.gov

From: "Hansen, Patrick (Philadelphia, PA-US)" <PHansen@trcsolutions.com>
To: Sherrel Henry/R2/USEPA/US@EPA
Cc: "'White, David'" <dwhite@metvan.com>, "Faecher, Marc (Millburn,NJ-US)" <MFaecher@trcsolutions.com>, "Smith, Robert (Windsor,CT-US)" <RSmith@trcsolutions.com>, "Butlien, Larry (Windsor,CT-US)" <LButlien@trcsolutions.com>
Date: 08/17/2010 02:37 PM
Subject: SMC--quarterly progress report; additional perchlorate GW sampling notice

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Sherrel,

Following our conversation late last week, TRC has prepared and attached the quarterly progress report for the SMC project.

Also, following our discussions starting at our June 9 meeting at your office and continuing thereafter, we are planning the second round of perchlorate ground water sampling for September, which we have summarized in the attached letter.

Please let me know if you have any questions.

Regards,

PJ Hansen
Project Coordinator

Patrick J. Hansen, PE
Director of Operations
Philadelphia Metro Area

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215.665.5748 Fax
phansen@trcsolutions.com
[attachment "Shieldalloy Superfund Site Progress Report 08 15 2010 final.pdf" deleted by Sherrel Henry/R2/USEPA/US] [attachment "EPA Notification Ltr second round perchlorate sampling.pdf" deleted by Sherrel Henry/R2/USEPA/US]

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January 31, 2011

Ms. Sherrel Henry
USEPA - Region II
290 Broadway, 19th Floor
New York, NY 10007-1866

Re: Additional Monitoring Well Installation/Sampling Notification
OU3 Perchlorate Remedial Investigation
Shieldalloy Metallurgical Corporation Facility - Newfield, NJ

Dear Ms. Henry:

As a follow-up to our phone conversation of January 25, 2011, TRC Environmental Corporation (TRC), on behalf of Shieldalloy Metallurgical Corporation (SMC), is pleased to present this notice and schedule for installing and sampling one additional groundwater monitoring well for the OU3 perchlorate remedial investigation (RI) at the SMC facility in Newfield, New Jersey (Site). The perchlorate RI is required to be conducted by SMC as part of Operable Unit 3 (OU3) of the Administrative Settlement Agreement and Order on Consent (AOC) and Scope of Work (SOW) signed by SMC, TRC and USEPA and executed on April 28, 2010. OU3 requires the investigation and delineation of perchlorate contamination in groundwater, soil, sediment and surface water attributable to the SMC facility.

As discussed during our phone conversation, based on the perchlorate RI work conducted to date, a data gap exists in the northern limit of the perchlorate groundwater plume in the deep aquifer zone. This zone may not have been fully delineated relative to the New Jersey Administrative Consent Order (ACO) action level of 5 ppb (required by the AOC-SOW). As discussed further below, this plume may be related to a regional perchlorate issue unrelated to the historical/industrial operations at the Site. Therefore, TRC recommends on behalf of SMC the installation and sampling of one additional deep monitoring well along Salem Avenue at a location approximately 1,000 feet northeast of monitoring well SC36D and approximately 2,000 feet west of the property line of the former SMC manufacturing facility (see attached figure). The proposed monitoring well would be installed and sampled using the approved methods and procedures utilized for the monitoring wells installed and sampled as part of the perchlorate RI (i.e., SC35D and SC36D). It is recommended that the proposed monitoring well be installed and sampled under the existing EPA- and NJDEP-approved Perchlorate RI work plan. Conducting this proposed work under the existing work plan would avoid unnecessarily delaying completion of the OU-3 Perchlorate RI and would be consistent with the perchlorate RI work performed to date.

By way of further explanation, there is evidence that there is likely a regional deep aquifer perchlorate issue not related to the Site, with concentrations of perchlorate above the New Jersey ACO action level of 5 ppb identified in deep wells located upgradient or side gradient of the Site. While the source or sources of this regional plume have yet to be verified, this may have resulted from the widespread agricultural land use of the surrounding area, which probably used Chilean-mined fertilizers extensively of which perchlorate was a known component. Further supporting the need to investigate background is the fact that the Site's Former Chemical Storage Building and adjacent unpaved road (AOC-1), the former furnace building (AOC-2), and the former unlined/lined lagoons (AOC-3) presently show only extremely low to non-detectable concentrations of perchlorate in the soil, thereby suggesting the need to explore the possibility of other sources. Thus, the installation and sampling of the proposed monitoring well would provide further information with respect to background conditions and possible other regional sources than the Site itself. Furthermore, subsequent studies/evaluations of the regional groundwater perchlorate issue may be necessary, at the appropriate point, in order to perform the future risk assessment for the Site.

New Monitoring Well Installation/Sampling/Analysis

The proposed monitoring well will be installed under the existing perchlorate RI work plan. The monitoring well will be installed using mud-rotary drilling techniques. Soil samples will be collected using a split-spoon device at a frequency of every 10 feet until the basal clay confining layer is encountered (estimated to be approximately 125 to 130 feet below grade based on the depth of the next closest well SC36D). The soils will be geologically logged in a field notebook with a general soil description (e.g., grain size distribution, color, moisture, staining and odors) performed. The proposed monitoring well will be installed using two–inch diameter Schedule 40 PVC riser pipe and screen. Ten feet of 0.010-inch slot screen will be used with flush-threaded riser pipe to the ground surface. The bottom of the well screened interval will be at the base of the Cohansey aquifer (i.e., on top of the clay confining unit). A gravel pack will be placed in the borehole annular space to several feet above the top of the screened interval. A 2-foot thick layer of fine #00 sand will be used as a seal above the gravel pack. To ensure a proper gravel pack and seal, the gravel pack and #00 sand will be placed in the annular space via the tremie method. Once the gravel pack and seal are completed, a cement/bentonite grout mixture will be tremied into the remaining annular space. The monitoring well will be completed with a locking, flush-mounted curb-box. All soil cuttings and drilling mud generated during monitoring well installation will be containerized and returned to the SMC facility pending proper disposal. Following installation, the monitoring well will be properly developed using a pumping and surging technique with all development water containerized and transported back to the SMC on-site water treatment plant for treatment.

At least two weeks following well development, TRC will collect a groundwater sample from the well using the volume-averaged purging technique outlined in the approved perchlorate RI work plan. This groundwater sampling procedure has been used historically at SMC (including the perchlorate RI groundwater sampling) and will continue to be used for consistency purposes (i.e., to support the comparisons of historic groundwater results to current and future results). In accordance with the purging technique, approximately three to five well volumes will be purged from the well. Groundwater samples will be collected using a dedicated, bottom-loading, laboratory-decontaminated Teflon® bailer. During sampling, the bailer will be lowered gently into the well to minimize agitation of the water column within the well. An aliquot of water will be field-tested with a turbidity meter. The remaining water will be retained for laboratory analysis. Additional field parameters, including pH, temperature, DO, ORP, and specific conductance, will be measured in-situ using a multi-parameter probe (e.g., YSI 600 XLM). Although the analytical method for perchlorate (Method 314.0, EPA, 1999) does not require chemical preservation, there is anecdotal evidence of the potential for microbial degradation (ITRC, 2005). In accordance with the approved perchlorate RI work plan, TRC will ultra-filter the sample in the field through a sterile 0.2-micron filter into a laboratory-supplied 125 ml, pre–sterilized nalgene bottle. TRC will also collect the sample with significant headspace (i.e., at a minimum, the top third of the sample bottle will be left empty). TRC will pour the water from the bailer into a laboratory-supplied bottle (standard un-preserved 200 ml polyethylene bottle). The water will then be transferred through the filtering device, via a dedicated sterile syringe, into the sterile nalgene sample bottle. The filtering device will be a 0.2-micron pore-diameter filter fitted to the syringe, supplied by the laboratory. All filters and syringes will be sterile and dedicated to the sampled well. In addition to the sample from the well, TRC will also collect quality assurance/quality control (QA/QC) samples including a blind duplicate, field rinsate blank and matrix spike/matrix spike duplicate. All samples will be submitted to a New Jersey-certified laboratory and analyzed for perchlorate using EPA Method 314.0.

Groundwater Data Validation, Update RI Report Preparation

Once the groundwater sampling results are received from the laboratory, TRC will conduct full data validation of the laboratory results in accordance with the approved perchlorate RI work plan. Once validated, the data will be evaluated and then included into the perchlorate RI report.

Schedule

Following EPA concurrence with the proposed work, it will take approximately a month to get all the permits and then schedule a driller to start drilling. It is estimated that the well installation will occur in March and that complete well installation and development will take several days to complete. Two weeks after the well is developed (likely in April), TRC will collect a groundwater sample (and QA/QC samples) from the new well. Following the receipt of sample results from the laboratory, TRC will conduct data validation on the sample results as discussed above. After the results are validated, the information about the new well and the analytical results will be incorporated into the OU3 perchlorate RI report. Given the sequence of events outlined above, the perchlorate RI report submittal date to the EPA is estimated to be in June 2011. We request an extension of the report submission until that time.

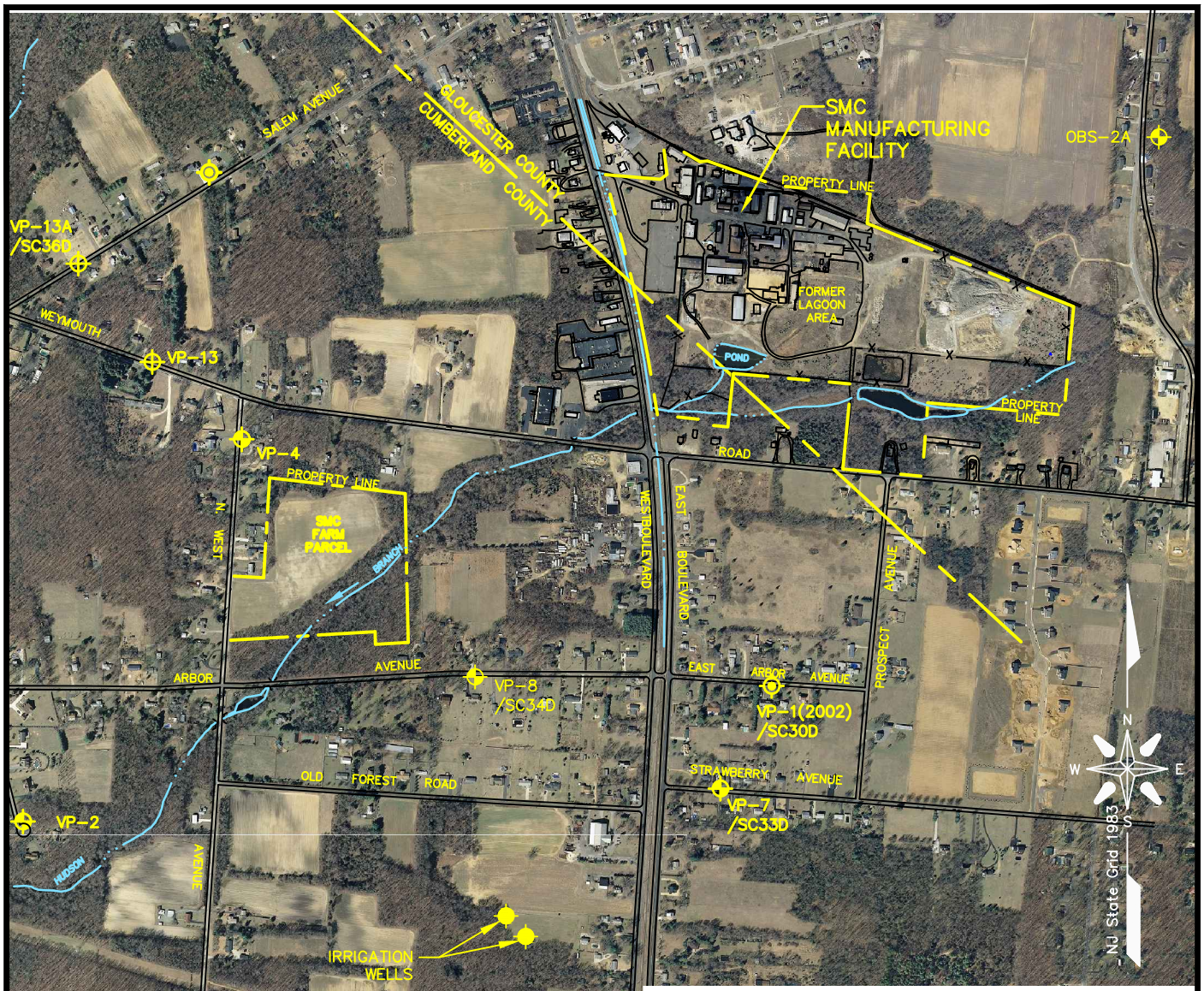
We will plan to proceed as outlined above, unless the EPA has an objection. If you should have any questions regarding this information, please do not hesitate to contact me at (215) 850-1126.

Very truly yours,

TRC

Patrick J. Hansen, PE
Senior Manager

Attachment
cc: D. White, SMC
L. Butlien, TRC



SOURCE:
BASE MAP FROM JAMES M. STEWART, INC., LAND SURVEYORS, PHILADELPHIA, PA. AND ON-SITE OBSERVATIONS.

ORTHOPHOTOS FROM NEW JERSEY IMAGE WAREHOUSE WEB SITE, PUBLISHED 10/2008 WITH PHOTOS TAKEN IN 2007 & 2008.

LEGEND

- 2006/2007 OFFSITE GROUND WATER VERTICAL PROFILING LOCATION
- 2009 SUPPLEMENTAL OFFSITE VERTICAL PROFILING LOCATION
- APPROXIMATE LOCATION OF HIGH-CAPACITY WELL
- PROPOSED MONITORING WELL LOCATION

0 1,000' 2,000'

GRAPHIC SCALE

TRC
21 Griffin Road North
Windsor, CT 06095
(860) 298-9692

SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY

PROPOSED MONITORING WELL LOCATION

Date: 01/25/11	**Project No.** 171441-000050-000000

J:\CAD\171441\000050\Remedial Inv Report\
Plate-4.dwg Layout:Prop Mon Well Loc January 31, 2011-10:22AM KHollenbeck