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Pinellas Environmental Restoration Project

Sitewide Environmental Monitoring Semiannual Progress Report for the Young - Rainey STAR Center June through November 2006

December 2006

U.S. Department of Energy

Office of Legacy Management

Work Performed Under DOE Contract No. DE–AC01–02GJ79491
for the U.S. Department of Energy Office of Legacy Management.

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Acronyms and Abbreviations

bls	below land surface
°C	degrees Celsius
CMS	Corrective Measures Study
CMIP	Corrective Measures Implementation Plan
COPC	contaminants of potential concern
CRDL	contract required detection limit
DCE	dichloroethene
DOE	U.S. Department of Energy
EA	environmental assessment
EPA	U.S. Environmental Protection Agency
FDEP	Florida Department of Environmental Protection
FONSI	Finding of No Significant Impacts
ft	feet
ft/ft	feet per foot
gpm	gallons per minute
HSWA	Hazardous and Solid Waste Amendments
HRC	Hydrogen Release Compound®
ICM	interim corrective measures
IDL	instrument detection limit
IMW	Interim Measures Work (Plan)
IWNF	Industrial Wastewater Neutralization Facility
MCL	maximum contaminant level
MSL	mean sea level
µmhos/cm	micromhos per centimeter
µg/L	micrograms per liter
mg/L	milligrams per liter
mV	millivolt
NAPL	non-aqueous phase liquid
NEPA	National Environmental Policy Act
NGVD	national geodetic vertical datum
NTU	Nephelometric Turbidity Units
PCIC	Pinellas County Industrial Council
QA/QC	quality assurance/quality control
RBCA	Risk Based Corrective Action
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RPD	relative percent difference
STAR Center	Young - Rainey Science, Technology, and Research Center
SWMU	solid-waste management unit
TCE	trichloroethene
TCOPC	total contaminants of potential concern
VC	vinyl chloride
VOCs	volatile organic compounds
WWNA	Wastewater Neutralization Area

1.0 Introduction

The Young - Rainey Science, Technology, and Research Center (STAR Center) is a former U.S. Department of Energy (DOE) facility constructed in the mid-1950s in Pinellas County, Florida. The 99-acre STAR Center is located in Largo, Florida, and lies in the northeast quarter of Section 13, Township 30 South, Range 15 East (Figure 1). The STAR Center, while owned by DOE, primarily manufactured neutron generators for nuclear weapons. Other products manufactured at the STAR Center have included radioisotopically powered thermoelectric generators, thermal batteries, specialty capacitors, crystal resonators, neutron detectors, lightning-arrestor connectors, and vacuum-switch tubes. In 1987, the U.S. Environmental Protection Agency (EPA) performed a Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA) (EPA 1988) at the site to gather information on potential releases of hazardous materials. In February of 1990, EPA issued a Hazardous and Solid Waste Amendments (HSWA) permit to DOE, enabling DOE to investigate and perform remediation activities in those areas contaminated by hazardous materials resulting from DOE operations. On March 17, 1995, DOE sold the facility to the Pinellas County Industrial Council (PCIC). The sales contract included clauses to ensure continued compliance with Federal, State, and local regulations while DOE remediates the site. On July 1, 1999, the PCIC was disestablished and ownership of the STAR Center changed to the Pinellas County government. In November 2000, the State of Florida received HSWA authorization from the EPA. The Florida Department of Environmental Protection (FDEP) issued a new HSWA permit to DOE in January 2002.

Administration of DOE activities at the facility is the responsibility of the DOE Office of Legacy Management in Grand Junction, Colorado. S.M. Stoller Corporation (Stoller), a prime contractor to DOE's Office of Legacy Management in Grand Junction, provides technical support to DOE for remediation and closure of all active solid-waste management units (SWMUs) on site.

The EPA RFA Report and the HSWA permit identified 15 sites at the former DOE facility that may have experienced environmental contamination as a result of past activities. Upon completion of the RCRA Facility Investigation (DOE 1991), 11 of the 15 SWMUs were recommended by DOE and approved by EPA Region IV and the FDEP for no further action (DOE 1994b). A twelfth site, the Former Pistol Range Site, was remediated in 1993 and recommended by DOE and approved by EPA Region IV and the FDEP for no further action.

Two additional SWMUs, the West Fenceline Site and the Wastewater Neutralization Area/ Building 200 (WWNA/Building 200), were identified after the HSWA permit was issued, bringing the total to 17 SWMUs that have been identified and investigated at the STAR Center. Remediation of the West Fenceline Site was completed in 1997 and DOE recommended, and EPA Region IV and FDEP approved, no further action for a total of 13 SWMUs remediated. A Corrective Measures Study (CMS)/Corrective Measures Implementation Plan (CMIP) was prepared and submitted in 1997 to EPA Region IV and FDEP to address the contamination at the WWNA/Building 200 Area.

Therefore, there are currently four sites that have contamination in the surficial aquifer ground water at levels in excess of protective standards. These four SWMUs, the Old Drum Storage Site (PIN06), the Industrial Drain Leaks-Building 100 Area (PIN12), the Northeast Site (PIN15), and the WWNA/Building 200 Area (PIN18). Two SWMUs, PIN06 and PIN12, are collectively

known as the Building 100 Area. Figure 2 depicts the location of the four SWMUs. Additional background information relative to each SWMU is briefly described below.

This document also serves as the semiannual progress report for each of these four SWMUs. The results of monitoring activities and a summary of ongoing and projected work are provided in this report.

1.1 Building 100 Area

The Building 100 Area (PIN06 and PIN12) is located in the southeast portion of the STAR Center. The Old Drum Storage Site is the former location of a concrete storage pad equipped with a drain and containment system used to store hazardous waste including methylene chloride, ignitable liquids, arsenic, and calcium chromate solids (DOE 1987a). Empty drums containing residual waste solvents were also stored in this area (DOE 1987b). The concrete pad was located near the northwest corner of Building 100. The pad was removed in October 1983 in accordance with an FDEP closure permit (DOE 1987a), and a closure report was submitted to the FDEP in August 1986 (DOE 1986). The decommissioning of the pad and the cessation of drum storage effectively removed the potential for a future contaminant source at PIN06.

Building 100 is the largest building at the STAR Center and covers approximately 11 acres. In the past, offices, laboratories, and production facilities for the DOE were housed in the building. SWMU PIN12 consists of the liquid waste drainage system that formerly served Building 100. Four individual drainage systems (sanitary, chemical, health physics, and storm water) were present within the building. In 1989, all four drainage systems were investigated, including verifying the system routing and the condition of underground and above-ground piping and ancillary equipment (EMC 1989). As a result of this investigation, the health physics and chemical drainage systems were flushed, grouted, and abandoned (DOE 1997). Some of the chemical drain lines were replaced by an above-ground system currently used by tenants of the building.

A CMS and CMIP were completed and approved for the Building 100 Area because volatile organic compounds (VOCs) concentrations measured in ground water at the Old Drum Storage Site (PIN06) and one monitoring well located at the northwest corner of Building 100 (PIN12) exceeded the Safe Drinking Water Act and FDEP maximum contaminant levels (MCLs). Subsequent investigations revealed elevated VOCs concentrations under Building 100 and downgradient to the southeast as well. On August 15, 2000, EPA approved the Building 100 CMIP Addendum. FDEP approved this same document on November 15, 1999.

In May 2001, DOE began an analysis of the potential remediation strategies for the three Building 100 Area tasks: plume control, source treatment, and dissolved phase treatment. The *Building 100 Area Remediation Technology Screening Report* (DOE 2001) assembled a list of remediation technologies, categorized them into the remediation tasks, and conducted an initial screening of the technologies. This initial screening eliminated the technologies that obviously would not work and recommended technologies that should be retained for detailed evaluation at a later time.

The *Building 100 Area Plume Control Technology Selection Report*, prepared in February 2002, conducted a detailed evaluation of five plume control technologies and recommended that enhanced bioremediation should be implemented for plume control at the Building 100 Area.

In-situ enhanced bioremediation to control the plume of dissolved contaminants at the Building 100 Area began as a pilot study on March 11, 2003. Hydrogen Release Compound® (HRC) was injected through nine injection points surrounding each of three monitoring wells. Ground water samples were collected from each of the three monitoring wells at approximately 2-month intervals through May 2004 to track the progress of HRC at remediating site contaminants. HRC was selected because it is a proven technology for optimizing degradation rates of chlorinated hydrocarbons dissolved in ground water. The continuous hydrogen source provided by the HRC can reduce the concentration of dissolved phase chlorinated hydrocarbons by greatly enhancing the reductive declorination process that occurs naturally at the Building 100 Area. The *In-Situ Enhanced Bioremediation Technology to Control the Plume of Dissolved Contaminants at the Building 100 Area of the Young - Rainey STAR Center Pilot Test* final report was received from the subcontractor on April 5, 2004. The results of the pilot test indicate that the injection of HRC had a limited influence in the pilot test area. This conclusion is based on increasing concentrations of the metabolic acids (as produced from HRC) and the decreasing concentrations of sulfate and iron and the observation of ethene at one location. A supplemental sampling event was conducted in May 2004, after which the pilot test was considered complete.

Several years have passed since the Building 100 Area CMS Report (DOE 1994a), the CMIP (DOE 1996a) and the CMIP Addendum (DOE 1998) were written. Therefore, in July 2006, the Building 100 Area CMS Report Addendum was prepared to update site conditions, discuss the regulatory framework, and re-evaluate active remediation alternatives for this SWMU. Based upon the recommendations included in this report, FDEP and DOE continue to discuss the closure strategy for this SWMU. One recommendation agreed upon by FDEP has already been implemented with the shutdown of the two recovery wells at Building 100 on August 21, 2006.

1.2 Northeast Site

In the late 1960s, before construction of the East Pond, drums of waste and construction debris were disposed of in the swampy area of the Northeast Site. The East Pond was excavated in 1968 as a borrow pit. In 1986, an expansion of the East Pond was initiated to create additional storm-water retention capacity. Excavation activities ceased when contamination was detected directly west of the East Pond. EPA identified the Northeast Site as a SWMU (EPA 1992). An Interim Corrective Measures (ICM) Study was developed and submitted to EPA and approval of this document was received in October 1991. An interim ground water recovery system for the Northeast Site was installed, and operation commenced in January 1992.

The ground water treatment system, as initially installed, consisted of four recovery wells equipped with pneumatic recovery pumps, a holding tank, centrifugal transfer pumps, and approximately 2,500 feet (ft) of transfer and secondary containment piping. During 1993, DOE proposed a reconfigured system for the site consisting of four shallow and three deep recovery wells. After EPA approved the upgrade, the system was reconfigured and became operational on March 1, 1994.

Between August and October 1995, after EPA and FDEP approval, a portion of the Northeast Site was excavated to remove debris and other materials that could inhibit future corrective measures. Location of the areas of excavation was based primarily on the results of a geophysical survey and knowledge of existing utility locations. Detailed descriptions of the debris removal activities were submitted to EPA and FDEP as part of the *Northeast Site Interim Measures Quarterly Progress Report* (DOE 1996b).

In 1996, DOE submitted a CMIP to EPA Region IV and FDEP. This plan was approved by both regulatory agencies in 1997. As part of the Northeast Site CMS and CMIP, a pump-and-treat system in conjunction with a subsurface hydrogeologic barrier wall to prevent migration of the contaminant plume was identified as the best available technology. A pretreatment system for iron removal, an air stripper unit, and a tank for holding treated ground water before discharge to the Pinellas County Publicly Owned Treatment Works were recommended. The treatment system was constructed in early 1997 and became operational by July 1997 with seven Northeast Site recovery wells and two Building 100 recovery wells pumping to the system influent tank. Subsequently several additional recovery wells were installed, and some of the old recovery wells were abandoned.

During 1997, anaerobic bioremediation and rotary steam stripping pilot tests were conducted in the northern and southern portions of the Northeast Site, respectively. These tests were designed by an Innovative Treatment Remediation Demonstration group of regulatory and industry members to provide remedial options at the STAR Center. At the conclusion of the field tests in July 1997, pump-and-treat technology resumed at the Northeast Site.

An *Interim Measures Work* (IMW) *Plan for Remediation of Non-Aqueous Phase Liquids at the Northeast Site* was submitted to FDEP in late November 2001. The purpose of this document was to present the plan for the interim measure to remediate non-aqueous phase liquids (NAPLs) at the Northeast Site. An ICM is warranted because it supports the long-term corrective action to remediate the dissolved phase contamination in the surficial aquifer to FDEP drinking water MCLs. Without this measure, NAPLs will continue to act as a source of dissolved contamination, resulting in contaminant concentrations in ground water well above the MCLs. FDEP approved this document on January 10, 2002.

Concurrent with the preparation of the IMW Plan, a National Environmental Policy Act (NEPA) Environmental Checklist recommending a Categorical Exclusion was approved by DOE on December 19, 2001. Categorically excluding the Area A pilot test activity was approved based upon the fact that the NAPL remediation of Area A was a small-scale, short-term cleanup action and the siting, construction, and operation of treatment facilities were temporary and pilot-scale in size. Additionally, activities of this nature were evaluated in the 1995 *Environmental Assessment of Corrective Action at the Northeast Site* (EA) (DOE 1995).

A NEPA Action Review was conducted for the interim measure source removal action at Area B in October of 2002. A summary of the review concluded that Area B remediation would impact an area of approximately 38,000 square ft. The footprint of the above ground treatment system would be about 80 ft by 80 ft, and an estimated 84,000 gallons per day of ground water would be processed over a 24-week period of operation. The proposed interim measure, although not specifically identified in the 1995 EA, was determined to be within the scope of the proposed actions. The remedial activity would occur within the same physical boundaries and address the

same contaminants identified in the EA, but in a more concentrated form. Because the EA provided for "design modifications to reflect technological advances or site-specific conditions," it was determined that the NAPL remediation of Area B was within the scope of the existing EA. However, this flexibility was not mentioned in the Finding of No Significant Impacts (FONSI) document signed in May 1995 (Glass 1995). Therefore, it was determined that the appropriate action under NEPA would require an amendment to the FONSI to include the broader scope of activities from the EA and any additional impacts from the NAPL removal action. The FONSI was amended, reviewed by the DOE-Idaho NEPA Planning Board, and approved by the DOE Grand Junction Office NEPA Compliance Officer on February 24, 2003.

Construction of the NAPL Area A treatment system began in late May 2002, and system startup occurred on September 26, 2002. NAPL treatment was completed on February 28, 2003. Three post-treatment sampling events occurred in March, May, and August 2003. Demobilization activities began in early March and were completed in September 2003. The *Northeast Site Area A NAPL Remediation Final Report* (DOE 2003), describing thermal remediation of Area A, was sent to stakeholders on September 25, 2003.

At the end of February 2004, a contract was awarded for the remediation of NAPL Area B using Electro-Thermal Dynamic Stripping Process. Construction of the NAPL Area B treatment system began in July 2004, and was completed in early August 2005. Operations began on August 16, 2005 and were completed on June 12, 2006. Heating resumed in a focused area from July 19, 2006 until August 25, 2006 to address ground water concentrations that exceeded remediation goals at two locations. The treatment system was permanently shut down on August 29, 2006. Approximately 18,000 pounds of contaminants were removed during operations. Confirmatory sampling activities were completed by the end of September 2006. Demobilization activities of the NAPL Area B treatment system are scheduled for completion by mid-December 2006. Significant events associated with NAPL remediation during this reporting period are presented in the *Northeast Site Non-Aqueous Phase Liquids Interim Measures Progress Report July through September 2006 and October through December 2006* (DOE 2006a, 2006b).

1.3 WWNA/Building 200 Area

The WWNA/Building 200 Area includes the active Industrial Wastewater Neutralization Facility (IWNF), the area around Building 200, and the area south of the neutralization facility. The IWNF refers to the physical treatment facility that currently receives sanitary and industrial wastewater and has been in operation since 1957.

A CMS Report and CMIP were completed in 1997 for this SWMU because vinyl chloride (VC), trichloroethene (TCE), and arsenic were detected in surficial aquifer ground water at concentrations above Federal and State MCLs. The recommended remediation alternative for the WWNA/Building 200 Area was ground water recovery with the Building 100 Area wells and an additional recovery well located in the WWNA. The CMIP recommended that recovered water from the additional well be discharged directly to the IWNF and that the recovery well in the WWNA/Building 200 Area will withdraw surficial aquifer ground water directly from the arsenic plume and thereby reduce the contaminant mass and prevent contaminant migration.

FDEP response to the CMS/CMIP concerning arsenic contamination in the upper 2 ft of soil suggested that a treatment technology, air sparging, was eliminated too early. DOE then proposed a multi-phased Interim Action that included operating the recovery well for 6 months, then pulsing the system, as well as performing geochemical analyses and leaching studies of the site. On January 21, 1999, FDEP approved the proposed interim remedial action.

Additionally, EPA Region IV also approved the interim remedial action and concurred with the FDEP's position regarding the arsenic contamination. EPA also requested an addendum or modification to the CMIP that addresses DOE's final selection of the remediation technology and a timeline for the completion of these activities.

In early June 1999, the WWNA recovery well commenced operation. All arsenic concentrations in water from the WWNA recovery well, PIN18−RW01, were below the STAR Center's daily maximum discharge standard for arsenic in wastewater of 0.20 milligrams per liter (mg/L) until shutdown.

Additional details concerning the impacts of ground water extraction are reported in the WWNA/Building 200 Area CMIP Addendum (DOE 2000b). Modifications to the recovery of ground water were proposed based on data collected through November 1999 and consisted of the installation of two new recovery wells screened at shallow intervals and the abandonment of RW01. The CMIP Addendum was submitted to the regulators and approved by FDEP and EPA in 2000. A Statement of Basis (DOE 2000a) was issued by DOE in late September 2000. This document provides a summary of environmental investigations and proposed cleanup alternatives for the WWNA/Building 200 Area. Part of DOE's proposed final action for the WWNA was to shut down the three extraction wells and begin a 1-year monitoring period. Verbal approval for this action was received from FDEP on December 20, 2005, and the wells were shut down that day.

1.4 Site Update

Risk Based Corrective Action (RBCA) rules are currently being evaluated for applicability to assist in expediting closure at some or all of the SWMUs at the STAR Center. Technical discussions continued between FDEP and DOE regarding RBCA as the proposed final action. Additionally, DOE is currently evaluating remediation alternatives for the Building 100 Area and WWNA in light of the RBCA rules.

1.5 Waste Minimization and Pollution Prevention

Based on the Federal Pollution Prevention Act and requirements in the HSWA Operations Permit, waste minimization efforts at the STAR Center are documented and reported annually. For 2006, several significant waste minimization and pollution prevention activities were successful. The majority of these activities resulted from the demobilization of the Area B NAPL treatment system, and includes the following materials that were recycled:

- 80 cubic yards of iron
- 1,235 cubic yards of asphalt,
- 210 cubic yards of concrete
- 9,000 pounds of carbon

1.6 Site Activities

- Obtained water-level measurements from all accessible monitoring wells, recovery wells, and ponds on September 28, 2006.
- Conducted the semiannual sampling event in September and October 2006. The sampling event included collecting water samples from 133 monitoring and former recovery wells.
- Bioremediation parameters were also collected.
- Reported the results of the semiannual sampling event (this document).

2.0 Water-Level Elevations

2.1 Work Conducted and Methods

Within a 10-hour period on September 28, 2006, depth-to-water measurements were taken at all accessible monitoring wells, former extraction wells, and ponds at the STAR Center. The water levels were measured with an electronic water-level indicator. Ground water and surface-water elevations are listed in Table 1.

2.2 Ground Water Flow

Ground water and surface-water elevations were used to construct sitewide ground water contour maps of the shallow and deep surficial aquifers (Plates 1 and 2, respectively). Individual contour maps were also constructed for the shallow and deep surficial aquifers at the Northeast Site and the Building 100 Area (Figure 3 through Figure 6).

Previously, water levels throughout the STAR Center indicated that the water table was highest in the general area around the West Pond (Plates 1 and 2). As ground water flowed from this recharge area, it dispersed to the west, south, and east. A new pattern was observed in the shallow surficial aquifer around the West Pond in September 2006. As shown on Plate 1, the West Pond and the new pond (Pond 5) were acting as discharge points for the surficial aquifer. During recent construction activities at the site, the West Pond was cleaned out, Pond 5 was excavated, and the two ponds were connected by an underground pipe. This construction work seems to have changed the flow pattern in this area of the site. This new flow pattern will be monitored closely in the next water level events, scheduled for December 2006 and January 2007. The flow pattern in the deep surficial aquifer is consistent with previously observed flow patterns.

At the Northeast Site, a return to the natural flow pattern of flow to the east was observed in September following completion of NAPL remediation in August. The previous three water level events showed a large ground water capture zone around Area B in response to the extraction that occurred as part of the Area B NAPL project. Along the northern boundary of the Northeast Site, the contours near the slurry wall for the past several years have indicated that the wall has been a significant barrier to ground water flow. This pattern was observed again in September 2006. As seen on Figure 4, in September there was a differential of about 0.6 ft between the downgradient and upgradient sides of the wall as measured in monitoring wells PIN15−M24D

and −M33D, respectively. This differential is less than the historical range of about 2 to 5 ft, but consistent with the differential observed in March 2006. Water-table elevations indicate that the East Pond was acting as a discharge point for the shallow surficial aquifer in September 2006 (Figure 3).

In the shallow surficial aquifer at the Northeast Site, the hydraulic gradient was about 0.005 feet per foot (ft/ft), with flow toward the east (Plate 1). Calculations using Darcy's Law along with approximations of 1 ft/day for hydraulic conductivity and 0.3 for effective porosity indicate that ground water at the Northeast Site is estimated to move about 6 ft/year. This velocity is less than the historical estimates of 17 and 22 ft/year, but consistent with the velocity in March 2006. Similar flow patterns were observed in the deep surficial aquifer (Plate 2).

At the WWNA, there was a small mound in the surficial aquifer from which there was radial flow in all directions. A component of flow toward the west (toward Pond 5) was observed for the first time. This change in ground water flow will be monitored closely in the future.

At Building 100, the surficial aquifer is no longer influenced by ground water withdrawals from recovery wells PIN12−RW01 and –RW02 which were shut off in August 2006. For the past 3.5 years, shallow ground water beneath Building 100 has been observed to flow to the southeast under a very slight gradient. This flow pattern was observed again in September 2006. The hydraulic gradient at the Building 100 Area was about 0.001 ft/ft. Using the approximations mentioned above, ground water flow velocity in this area is estimated to be less than 2 ft/year.

Water-level elevations in the three wells screened in the upper part of the Floridan aquifer are presented in Table 2. The water levels in these wells indicate that the potentiometric surface of the Floridan aquifer at the site was about 1.5 ft higher in September 2006 than in March 2006.

Surface-water elevations were recorded from the East, South, Southwest, and West Ponds at the site and are presented in Table 3. A new measuring point for the West Pond was set and surveyed on August 9, 2006. The surface-water elevation of Pond 5 is expected to be the same as the West Pond because they are connected by a pipe. However, a staff gauge is scheduled to be installed in Pond 5 in December 2006. All the ponds are hydraulically connected to the shallow surficial aquifer system (Plate 1).

3.0 Ground Water Sampling and Analytical Results

3.1 Work Performed

During annual sampling in September 2006, ground water samples were collected from 133 monitoring and former recovery wells. VOCs analyses were performed on 106 samples using EPA SW-846 Method 8260. Arsenic was analyzed in 36 samples using EPA SW-846 Method 6010. Laboratory reports are provided in Appendix A.

During the period of June 1 to August 31, 2006, VOCs, iron, and hardness (as $CaCO_3$) were measured for the Building 100 treatment system and results are provided in Appendix B. The Building 100 treatment system was shut down on August 21, 2006.

Samples were also collected for dissolved gases and microbial analyses (Table 4). The dissolved gases are ethene, ethane, hydrogen, methane, and carbon dioxide. The microbiological analysis is for dehalococcoides ethenogenes.

All samples were collected in accordance with the Stoller *Sampling Procedures for the Young - Rainey STAR Center and 4.5 Acre Site* (DOE 2004), using FDEP procedures. All samples collected were submitted to Accutest Laboratories in Orlando, Florida, for analysis. Accutest is accredited by the Florida Department of Health in accordance with the National Environmental Laboratory Accreditation Conference, certification number E83510. All monitoring wells were micropurged using a dedicated bladder pump, and sampling was performed when the field measurements stabilized. Table 5 lists field measurements of pH, specific conductance, dissolved oxygen, oxidation-reduction potential, turbidity, and temperature recorded at the time the samples were collected. Measurements were made with a flow cell and a multiparameter instrument.

3.2 Analytical Results

3.2.1 Northeast Site (PIN15)

Table 6 shows the results of arsenic sampling at four Northeast Site wells. Arsenic concentrations ranged from 0.005 to 0.022 mg/L, with the highest value detected in well PIN15−M32S.

Concentrations of contaminants of potential concern (COPCs) in samples collected from wells at the Northeast Site (PIN15) are included in Table 7, which also shows the previous year of data for comparison purposes. Figure 7 shows the total COPCs (TCOPCs) concentrations. Fifteen wells were sampled for VOCs, with the highest TCOPCs concentration measured in well 0561 at 51.5 µg/L.

3.2.2 Building 100 Area (PIN06, PIN09, PIN10, PIN12, and PIN21)

Table 6 shows the results of arsenic sampling in the Building 100 Area. The highest arsenic concentration was measured in well S31B at 0.0787 mg/L.

TCOPCs concentrations in samples collected from the 53 wells sampled at the Building 100 Area are included in Table 8, which also shows the previous year of data for comparison purposes. Figure 8 shows the TCOPCs concentrations, the highest of which was measured in well S35B at 120,700 µg/L.

3.2.3 Wastewater Neutralization Area (PIN18)

All 22 existing wells at the WWNA were sampled for arsenic in September and early October 2006. Well RW0501 contained the highest arsenic concentration, 0.150 µg/L.

3.3 Quality Assurance/Quality Control

The results from the analytical laboratory, Accutest, were checked for quality assurance/quality control (QA/QC) through duplicate samples and trip blanks. Detected analytes (VOCs and arsenic) for each duplicate sample are listed in Table 10. The duplicate sample results were compared and the relative percent differences (RPDs) between the results were calculated. Four duplicates were analyzed for VOCs, and two for arsenic. All data passed QA/QC criteria at a Class A level, indicating that the data may be used for quantitative and qualitative purposes.

Duplicate samples should be collected at a frequency of one duplicate for every 20 or fewer samples. There were 106 ground water samples analyzed for VOCs, with six duplicate VOC samples collected. There were 25 ground water samples analyzed for arsenic, with three duplicate samples. The duplicate requirements for this sampling event were met.

There were 22 trip blanks collected during this event and all were nondetect for volatile compounds.

A data validation software module for identifying and tracking anomalous ground water data points within the SeePRO database was used to print a report of analytical results that fall outside of historical minimum or maximum values.

4.0 Data Interpretation

The purpose of this data interpretation section is to aid in evaluation of plume stability. Time versus concentration plots were generated to aid the interpretation.

4.1 Contaminant Concentration Trends

Monitoring well PIN15–0569 was chosen to evaluate plume stability at the Northeast Site. Well PIN15−0569 is located near the leading edge of the contaminant plume at the Northeast Site (Figure 7). The VC concentration in this well shows an overall decreasing concentration trend (Figure 9). This well was out of the area of influence of the NAPL Area B ground water pumping, so this decreasing trend probably is due to biodegradation. This conclusion is supported by the presence of the dechlorinating organism *Dehalococcoides ethenogenes* along with the presence of the biodegradation daughter products ethene and ethane (Table 4). This decreasing concentration trend indicates a stable or shrinking contaminant plume in the vicinity of this well.

At the WWNA, three wells were chosen to illustrate plume stability. Wells PIN18−0500, −0522, and −0525 were chosen because they are shallow wells containing high arsenic concentrations (Figure 10). The arsenic concentration in wells 0500 and 0522 continues to show a decreasing trend, with the arsenic concentration in well 0522 having decreased to below the 10 µg/L MCL. The arsenic concentration in well 0525 has previously shown an increasing trend, but has shown an overall decreasing trend over the last 2 years. These decreasing trends likely indicate that the arsenic plume is shrinking.

Monitoring wells PIN21–0512 and PIN12–S73C were chosen to evaluate plume stability at the Building 100 Area because they are the monitoring wells nearest the property boundaries. Well 0512 lies along the southern boundary and well S73C lies along the eastern boundary of the STAR Center (Figure 8).Figure 11 illustrates the VC concentration over time in well 0512, and Figure 12 shows the VC concentration in well S73C. Well 0512 shows a consistent VC concentration trend (considering the inherent sampling and analytical variability of low concentrations), with concentrations ranging between 0.3 and 8.6 µg/L since November 1998. Well S73C shows a decreasing VC concentration trend from 2002 to late 2003, followed by a stable trend since that time. These stable and decreasing concentration trends indicate a stable or shrinking contaminant plume near the property boundaries.

Figure 13 shows the TCE, cis-1,2-DCE, trans-1,2-DCE, and VC concentrations in well PIN12−0524, located near the southeast corner of Building 100. The concentration trends in this well suggest that a localized slug of TCE, DCE, and VC is moving through the aquifer. The concentration trends in well 0524, particularly the significant TCE decrease, indicate that the slug is nearly past the well.

4.2 Geochemical Parameters

Geochemical parameters measured in the field in all wells at the STAR Center during September 2006 are summarized in Table 5. Conditions across the STAR Center generally are reducing as evidenced by the low values of dissolved oxygen and oxygen reduction potential. Hydrogen is another indicator of redox conditions (Table 4), and all concentrations measured in September 2006 were >1 nanomolar, indicating reducing conditions that are conducive to reductive dechlorination (EPA 2000).

5.0 Treatment System and Recovery Well Performance

5.1 Building 100

From June 1 through August 21, 2006, 378,594 gallons of ground water were processed by the Building 100 treatment system from the Building 100 Area recovery wells. Operation of this treatment system was discontinued on August 21, 2006 with FDEP approval. For the month of June, 166,747 gallons of ground water were recovered and 4.3 pounds of VOCs were removed. In July, 107,322 gallons of ground water were recovered and 2.1 pounds of VOCs were removed. For August, 104,525 gallons of ground water were recovered and 1.9 pounds of VOCs were removed.

Figure 14 presents the historical monthly volume of ground water recovered and mass of VOCs removed. Analytical results of samples collected from the Building 100 Area treatment system influent and effluent streams are listed in Table 11.

Since startup of the Building 100 treatment system, a summary of ground water recovery volume from the Building 100 Area recovery wells is shown in Table 12. Table 13 presents the calculated mass of selected analytes recovered with the Building 100 Area treatment system for

each month of this reporting period. These monthly results are based on the influent ground water concentration and flow.

5.2 Wastewater Neutralization Area

The WWNA recovery wells were shut down December 20, 2005, thus commencing DOE's 1-year monitoring period.

6.0 Tasks to be Performed Semiannually

The following tasks are expected to be conducted during the next semiannual period (December 2006 through May 2007):

- Semiannual sampling and analysis of ground water in March 2007.
- Collect water level measurements in March 2007.
- Utilization of the dedicated bladder pumps for semiannual sampling using the micropurging technique will continue.

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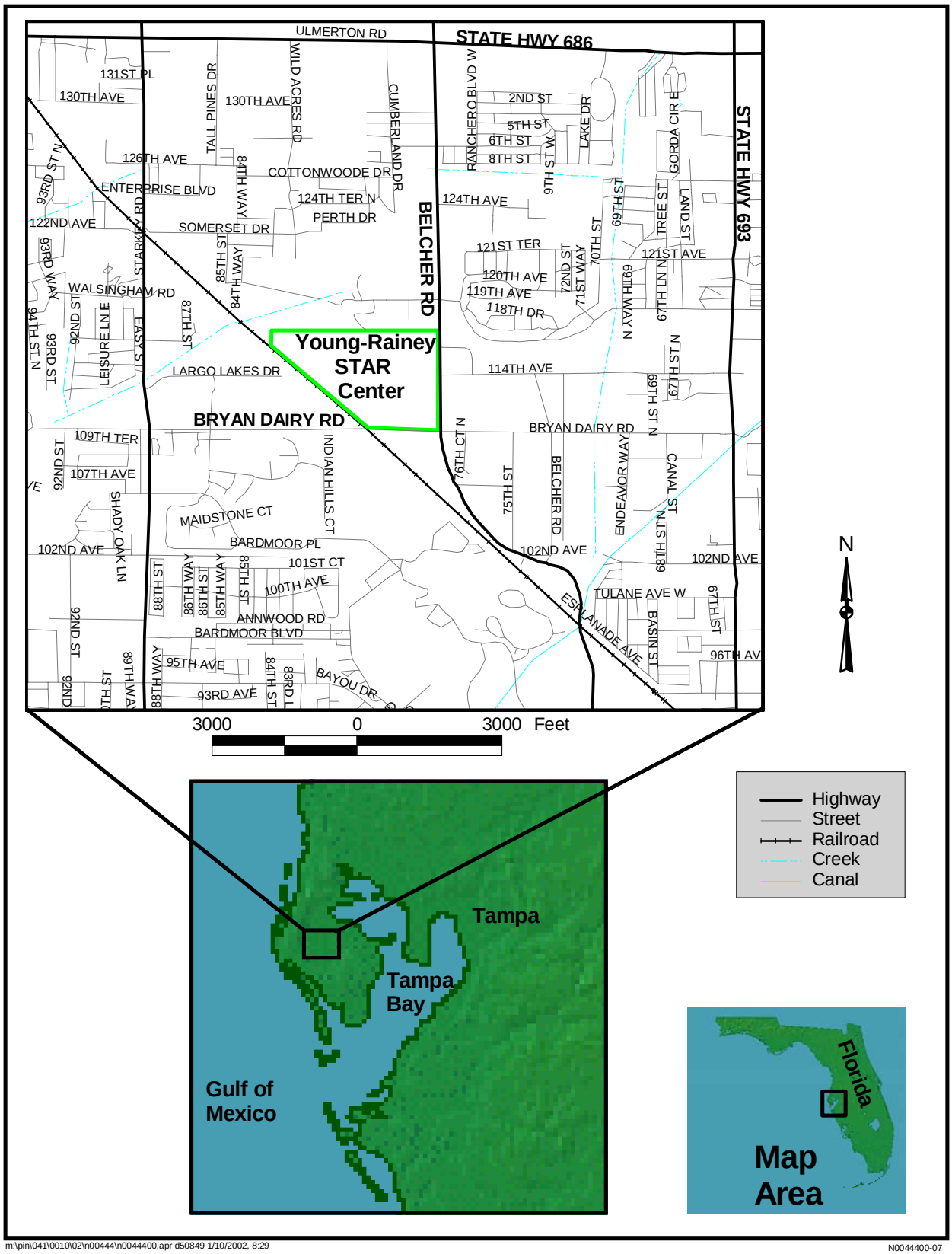

Figure 1. Young - Rainey STAR Center Location

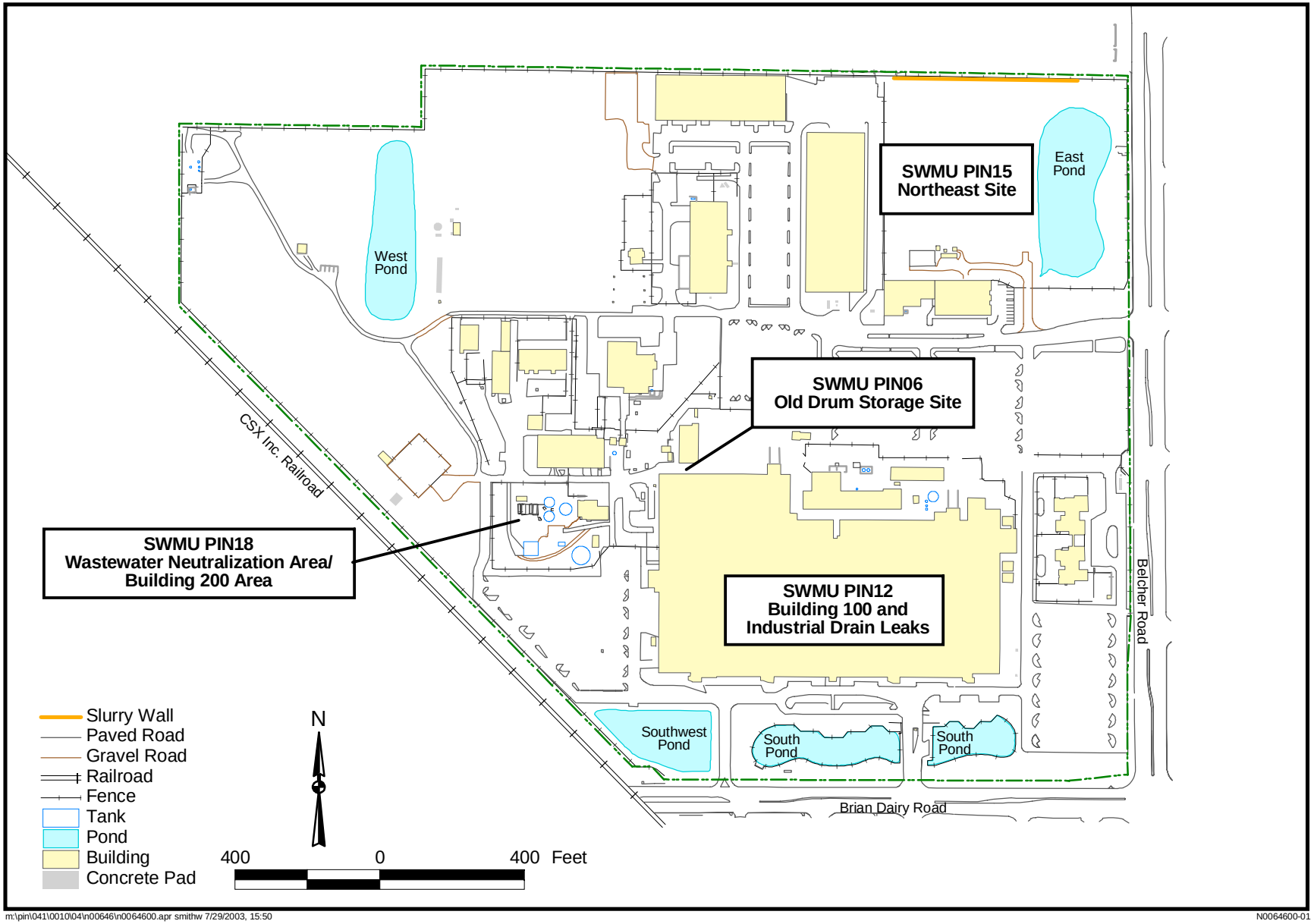

Figure 2. Location of STAR Center Solid Waste Management Units (SWMUs)

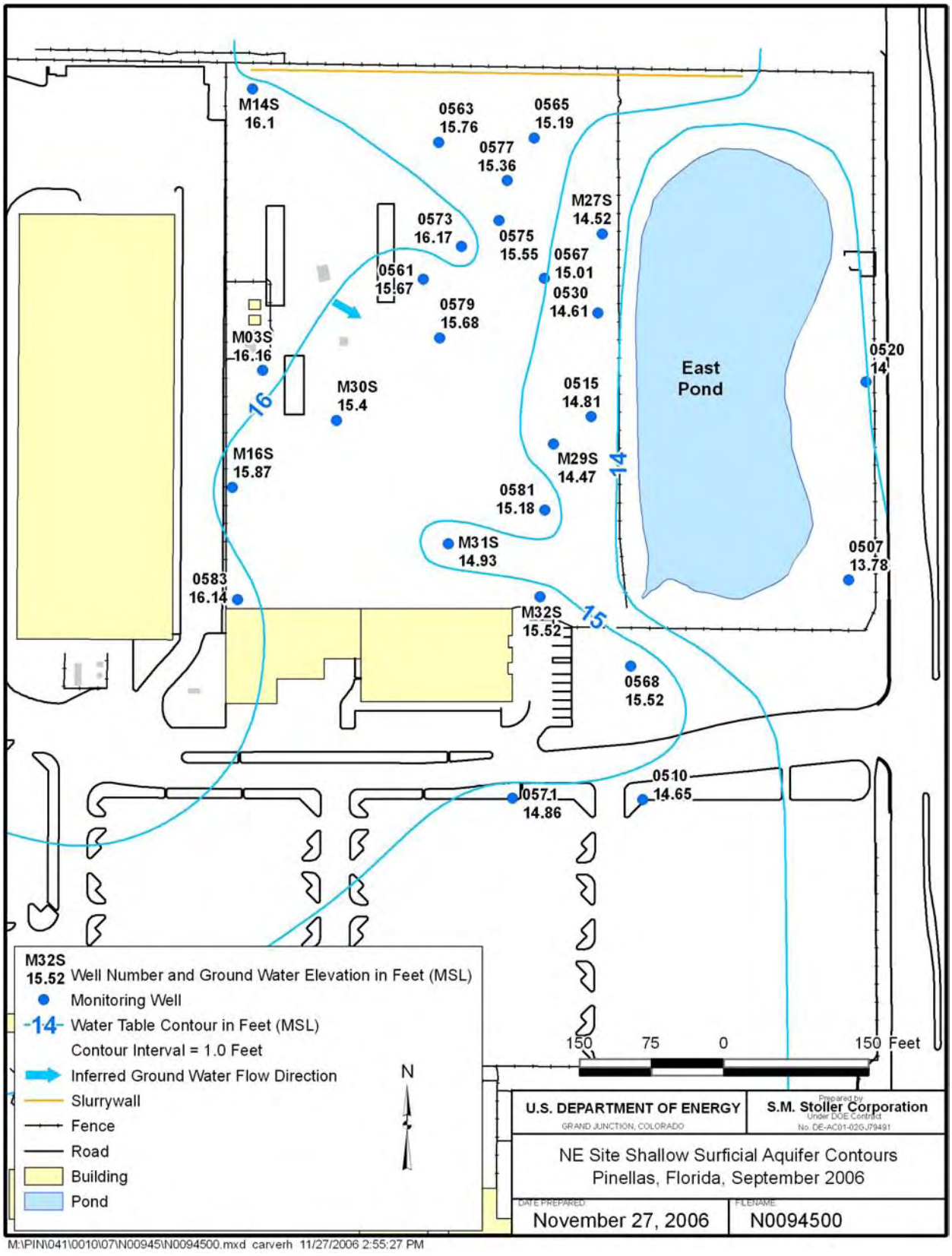

Figure 3. Ground Water Elevations and Shallow Surficial Aquifer Flow, Northeast Site, September 2006

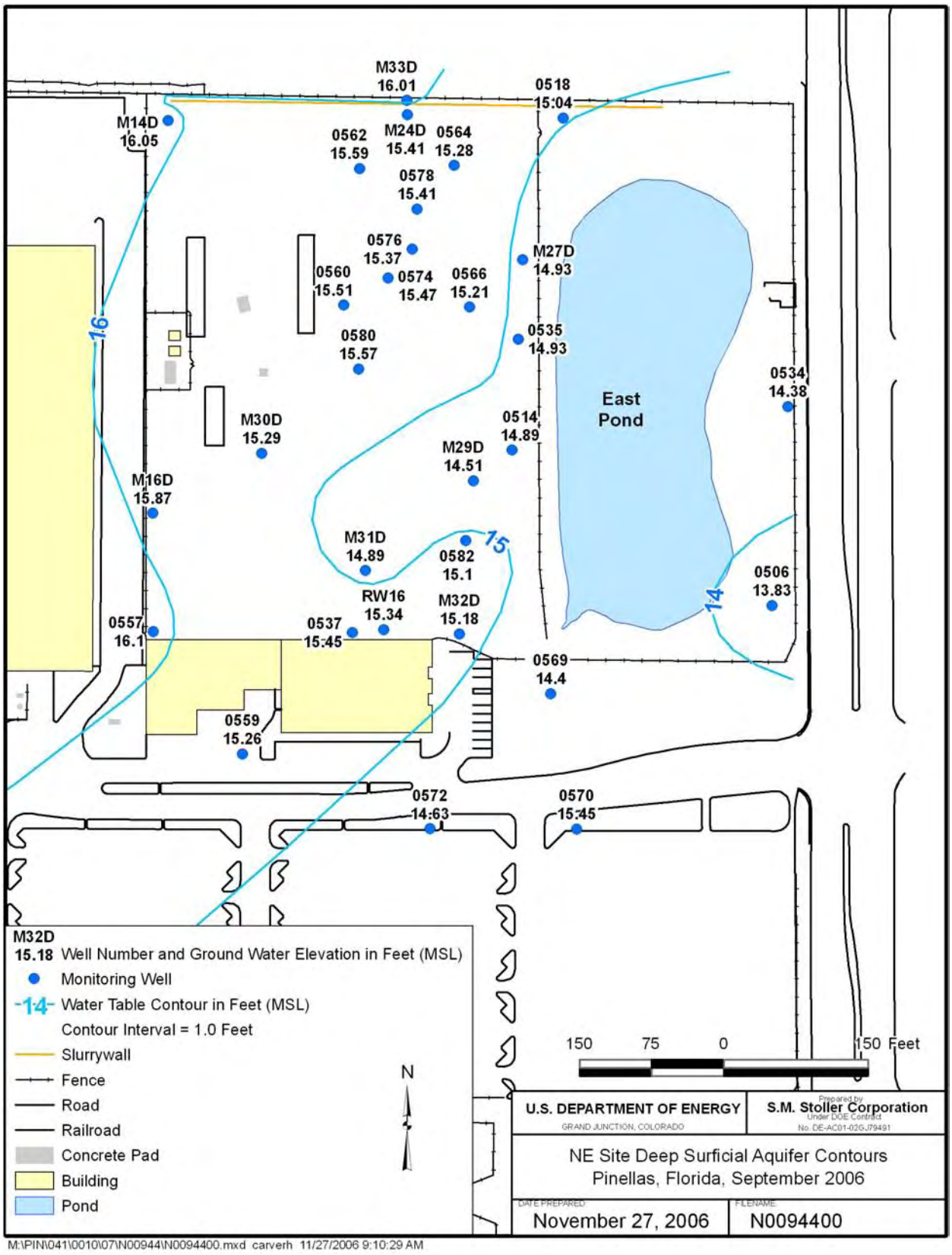

Figure 4. Ground Water Elevations and Deep Surficial Aquifer Flow, Northeast Site, September 2006

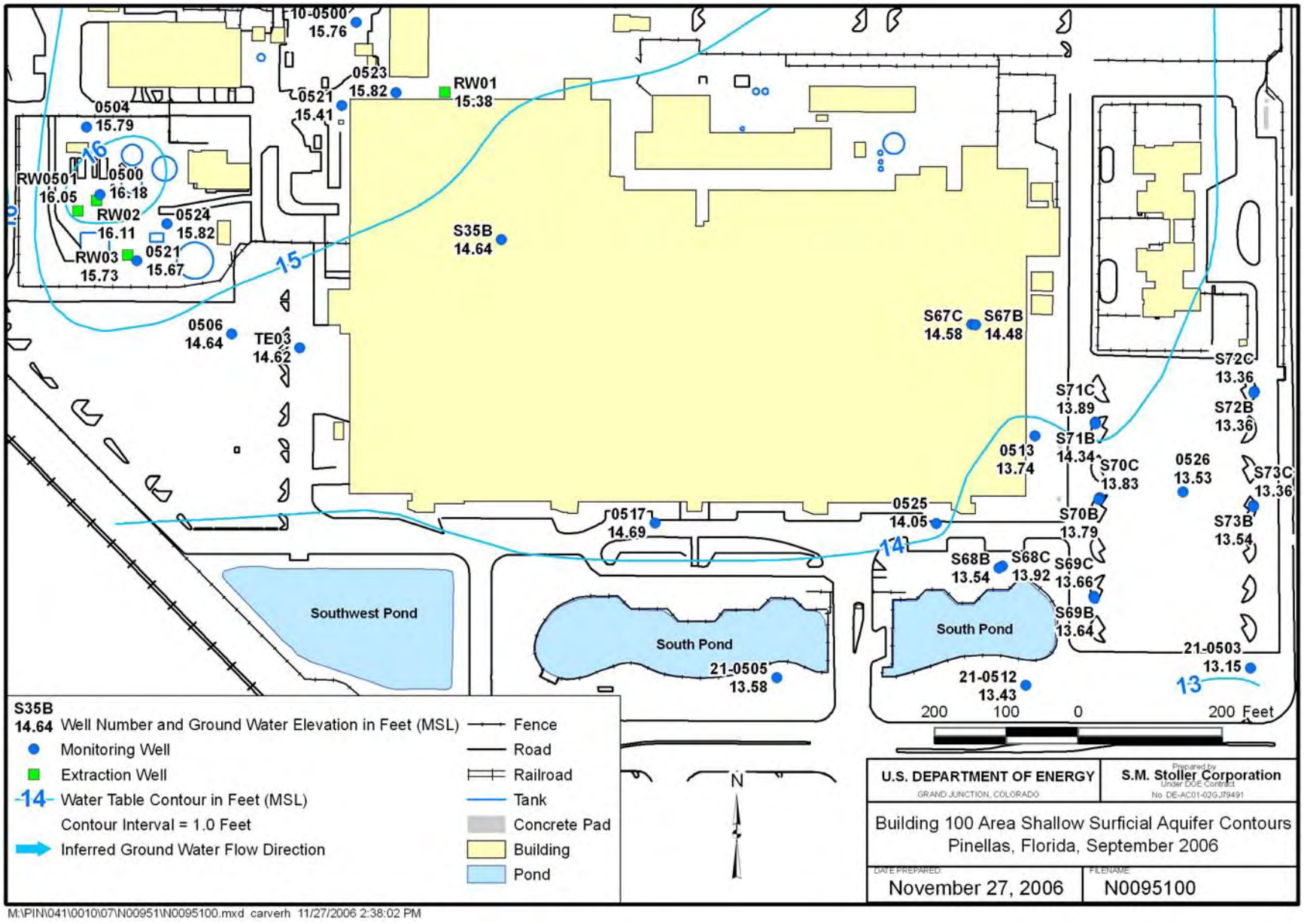

Figure 5. Ground Water Elevations and Shallow Surficial Aquifer Flow, Building 100 Area, September 2006

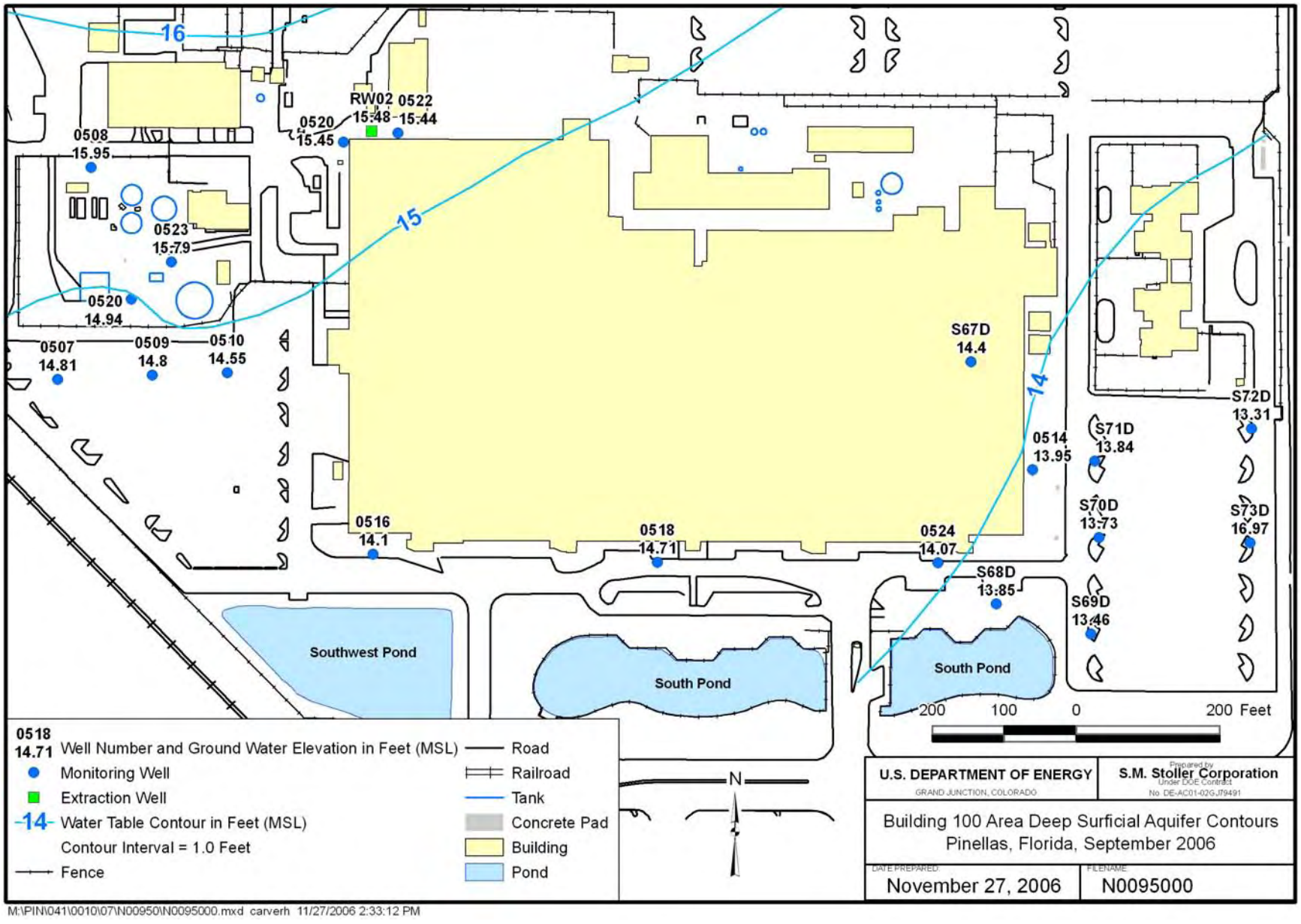

Figure 6. Ground Water Elevations and Deep Surficial Aquifer Flow, Building 100 Area, September 2006

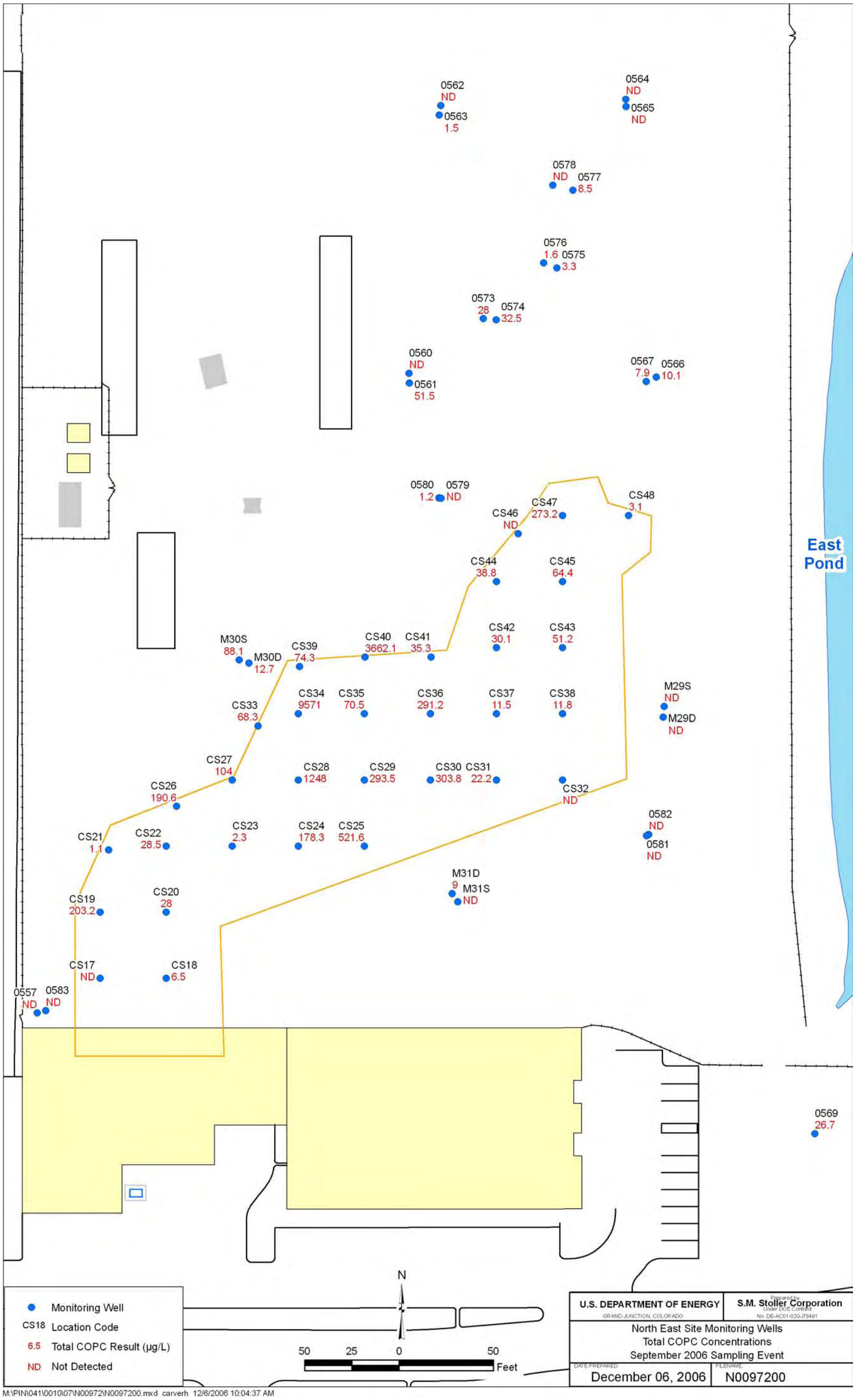

Figure 7. Northeast Site Total COPC Concentrations September 2006 Sampling Event

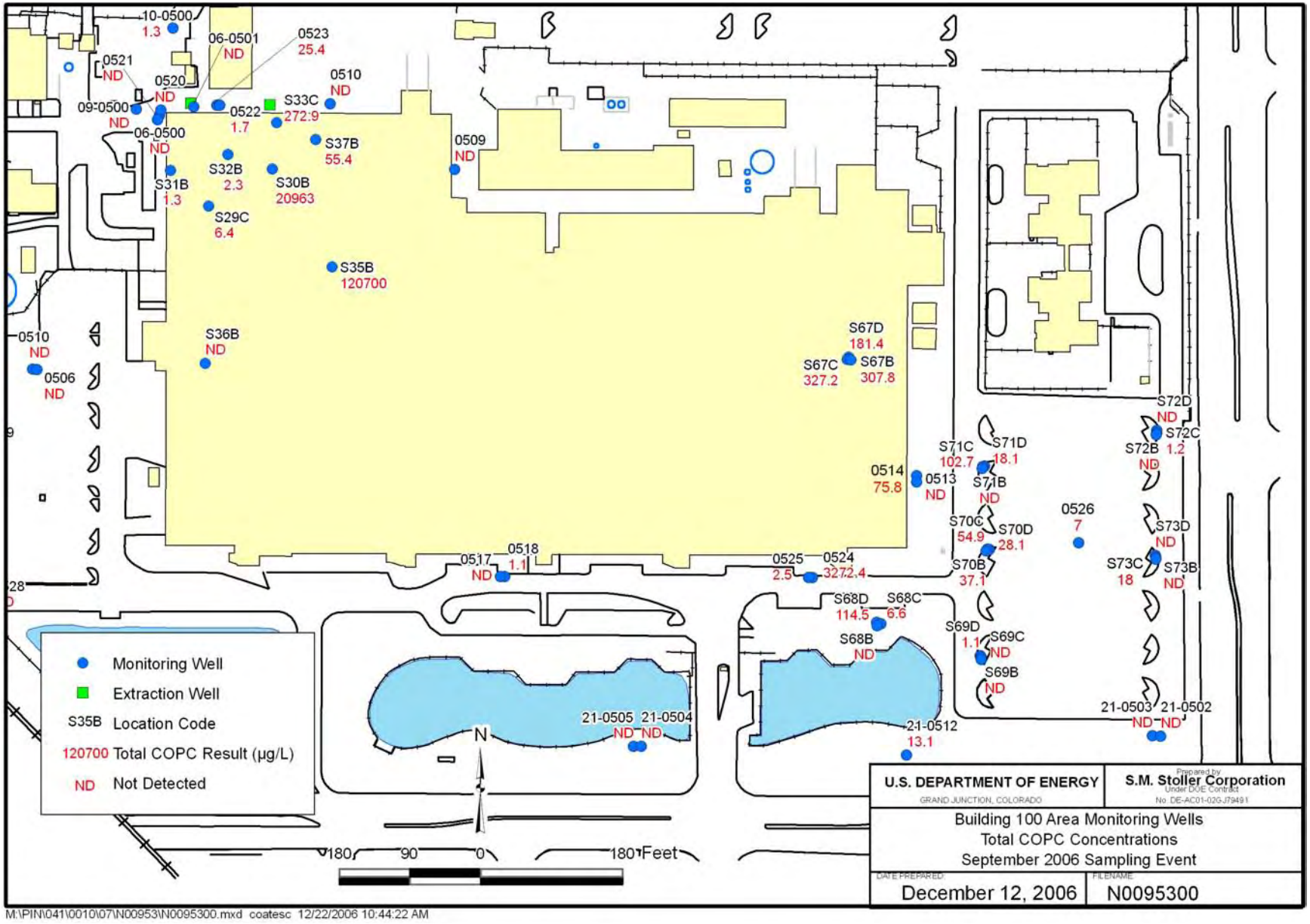

Figure 8. Building 100 Area Total COPC Concentrations September 2006 Sampling Event

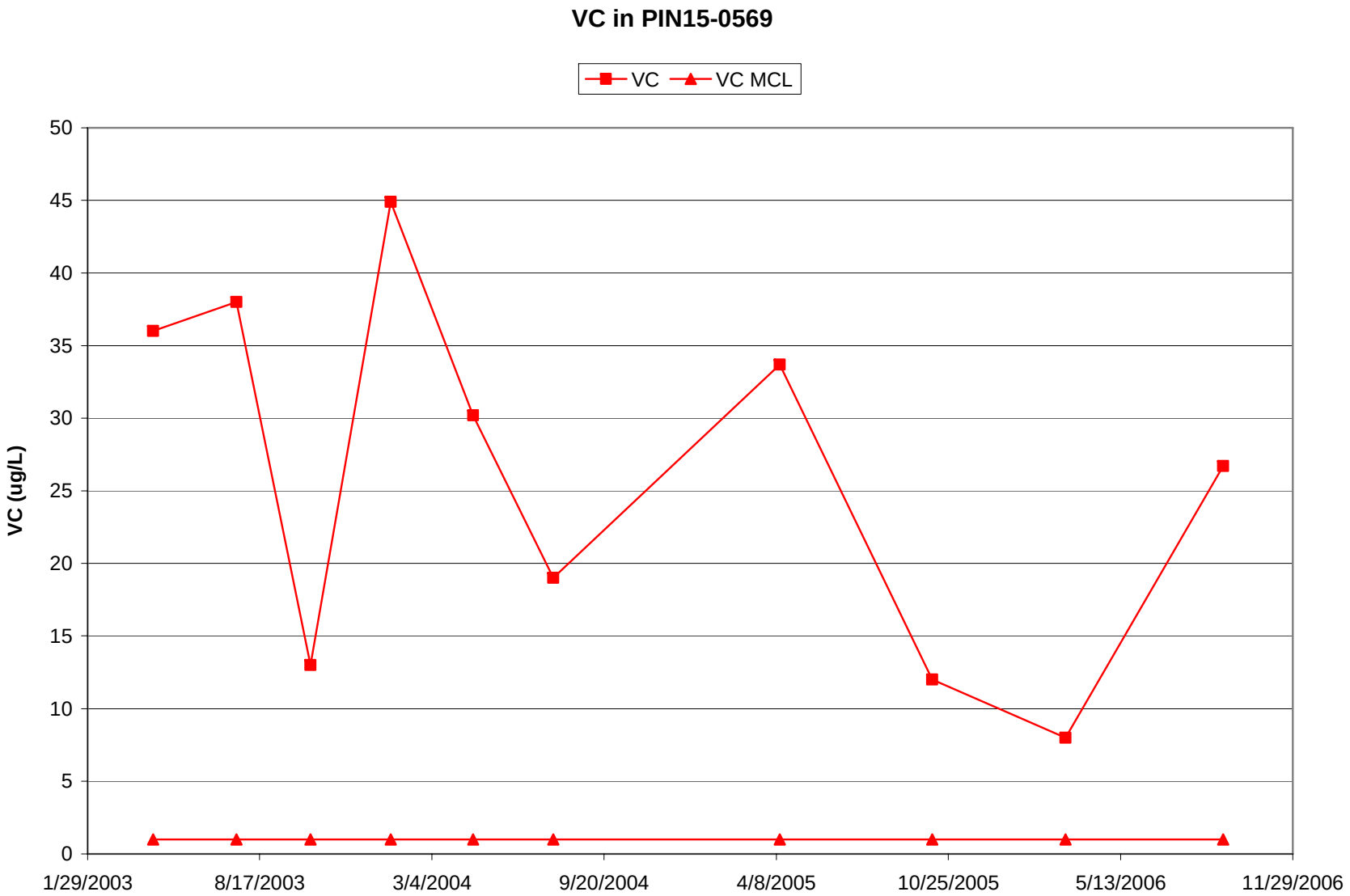

Figure 9. VC in PIN15−0569

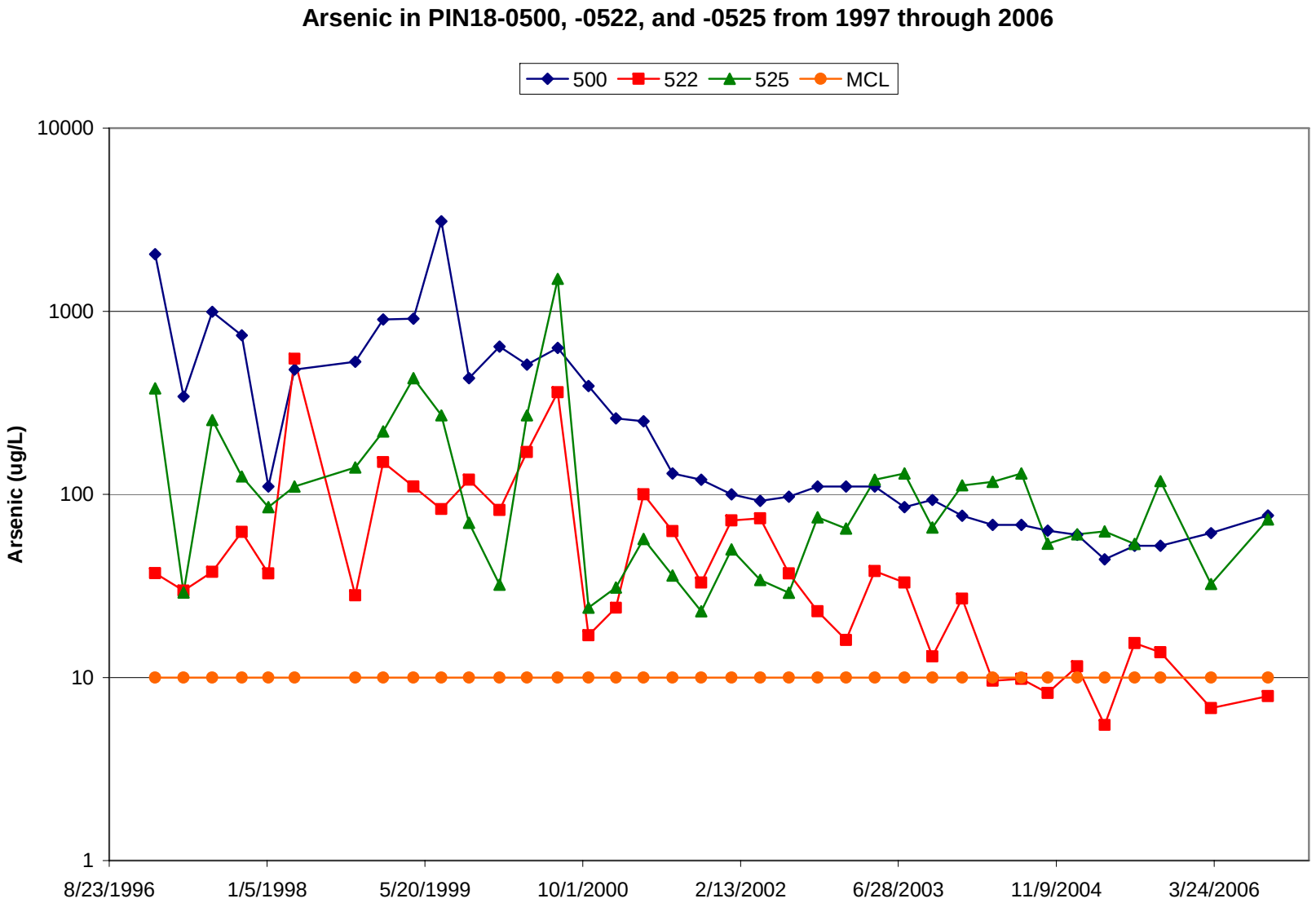

Figure 10. Arsenic in PIN18−0500, −0522, and −0525 from 1997 through 2006

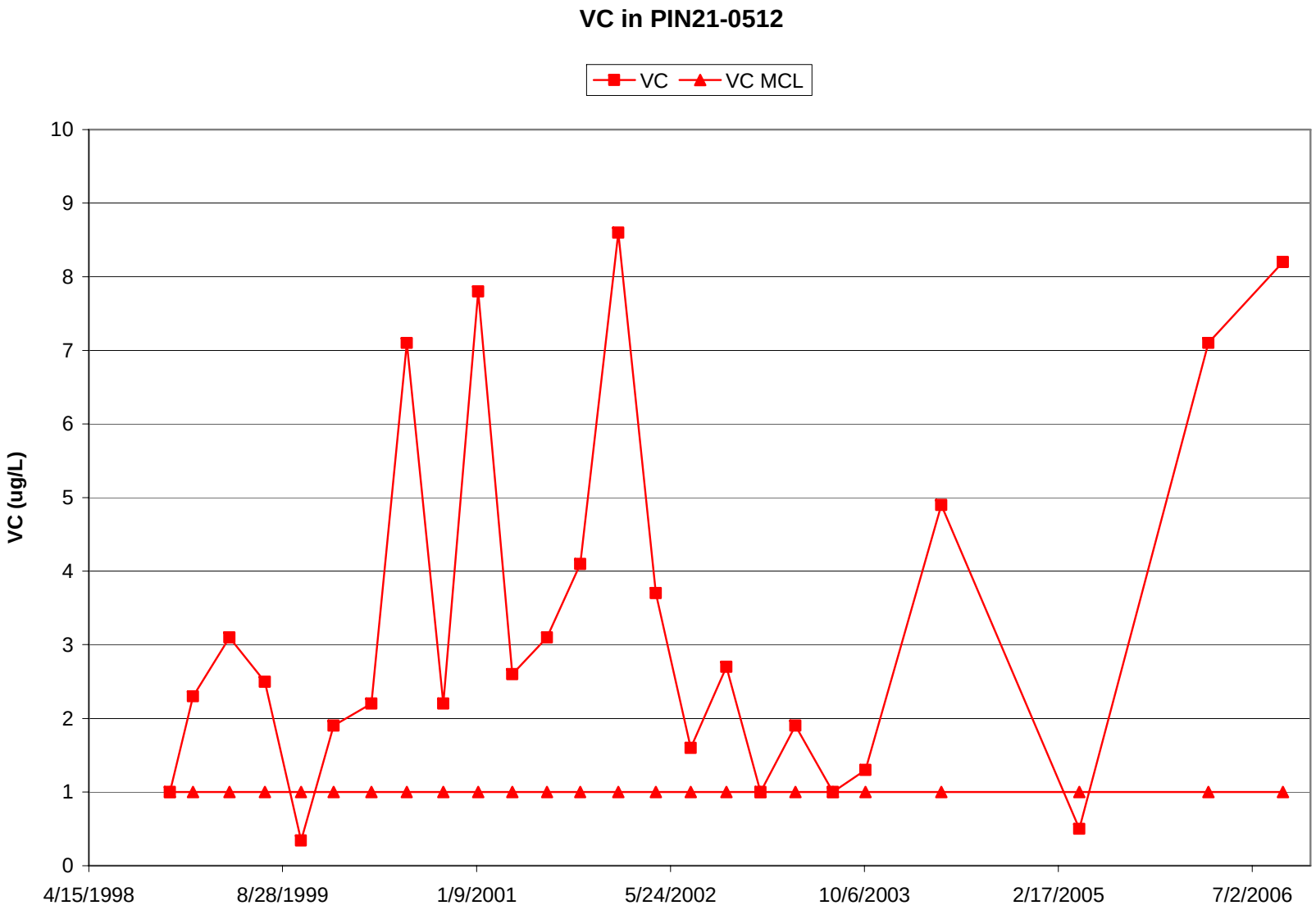

Figure 11. VC in PIN21−0512

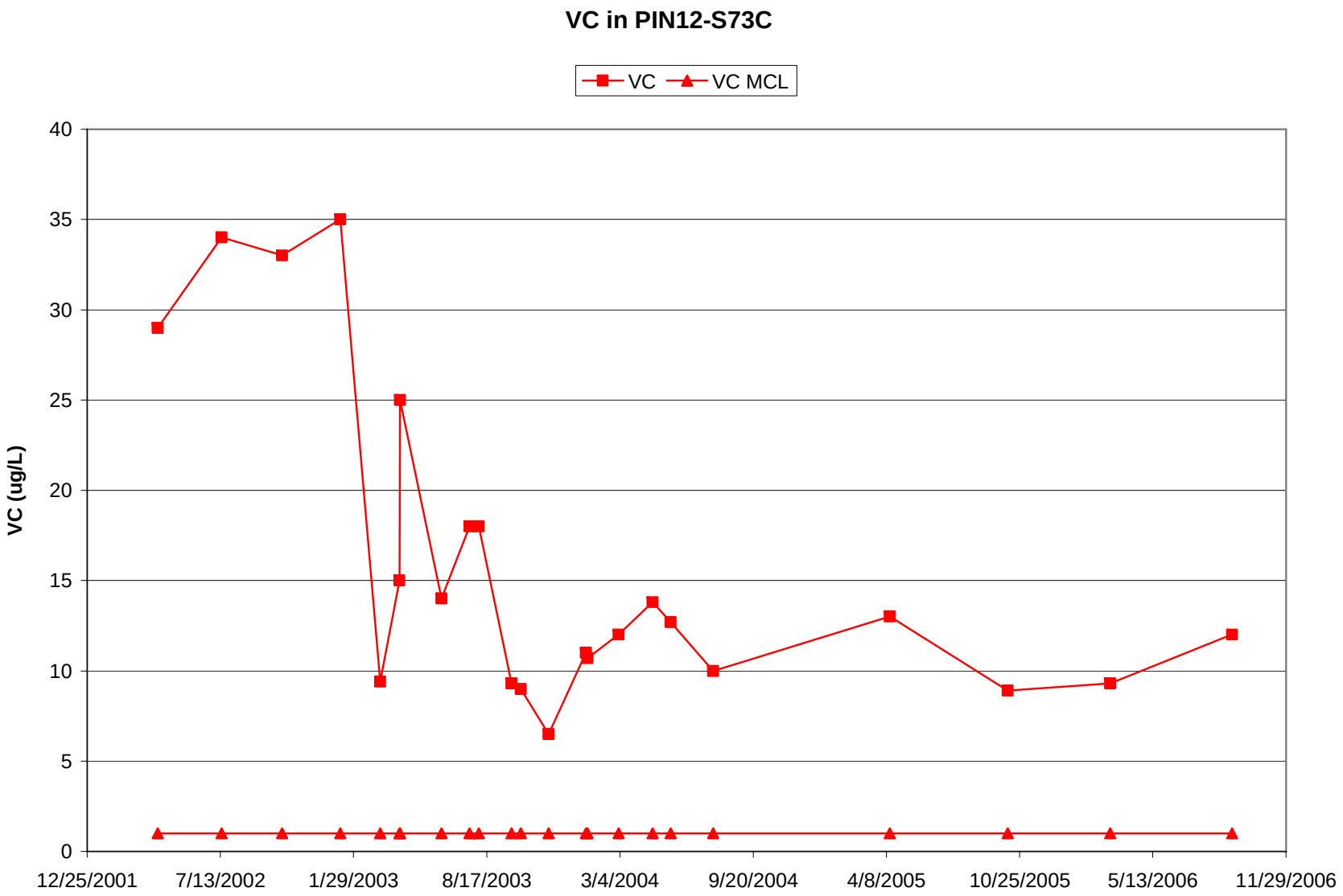

Figure 12. VC in PIN12−S73C

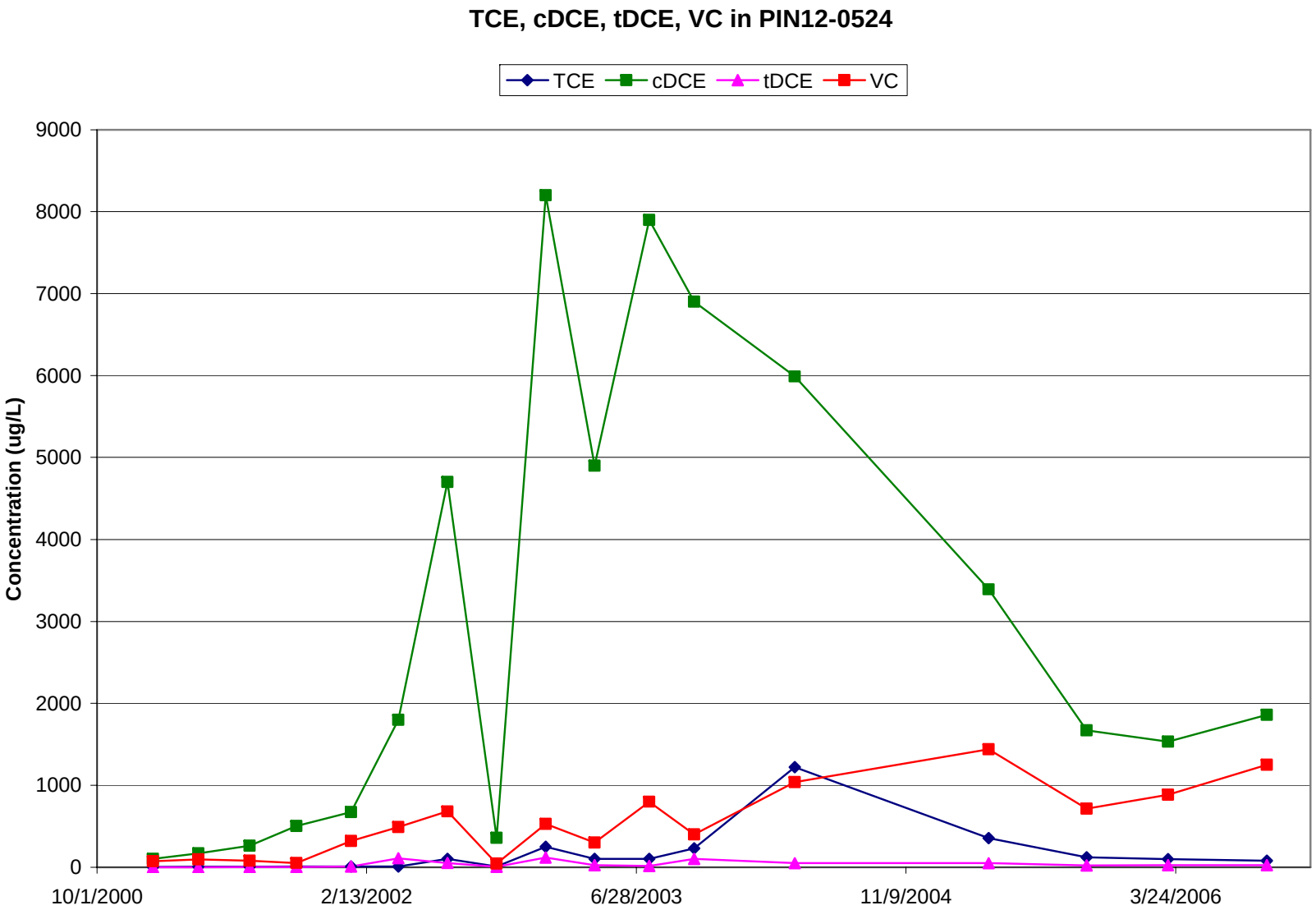

Figure 13. TCE, cDCE, tDCE, VC in PIN12−0524

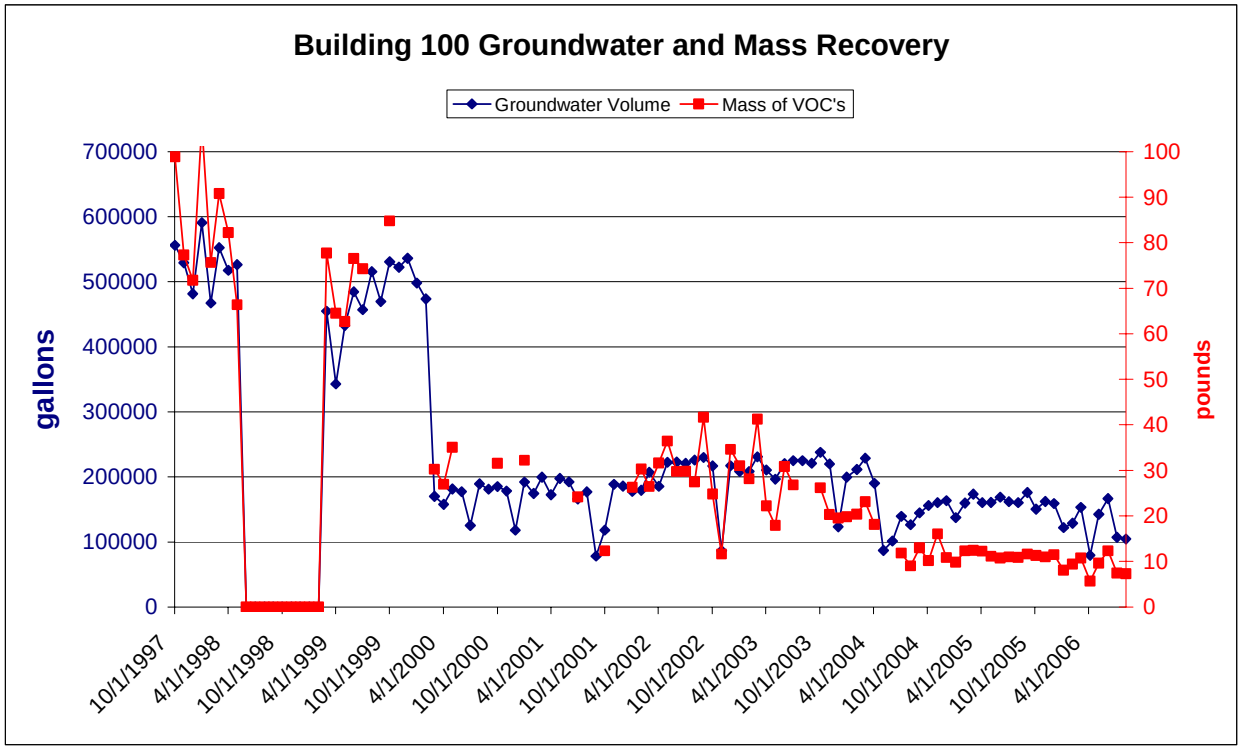

Figure 14. Building 100 Ground Water Recovery and VOC Mass Removal

Table 1. Water-Level Data at the STAR Center

Location	Measurement		Water Depth From Land Surface (ft)	Ground Water Elevation (ft NGVD)
	Date	Time		
PIN06	**Industrial Drain Leaks Bldg 100/Old Drum Storage Site**			
0500	9/28/2006	10:44	2.46	15.54
0501	9/28/2006	10:36	2.83	15.47
PIN09				
0500	9/28/2006	10:28	2.09	15.88
PIN10				
0500	9/28/2006	10:47	2.14	15.76
PIN12				
0509	9/28/2006	11:07	3.07	14.97
0510	9/28/2006	11:03	2.83	15.23
0513	9/28/2006	14:37	4.76	13.74
0514	9/28/2006	14:36	4.55	13.95
0515	9/28/2006	14:04	3.76	14.14
0516	9/28/2006	14:06	3.90	14.10
0517	9/28/2006	14:15	3.21	14.69
0518	9/28/2006	14:13	3.23	14.71
0520	9/28/2006	10:38	2.95	15.06
0521	9/28/2006	10:32	2.53	15.52
0522	9/28/2006	10:55	2.76	15.44
0523	9/28/2006	10:53	2.34	15.82
0524	9/28/2006	15:34	3.34	14.07
0525	9/28/2006	15:33	3.37	14.05
0526	9/28/2006	15:12	3.29	13.53
0527	9/28/2006	11:11	10.74	7.33
0528	9/28/2006	14:01	10.41	7.19
RW01	9/28/2006	10:59	2.87	15.38
RW02	9/28/2006	10:51	2.85	15.48
S29C	9/28/2006	08:23	3.51	15.00
S30B	9/28/2006	08:42	3.45	15.06
S31B	9/28/2006	08:17	3.28	15.23
S32B	9/28/2006	08:28	3.30	15.21
S33C	9/28/2006	08:37	3.22	15.29
S35B	9/28/2006	08:51	3.87	14.64
S36B	9/28/2006	08:09	3.97	14.54
S37B	9/28/2006	08:32	3.37	15.14
S67B	9/28/2006	09:14	3.99	14.48
S67C	9/28/2006	09:06	3.89	14.58
S67D	9/28/2006	09:10	4.08	14.40
S68B	9/28/2006	14:29	4.36	13.54
S68C	9/28/2006	14:26	3.98	13.92
S68D	9/28/2006	14:28	4.05	13.85

Table 1 (continued). Water-Level Data at the STAR Center

Location	Measurement		Water Depth From Land Surface (ft)	Ground Water Elevation (ft NGVD)
	Date	Time		
S69B	9/28/2006	14:41	2.36	13.64
S69C	9/28/2006	14:43	2.34	13.66
S69D	9/28/2006	14:44	2.54	13.46
S70B	9/28/2006	15:18	2.91	13.79
S70C	9/28/2006	15:16	2.87	13.83
S70D	9/28/2006	15:15	2.97	13.73
S71B	9/28/2006	14:54	4.06	14.34
S71C	9/28/2006	14:56	4.51	13.89
S71D	9/28/2006	14:57	4.56	13.84
S72B	9/28/2006	15:01	4.84	13.36
S72C	9/28/2006	15:03	4.84	13.36
S72D	9/28/2006	15:04	4.89	13.31
S73B	9/28/2006	15:06	3.46	13.54
S73C	9/28/2006	15:08	3.64	13.36
S73D	9/28/2006	15:09	0.03	16.97
TE03	9/28/2006	13:59	2.38	14.62
PIN15	**Northeast Site**			
0506	9/28/2006	14:16	3.17	13.83
0507	9/28/2006	14:16	3.22	13.78
0510	9/28/2006	12:59	2.87	14.65
0513	9/28/2006	14:31	10.35	7.25
0514	9/28/2006	14:58	2.61	14.89
0515	9/28/2006	14:56	2.69	14.81
0516	9/28/2006	14:54	2.91	14.49
0518	9/28/2006	14:34	2.76	15.04
0520	9/28/2006	14:24	3.20	14.00
0530	9/28/2006	14:45	2.79	14.61
0534	9/28/2006	14:27	2.92	14.38
0535	9/28/2006	14:42	2.67	14.93
0537	9/28/2006	13:59	3.15	15.45
0557	9/28/2006	13:25	3.00	16.10
0559	9/28/2006	11:10	3.53	15.26
0560	9/28/2006	15:18	2.49	15.51
0561	9/28/2006	15:22	2.33	15.67
0562	9/28/2006	15:26	2.21	15.59
0563	9/28/2006	15:27	2.04	15.76
0564	9/28/2006	15:35	1.92	15.28
0565	9/28/2006	15:37	2.01	15.19
0566	9/28/2006	15:46	2.29	15.21
0567	9/28/2006	15:48	2.49	15.01
0568	9/28/2006	13:06	2.98	15.52
0569	9/28/2006	13:07	3.98	14.40

Table 1 (continued). Water-Level Data at the STAR Center

Location	Measurement		Water Depth From Land Surface (ft)	Ground Water Elevation (ft NGVD)
	Date	Time		
0570	9/28/2006	13:02	2.53	15.45
0571	9/28/2006	12:55	2.61	14.86
0572	9/28/2006	12:56	2.88	14.63
0573	9/28/2006	15:57	2.21	16.17
0574	9/28/2006	15:54	2.95	15.47
0575	9/28/2006	15:51	2.29	15.55
0576	9/28/2006	15:52	2.11	15.37
0577	9/28/2006	15:42	2.28	15.36
0578	9/28/2006	15:39	2.11	15.41
0579	9/28/2006	15:14	2.72	15.68
0580	9/28/2006	15:15	2.83	15.57
0581	9/28/2006	15:08	2.22	15.18
0582	9/28/2006	15:07	2.30	15.10
0583	9/28/2006	13:28	3.06	16.14
E001	9/28/2006	14:11	2.23	13.79
M03D	9/28/2006	13:47	2.76	15.34
M03S	9/28/2006	13:44	1.94	16.16
M14D	9/28/2006	13:14	1.95	16.05
M14S	9/28/2006	13:18	1.90	16.10
M16D	9/28/2006	13:34	2.33	15.87
M16S	9/28/2006	13:33	2.33	15.87
M24D	9/28/2006	15:32	2.39	15.41
M27D	9/28/2006	14:38	2.67	14.93
M27S	9/28/2006	14:40	3.08	14.52
M29D	9/28/2006	15:02	3.09	14.51
M29S	9/28/2006	15:00	3.13	14.47
M30D	9/28/2006	13:40	2.61	15.29
M30S	9/28/2006	13:39	2.40	15.40
M31D	9/28/2006	13:55	3.11	14.89
M31S	9/28/2006	13:57	3.07	14.93
M32D	9/28/2006	14:04	2.62	15.18
M32S	9/28/2006	14:06	2.28	15.52
M33D	9/28/2006	15:30	1.59	16.01
RW16	9/28/2006	14:02	2.66	15.34
PIN18	**Wastewater Neutralization Area**			
0500	9/28/2006	10:05	3.92	16.18
0502	9/28/2006	10:00	3.93	16.07
0503	9/28/2006	13:51	2.46	15.22
0504	9/28/2006	09:55	3.16	16.44
0506	9/28/2006	13:56	2.90	14.81
0508	9/28/2006	09:51	2.92	16.58
0509	9/28/2006	13:53	2.63	15.20

Table 1 (continued). Water-Level Data at the STAR Center

Location	Measurement		Water Depth From Land Surface (ft)	Ground Water Elevation (ft NGVD)
	Date	Time		
0520	9/28/2006	10:13	2.62	15.38
0521	9/28/2006	10:15	2.43	15.67
0522	9/28/2006	10:11	2.28	15.82
0523	9/28/2006	10:21	3.61	15.79
0524	9/28/2006	10:18	3.18	15.82
0525	9/28/2006	10:20	2.84	16.06
0526	9/28/2006	13:46	3.64	14.96
RW02	9/28/2006	10:06	3.99	16.11
RW03	9/28/2006	10:09	2.57	15.73
RW0501	9/28/2006	10:02	3.95	16.05
PIN21	**Perimeter Monitoring Wells**			
0502	9/28/2006	14:52	1.87	13.33
0503	9/28/2006	14:51	2.05	13.15
0504	9/28/2006	14:17	4.01	13.59
0505	9/28/2006	14:19	3.82	13.58
0512	9/28/2006	14:22	3.87	13.43
PIN23	**Southwest Pond**			
SW01	9/28/2006	14:10		13.58
PIN37	**South Pond**			
S001	9/28/2006	14:11		13.59

Table 2. Floridan Aquifer Monitoring Well Water Elevations

Well Identification	March 2006 Water Level Elevation (ft, MSL)	September 2006 Water Level Elevation (ft, MSL)
PIN15−0513	5.65	7.25
PIN12−0527	5.59	7.33
PIN12−0528	5.53	7.19

Table 3. Surface Water Elevations

Pond Location	March 2006 Water Level Elevation (ft, MSL)	September 2006 Water Level Elevation (ft, MSL)
East Pond	13.42	13.79
South Pond	13.43	13.59
West Pond	Not measured	13.85
Southwest Pond	13.48	13.58

Table 4. Dissolved Gas and Dehalococcoides ethenogenes

Location		Date Sampled	Ethane (µg/L)	Ethene (µg/L)	Hydrogen (nmol/L)	Methane (µg/L)	Carbon dioxide (mg/L)	Dehalococcoides ethenogenes (copy numbers/L)
Industrial Drain Leaks Bldg 100/Old Drum Storage Site								
PIN12	0514	9/9/2006	0.083	0.5	1.8	6,600	150	50,000,000
	0524	9/9/2006	0.064	9.3	1.4	910	160	5,000,000
	0526	9/9/2006	0.004J	<0.01	5.1	8,200	330	1,000J
	S73C	9/9/2006	<0.01	0.25	66	8,300	300	20,000,000
	S35B	9/12/2006	85	1100	1.4	2,700	180	900
Pinellas Northeast Site								
PIN15	0567	9/7/2006	1.3	0.012	1.5	40	140	<4,000
	0574	9/7/2006	0.024	0.73	1.2	3,100	250	60,000
	0576	9/7/2006	1.6	0.018	1.2	1,300	120	700J
	0577	9/7/2006	82	0.067	1.2	3,300	230	1,000,000
	0569	9/9/2006	77	0.098	2.3	500	140	6,000

Notes:
"<"=not detected above the associated value
J = Estimated value, result is between the reporting limit and the method detection limit.

Table 5. Field Measurements of Samples Collected at the STAR Center

Location	Screen Depth (ft bls)	Temperature (°C)	Specific Conductance (µmhos/cm)[a]	Turbidity (NTU)	pH	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/L)
PIN06	**Industrial Drain Leaks Bldg 100/Old Drum Storage Site**						
0500	3–13	29.6	416	2.1	6.76	-130.4	0.68
0501	3–13	28.57	636	7.2	6.68	77	0.52
PIN09							
0500	3–13	30	483	7.8	6.86	-124	1.02
		26.82	622	8.9	6.54	-33	0.67
PIN12							
0509	3–13	27.91	566	17.8	6.77	-32.5	0.37
0510	3–13	29.94	804	39.1	6.55	-70	0.36
0513	15–25	24.88	633	12.2	6.69	-64.5	0.39
0514	30–40	25.61	1,200	377	6.62	-252	0.67
0517	15–25	28.89	398	8.1	7.14	-98.8	0.19
0518	30–40	27.94	513	12	6.86	-42.2	0.37
0520	36–46	27.3	764	50.8	6.73	-112.8	0.81
0521	19.5–29.5	27.1	456	44.2	6.84	-124.9	0.98
0522	32–42	26.82	761	8.7	6.65	-26.1	0.65
0523	18–28	27.01	574	16.8	6.73	-75.9	0.47
0524	27–37	27.58	1,399	2.63	6.53	-123.1	0.29
0525	12–22	29.11	590	7.42	6.95	-73.1	0.33
0526	19.5–29.5	33.86	1,965	3.08	6.43	-276.2	2.36
0527	118–137.9	28.75	1,226	5.79	6.7		
0528	127–146.9	25.26	939	2.87	7.11	-177.1	0.3
S29C	14–24	23.02	1,099	5.9	6.62	-83.8	0.3
S30B	5–15	22.9	1,199	3.9	6.59	-12.3	0.46
S31B	5–15	24.67	462	24.1	6.82	-95.9	0.25
S32B	5.5–15.5	23.12	1,098	3.2	6.65	-69.6	0.42
S33C	11–21	24.45	1,325	64	6.62	-95.4	0.54
S35B	5–15	23.35	1,583	10.5	6.4	-60.5	0.47
S36B	5–15	23.84	638	51.5	6.48	-79.5	0.32
S37B	5–15	23.31	817	32.2	6.71	-96	0.24
S67B	10–19.83	23.25	1,105	65.6	6.66	-58.7	1.33
S67C	20–29.83	23.07	894	43.9	6.71	-64.9	0.95
S67D	30–39.83	23.22	1,034	134	6.45	-29.4	0.61
S68B	10–20	26.4	666	14	6.5	-37.7	0.99
S68C	18–28	26.38	743	13.7	6.66	-38.6	0.84
S68D	30–40	26.19	997	8.5	6.64	-38	0.81
S69B	10–20	31.26	525	76	6.79	-69.9	0.93
S69C	20–30	29.28	543	12.2	7.87	-54.9	0.35
S69D	30–40	28.61	1,169	7.7	7.74	-37.3	0.76
S70B	10–20	31.79	1,137	15.5	7.81	-33.2	0.27
S70C	20–30	30.67	1,161	162	7.74	-51	0.29
S70D	30–40	30.18	1,187	30.1	7.64	-36.7	0.32
S71B	10–20	32.14	1,361	10.7	7.69	-73.3	0.27

Table 5 (continued). Field Measurements of Samples Collected at the STAR Center

Location	Screen Depth (ft bls)	Temperature (°C)	Specific Conductance (µmhos/cm)[a]	Turbidity (NTU)	pH	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/L)
S71C	20–30	31.66	1,218	352	7.61	-55.1	0.21
S71D	30–40	30.73	1,116	13.8	7.86	-53.1	0.26
S72B	10–20	31.14	1,496	16.6	6.12	-39.2	0.46
S72C	20–30	30.56	676	8.8	6.59	-65.4	0.41
S72D	30–40	30.35	1,145	84.9	6.64	-6.9	0.38
S73B	10–20	32.05	813	293	6.44	-39.9	0.95
S73C	20–30	30.03	1,881	65.8	6.46	-52.2	1.09
S73D	30–40	31.81	1,927	69.8	6.28	-57.2	0.72
PIN15	**Northeast Site**						
0537	17.5–30	25.09	1,009	4.8	6.52	-57.7	0.45
0557	21–31	27.49	660	4.38	6.48	10.1	0.61
0560	19–28.5	27.96	1,375	2.11	6.55	-35.4	0.4
0561	5–14.5	27.84	743	4.96	6.54	-61.2	0.39
0562	20–29.5	27.09	1,084	3.08	6.61	-61.3	0.74
0563	5–14.5	27.6	1,499	6.27	6.5	-77.7	0.41
0564	20–29.5	27.83	1,233	2.04	6.44	18.1	0.81
0565	5–14.5	28.51	6.7	1.39	6.49	-3.8	0.47
0566	19–28.5	28.5	1,239	208	6.47	-662.9	0
0567	5–14.5	28.45	1,115	37.8	6.71	54	0.87
0569	20–30	26.78	1,332	11.8	6.68	-114.5	0.11
0573	5–15	28.74	1,459	5.55	6.63	-621.2	0
0574	18–28	29.06	2,089	20.8	6.77	-105.4	0.55
0575	5–15	31.73	1,795	31.8	6.61		
0576	20–30	32.12	1,555	17	6.93	-137	0.32
0577	5–15	29.12	1,772	3.77	6.77	-67.9	0.85
0578	20–30	30.43	1,116	2.6	6.36	-56.2	0.34
0579	5–15	28.38	1,639	16.3	6.79	-11.5	1
0580	20–30	27.47	804	14.1	6.71	-43.9	0.51
0581	5–15	28.87	1,293	23	6.91	-71.5	0.98
0582	20–30	29.02	1,195	11.2	6.6	-33.7	0.68
0583	5–15	28	425	4.75	6.5	45.7	0.57
M03S	2.5–12	28.4	561	25.7	6.63	-33.2	0.46
M14S	4–14	27.85	606	19.6	6.61	14.3	0.5
M29D	20–30	30.4	522	6.2	6.78	-29.6	0.91
M29S	5–15	29.69	467	22.6	6.99	-8.6	1.13
M30D	20.5–30.5	30.82	1,139	2.89	6.19	-30.2	0.58
M30S	5.5–15.5	29.58	1,909	7.54	6.42	-34.7	0.68
M31D	19.5–29.5	29.73	1,148	4.7	6.82	-38.9	0.78
M31S	4.5–14.5	28.93	1,465	38.5	6.78	-12.4	0.77
M32S	3–13	27.57	550.1	2.12	6.54	-752.4	0
PIN18	**Wastewater Neutralization Area**						
0500	11–16	27.76	496	3.03	7.25	-137.1	0.5
0502	11–16	27.15	481	14.9	6.95	-116.6	0.64
0503	10–20	29.3	618	3.3	6.63	-99.2	1.32

Table 5 (continued). Field Measurements of Samples Collected at the STAR Center

Location	Screen Depth (ft bls)	Temperature (°C)	Specific Conductance (µmhos/cm)[a]	Turbidity (NTU)	pH	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/L)
0504	13–22	28.1	341	17.6	6.73	-72.7	0.7
0505	10.5–20.5	29.52	666	16.3	6.75	-141.8	0.77
0506	12–22	28.98	764	4.3	6.73	-166.9	0.81
0507	27–37	28.3	911	4.8	6.73	-96.6	1.26
0508	31–41	28.1	546	34.2	6.63	-55.2	0.97
0509	27.5–37.5	28.48	1,254	3.9	6.76	-153.5	0.91
0510	27.5–37.5	28.01	1,132	63.3	6.8	-147.9	0.91
0519	12.5–22.5	29.2	668	4.8	6.85	-94.5	0.89
0520	32.5–42.5	25.6	1,532	92.2	6.87	-133.3	0.84
0521	20–30	26.86	704	4.19	6.93	-82.9	0.6
0522	5–15	28.07	473	6.99	6.81	57.9	0.57
0523	32.5–42.5	26.27	718	19.9	6.9	-77	0.51
0524	20–30	27.28	619	14.2	6.9	-113.1	0.52
0525	5–15	29.6	362	16.3	6.67	65.7	0.45
0526	19.5–29	25.7	384	41.2	6.48	-84.8	0.74
RW02	10–20	26.64	346	12.6	7.22	-142.3	0.32
RW03	9–24	27.31	634	0.76	6.89	-84.7	0.95
RW0501	11–16	26.88	695	4.85	6.81	-89.9	0.95
PIN21							
0502	7–17	27.22	776	8.9	6.69	-47.2	0.59
0503	20–28	26.37	661	57.9	6.7	-84.3	0.31
0504	7–17	26.89	605	26.1	6.83	-104.1	0.45
0505	20–28	25.78	726	8.4	6.65	-26.9	0.32
0512	20–29.5	25.17	784	8.5	6.61	-54.9	0.51

[a]Temperature corrected to 25°C.

Table 6. Sitewide Arsenic Measurements

Location	Sample Date	Concentration (mg/L)
PIN06	**Industrial Drain Leaks Bldg 100/Old Drum Storage Site**	
0501	9/20/2006	0.0099B
PIN09		
0500	9/29/2006	0.0163
PIN10		
0500	9/20/2006	0.0076B
PIN12		
0525	9/20/2006	0.0333
S31B	9/13/2006	0.0787
S32B	9/13/2006	0.0394
S33C	9/13/2006	0.0104
S35B	9/12/2006	0.0236
S68B	9/21/2006	0.0543
PIN15	**Northeast Site**	
0567	9/7/2006	0.015
M03S	9/14/2006	0.0049B
M14S	9/14/2006	0.0131
M32S	9/18/2006	0.0222
PIN18	**Wastewater Neutralization Area**	
0500	9/11/2006	0.0765
0502	9/11/2006	0.116
0503	10/3/2006	<0.0028
0504	10/3/2006	<0.0028
0505	10/5/2006	0.0036B
0506	10/5/2006	<0.0028
0507	10/3/2006	<0.0028
0508	10/3/2006	<0.0028
0509	10/5/2006	<0.0028
0510	10/5/2006	<0.0028
0519	10/3/2006	<0.0028
0520	10/4/2006	<0.0028
0521	9/11/2006	0.0037B
0522	9/11/2006	0.0079B
0523	9/11/2006	<0.0028
0524	9/11/2006	0.0359
0525	9/11/2006	0.0728
0526	10/3/2006	<0.0028
RW02	9/11/2006	0.0764
RW03	9/11/2006	0.0361
RW0501	9/11/2006	0.15

B = Inorganic result is between the IDL and CRDL
"<" values are method detection limits.

Table 7. COPC Concentrations at the Northeast Site
(reported in micrograms per liter)[a]

Location	Screen Depth (ft)	Date Sampled	TCE	cis-1,2-DCE	Total 1,2-DCE[b]	Vinyl chloride	Methylene chloride	Benzene	Toluene	Total COPC[c]
FDEP MCL			**3**	**70**	**63**	**1**	**5**	**1**	**1,000**	
PIN15		**Northeast Site**								
0506	12–21.5	3/15/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0507	5–14.5	3/15/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0510	4–13.5	3/15/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0513	135–149.6	3/15/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0514	15.5–25.5	3/16/2006	<0.5	0.73J	0.73J	6.3	<1	12.9	<0.5	19.2
0515	7.6–17.6	3/16/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0516	0.3–10.3	3/16/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0518	23–28	3/15/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0520	5–14.5	3/15/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0523	5–14.5	3/15/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0530	5–14.5	3/16/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0534	19.5–29	3/15/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0535	20.5–30	3/16/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0537	17.5–30	3/16/2006	<0.5	2.2	2.2	111	<1	3.2	<0.5	116.4
0559	22–31.5	3/15/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0560	19–28.5	10/10/2005	0.86J	0.95J	0.95J	2.2	<1	<0.5	<0.5	2.2
		3/16/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		9/15/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0561	5–14.5	10/10/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		3/16/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		9/15/2006	25.9	14.2	14.2	11.4	<1	0.61J	<0.5	51.5
0562	20–29.5	10/7/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		3/14/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		9/15/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0563	5–14.5	10/7/2005	0.51J	1.3	1.3	<0.5	<1	<0.5	<0.5	1.3
		3/14/2006	<0.5	0.95J	0.95J	<0.5	<1	<0.5	<0.5	ND
		9/15/2006	<0.5	1.5	1.5	<0.5	<1	<0.5	<0.5	1.5
0564	20–29.5	10/7/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		3/14/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		9/14/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0565	5–14.5	10/7/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		3/14/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		9/14/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0566	19–28.5	10/10/2005	0.82J	5.6	5.6	2.9	<1	1.1	<0.5	9.6
		3/15/2006	<0.5	1.2	1.2	2	<1	0.79J	<0.5	3.2
		9/18/2006	<0.5	2.7	2.7	7.4	<1	0.86J	<0.5	10.1

Table 7 (continued). COPC Concentrations at the Northeast Site (reported in micrograms per liter)[a]

Location	Screen Depth (ft)	Date Sampled	TCE	cis-1,2-DCE	Total 1,2-DCE[b]	Vinyl chloride	Methylene chloride	Benzene	Toluene	Total COPC[c]
FDEP MCL			**3**	**70**	**63**	**1**	**5**	**1**	**1,000**	
0567	5–14.5	10/5/2005	0.66J	7.7	10	1.9	<1	0.53J	<0.5	11.9
		3/13/2006	0.53J	5.7	7.3	2.1	<1	<0.5	<0.5	9.4
		9/7/2006	<0.5	5.2	6.8	1.1	<1	<0.5	<0.5	7.9
0568	10–20	3/15/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0569	20–30	10/6/2005	<0.5	<0.5	ND	12	<1	<0.5	<0.5	12
		3/10/2006	2.2	1.1	1.1	8	<1	<0.5	<0.5	11.3
		9/9/2006	<0.5	<0.5	ND	26.7	<1	<0.5	<0.5	26.7
0570	20–30	3/15/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0571	10–20	3/15/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0572	20–30	3/15/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0573	5–15	10/7/2005	<0.5	0.57J	0.57J	20.1	<1	<0.5	1.8	21.9
		3/13/2006	<0.5	<0.5	ND	26.4	<1	<0.5	<0.5	26.4
		9/18/2006	<0.5	<0.5	ND	28	<1	<0.5	<0.5	28
0574	18–28	10/5/2005	2.9	13.5	13.5	6.7	<1	0.68J	<0.5	23.1
		3/13/2006	<0.5	4.1	4.1	3.1	<1	<0.5	<0.5	7.2
		9/7/2006	<0.5	<0.5	0.52J	32.5J	<1	0.66JJ	<0.5	32.5
0575	5–15	10/7/2005	<0.5	2.2	9.1	6.6	<1	2.2	1.5	19.4
		3/14/2006	<0.5	1.1	4.3	1.8	<1	1.3	0.51J	7.4
		9/18/2006	<0.5	1.2	2.2	1.1	<1	0.83J	<0.5	3.3
0576	20–30	10/5/2005	<0.5	5.5	5.5	3.2	<1	0.53J	<0.5	8.7
		3/13/2006	<0.5	1.4	1.4	0.58J	<1	<0.5	<0.5	1.4
		9/7/2006	<0.5	1.6J	1.6	0.86JJ	<1	<0.5	<0.5	1.6
0577	5–15	10/5/2005	<0.5	<0.5	7.5	0.69J	<1	4.7	1.5	13.7
		3/13/2006	<0.5	<0.5	3.5	0.92J	<1	2.6	<0.5	6.1
		9/7/2006	<0.5	<0.5	3	2.3J	<1	3.2J	0.85JJ	8.5
0578	20–30	10/10/2005	<0.5	2.5	2.5	1.8	<1	<0.5	<0.5	4.3
		3/13/2006	<0.5	1.5	1.5	1.9	<1	<0.5	<0.5	3.4
		9/15/2006	<0.5	0.76J	0.76J	0.58J	<1	<0.5	<0.5	ND
M03D	15–25	3/16/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M03S	2.5–12	3/16/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M12D	22.5–32.5	3/15/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M12S	5–14.5	3/15/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M14D	18.5–28.5	3/14/2006	<0.5	<0.5	ND	3.2	<1	<0.5	<0.5	3.2
M14S	4–14	3/14/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M16D	18.5–28.5	3/16/2006	<0.5	<0.5	ND	1.7	<1	<0.5	<0.5	1.7
M16S	5–14.5	3/16/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M24D	20–30	3/14/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M27D	21–31	3/15/2006	<0.5	<0.5	ND	0.73J	<1	<0.5	<0.5	ND
M27S	6–16	3/15/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND

Table 7 (continued). COPC Concentrations at the Northeast Site (reported in micrograms per liter)[a]

Location	Screen Depth (ft)	Date Sampled	TCE	cis-1,2-DCE	Total 1,2-DCE[b]	Vinyl chloride	Methylene chloride	Benzene	Toluene	Total COPC[c]
FDEP MCL			**3**	**70**	**63**	**1**	**5**	**1**	**1,000**	
M32D	14–24	3/16/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M32S	3–13	3/16/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M33D	20–30	3/14/2006	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
RW16	20–30	3/16/2006	<0.5	<0.5	ND	7.9	<1	<0.5	<0.5	7.9

[a]"<" values are reporting limits.
[b]Total 1,2-DCE is the sum of cis-1,2-DCE and trans-1,2-DCE.
[c]Total COPC is the sum of the individual COPC concentrations. The cis-1,2-DCE value is not part of the total COPC value because this value is included in the total 1,2-DCE value. "J" values are not included in the total COPC value.

ND = Not detected.
J = Estimated value, result is between the reporting limit and the method detection limit.
Arsenic, while a COPC, is not included in this table, nor in the Total COPC value.

Table 8. COPC Concentrations at the Building 100 Area
(reported in micrograms per liter)[a]

Location	Screen Depth (ft)	Date Sampled	TCE	cis-1,2-DCE	trans-1,2-DCE	Total 1,2-DCE[b]	1,1-DCE	Vinyl chloride	Total COPC[c]
FDEP MCL			**3**	**70**	**100**	**63**	**7**	**1**	
Industrial Drain Leaks Bldg 100/Old Drum Storage Site									
PIN06									
0500	3–13	3/15/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
		9/29/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0501	3–13	3/15/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
		9/20/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
PIN09									
0500	3–13	3/14/2006	<0.5	0.51J	<0.5	0.51J	<0.5	<0.5	ND
		9/29/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
PIN10									
0500	3–13	3/14/2006	<0.5	0.56J	<0.5	0.56J	<0.5	<0.5	ND
		9/20/2006	0.84J	1.3	<0.5	1.3	<0.5	<0.5	1.3
PIN12									
0508	3–13	3/15/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0509	3–13	3/15/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
		9/20/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0510	3–13	3/15/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
		9/20/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0511	3–13	3/11/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0512	3–13	3/11/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0513	15–25	3/11/2006	<0.5	0.58J	1.1	1.1	<0.5	1.9	3
		9/21/2006	<0.5	<0.5	0.94J	0.94J	<0.5	<0.5	ND
0514	30–40	10/6/2005	<0.5	9.4	28.4	37.8	<0.5	35.6	73.4
		3/13/2006	<0.5	4.5	21.7	26.2	<0.5	32.9	59.1
		9/9/2006	<0.5	9.9	24.6	34.5	<0.5	41.3	75.8
0515	15–25	3/11/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0516	30–40	3/11/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0517	15–25	3/11/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
		9/20/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0518	30–40	3/11/2006	<0.5	<0.5	<0.5	ND	<0.5	1.3	1.3
		9/20/2006	<0.5	<0.5	<0.5	ND	<0.5	1.1	1.1
0520	36–46	3/15/2006	<0.5	<0.5	<0.5	ND	<0.5	27.3	27.3
		9/29/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0521	19.5–29.5	3/15/2006	1.5	1.9	<0.5	1.9	<0.5	0.91J	3.4
		9/29/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0522	32–42	3/15/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
		9/20/2006	<0.5	<0.5	<0.5	ND	<0.5	1.7	1.7
0523	18–28	3/15/2006	<0.5	0.72J	<0.5	0.72J	<0.5	<0.5	ND
		9/20/2006	<0.5	10.3	6.1	16.4	<0.5	9	25.4
0524	27–37	10/10/2005	123	1,670	19.8	1,689.8	80.6	713	2,606.4
		3/10/2006	98.6	1,530	<25	1,530	62.7	885	2,576.3
		9/9/2006	78.9	1,860	<25	1,860	83.5	1,250	3,272.4

Table 8 (continued). COPC Concentrations at the Building 100 Area (reported in micrograms per liter)[a]

Location	Screen Depth (ft)	Date Sampled	TCE	cis-1,2-DCE	trans-1,2-DCE	Total 1,2-DCE[b]	1,1-DCE	Vinyl chloride	Total COPC[c]
FDEP MCL			**3**	**70**	**100**	**63**	**7**	**1**	
0525	12–22	3/11/2006	<0.5	1.9	<0.5	1.9	<0.5	<0.5	1.9
		9/20/2006	<0.5	2.5	<0.5	2.5	<0.5	<0.5	2.5
0526	19.5–29.5	10/10/2005	<0.5	3.4	1.4	4.8	<0.5	0.69J	4.8
		3/9/2006	<0.5	1.4	0.61J	1.4	<0.5	<0.5	1.4
		9/9/2006	<0.5	3.5	1.3	4.8	<0.5	2.2	7
0527	118–137.9	3/15/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
		9/18/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0528	127–146.9	3/11/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
		9/19/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
S29C	14–24	3/8/2006	<0.5	<0.5	3	3	<0.5	11.6	14.6
		9/12/2006	<0.5	<0.5	1.2	1.2	<0.5	5.2	6.4
S30B	5–15	9/12/2006	5,560	13,700	901	14,601	176J	802	20,963
S31B	5–15	3/8/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
		9/13/2006	<0.5	1.3	<0.5	1.3	<0.5	0.93J	1.3
S32B	5.5–15.5	3/8/2006	<0.5	0.92J	<0.5	0.92J	<0.5	<0.5	ND
		9/13/2006	<0.5	2.3	<0.5	2.3	<0.5	<0.5	2.3
S33C	11–21	3/8/2006	1.9	72.6	14.6	87.2	1	318	408.1
		9/13/2006	6.7J	69	10.9	79.9	<5	193	272.9
S35B	5–15	10/7/2005	11,600	33,700	5,010	38,710	146E	7,500	57,956
		3/9/2006	16,600	53,200	9,150	62,350	139J	16,000	94,950
		9/12/2006	19,400	71,700	10,900	82,600	<500	18,700	120,700
S36B	5–15	3/8/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
		9/13/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
S37B	5–15	3/8/2006	<0.5	44.8	0.87J	44.8	<0.5	59.2	104
		9/12/2006	<0.5	25.2	<0.5	25.2	<0.5	30.2	55.4
S67B	10–19.83	3/16/2006	<0.5	25.5	5.1	30.6	<0.5	406	436.6
		9/13/2006	<5	19.8	<5	19.8	<5	288	307.8
S67C	20–29.83	3/16/2006	<0.5	267	49.5	316.5	4.1	210	530.6
		9/13/2006	<1	193	36.3	229.3	2.7	95.2	327.2
S67D	30–39.83	3/16/2006	<1	87.9	13.5	101.4	1.4J	77.1	178.5
		9/13/2006	<0.5	95.4	15.4	110.8	1.4	69.2	181.4
S68B	10–20	3/11/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
		9/21/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
S68C	18–28	3/11/2006	<0.5	2.2	<0.5	2.2	<0.5	5.9	8.1
		9/21/2006	<0.5	2.1	<0.5	2.1	<0.5	4.5	6.6
S68D	30–40	3/11/2006	<0.5	45.7	0.72J	45.7	<0.5	66.2	111.9
		9/21/2006	<0.5	56.5	0.98J	56.5	<0.5	58	114.5
S69B	10–20	3/14/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
		9/19/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
S69C	20–30	3/14/2006	<0.5	<0.5	<0.5	ND	<0.5	1	1
		9/21/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
S69D	30–40	3/14/2006	<0.5	1	<0.5	1	<0.5	0.5J	1
		9/21/2006	<0.5	1.1	<0.5	1.1	<0.5	<0.5	1.1

Table 8 (continued). COPC Concentrations at the Building 100 Area (reported in micrograms per liter)[a]

Location	Screen Depth (ft)	Date Sampled	TCE	cis-1,2-DCE	trans-1,2-DCE	Total 1,2-DCE[b]	1,1-DCE	Vinyl chloride	Total COPC[c]
FDEP MCL			**3**	**70**	**100**	**63**	**7**	**1**	
S70B	10–20	3/14/2006	<0.5	18.8	<0.5	18.8	<0.5	23.4	42.2
		9/21/2006	<0.5	19.8	0.9J	19.8	<0.5	17.3	37.1
S70C	20–30	3/14/2006	<0.5	26.1	8.8	34.9	0.95J	26	60.9
		9/21/2006	<0.5	25.8	9.5	35.3	0.94J	19.6	54.9
S70D	30–40	3/14/2006	<0.5	14.9	5.6	20.5	<0.5	11.3	31.8
		9/21/2006	<0.5	14.4	5.4	19.8	<0.5	8.3	28.1
S71B	10–20	3/14/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
		9/21/2006	<0.5	0.65J	<0.5	0.65J	<0.5	<0.5	ND
S71C	20–30	3/14/2006	<0.5	32.5	19.8	52.3	0.73J	41.5	93.8
		9/21/2006	<0.5	37.2	19.5	56.7	0.69J	46	102.7
S71D	30–40	3/14/2006	<0.5	5.2	2.3	7.5	<0.5	6.3	13.8
		9/21/2006	<0.5	7	3.1	10.1	<0.5	8	18.1
S72B	10–20	3/13/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
		9/18/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
S72C	20–30	3/13/2006	<0.5	1.2	<0.5	1.2	0.57J	1.1	2.3
		9/18/2006	<0.5	1.2	<0.5	1.2	0.62J	0.75J	1.2
S72D	30–40	3/13/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
		9/18/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
S73B	10–20	3/14/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
		9/18/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
S73C	20–30	10/7/2005	<0.5	1	3.6	4.6	<0.5	8.9	13.5
		3/10/2006	<0.5	<0.5	2.3	2.3	<0.5	9.3	11.6
		9/9/2006	<0.5	2.5	3.5	6	<0.5	12	18
S73D	30–40	3/14/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
		9/18/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
TE03	–	3/11/2006	<0.5	<0.5	<0.5	ND	<0.5	4.2	4.2
PIN21		**Perimeter Monitoring Wells**							
0500	7–17	3/13/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0501	20–28	3/13/2006	<0.5	1.4	<0.5	1.4	<0.5	<0.5	1.4
0502	7–17	3/15/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
		9/19/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0503	20–28	3/15/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
		9/19/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0504	7–17	3/11/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
		9/19/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0505	20–28	3/11/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
		9/19/2006	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0512	20–29.5	3/11/2006	<0.5	2.4	<0.5	2.4	<0.5	7.1	9.5
		9/19/2006	<0.5	4.9	<0.5	4.9	<0.5	8.2	13.1

[a]"<" values are reporting limits.
[b]Total 1,2-DCE is the sum of cis-1,2-DCE and trans-1,2-DCE.
[c]Total COPC is the sum of the individual COPC concentrations. The cis-1,2-DCE and trans-1,2-DCE values are not part of the total COPC value because these values are included in the total 1,2-DCE value. "J" values are not included in the total COPC value.

ND = Not detected.
J = Estimated value, result is between the reporting limit and the method detection limit.
Arsenic, while a COPC, is not included in this table, nor in the Total COPC value.

Table 9. COPC Concentrations at the Wastewater Neutralization Area (reported in micrograms per liter)[a]

Location	Screen Depth (ft)	Date Sampled	Arsenic	Total COPC[b]
FDEP MCL			**50**	
PIN18	**Wastewater Neutralization Area**			
0500	11–16	10/5/2005	52.3	52.3
		3/14/2006	61.3	61.3
		9/11/2006	76.5	76.5
0502	11–16	10/5/2005	33.7	33.7
		3/14/2006	40.3	40.3
		9/11/2006	116	116
0503	10–20	3/11/2006	<2.9	ND
		10/3/2006	<2.8	ND
0504	13–22	3/13/2006	<2.9	ND
		10/3/2006	<2.8	ND
0505	10.5–20.5	3/11/2006	<2.9	ND
		10/5/2006	3.6B	ND
0506	12–22	3/11/2006	<2.9	ND
		10/5/2006	<2.8	ND
0507	27–37	3/11/2006	<2.9	ND
		10/3/2006	<2.8	ND
0508	31–41	3/13/2006	<2.9	ND
		10/3/2006	<2.8	ND
0509	27.5–37.5	3/11/2006	<2.9	ND
		10/5/2006	<2.8	ND
0510	27.5–37.5	3/11/2006	3.2B	ND
		10/5/2006	<2.8	ND
0519	12.5–22.5	10/3/2006	<2.8	ND
0520	32.5–42.5	3/14/2006	<2.9	ND
		10/4/2006	<2.8	ND
0521	20–30	10/5/2005	<2.9	ND
		3/14/2006	3.5B	ND
		9/11/2006	3.7B	ND
0522	5–15	10/5/2005	13.7	13.7
		3/14/2006	6.8B	ND
		9/11/2006	7.9B	ND
0523	32.5–42.5	10/5/2005	<2.9	ND
		3/13/2006	<2.9	ND
		9/11/2006	<2.8	ND
0524	20–30	10/5/2005	8.9B	ND
		3/13/2006	38.4	38.4
		9/11/2006	35.9	35.9
0525	5–15	10/5/2005	118	118
		3/13/2006	32.3	32.3
		9/11/2006	72.8	72.8
0526	19.5–29	3/15/2006	<2.9	ND
		10/3/2006	<2.8	ND

Table 9 (continued). COPC Concentrations at the Wastewater Neutralization Area (reported in micrograms per liter)[a]

Location	Screen Depth (ft)	Date Sampled	Arsenic	Total COPC[b]
FDEP MCL			**50**	
PIN18	**Wastewater Neutralization Area**			
RW02	10–20	3/14/2006	41.5	41.5
		9/11/2006	76.4	76.4
RW03	9–24	3/14/2006	11.4	11.4
		9/11/2006	36.1	36.1
RW0501	11–16	3/14/2006	145	145
		9/11/2006	150	150

[a]"<" values are reporting limits.
[b]Total COPC is the sum of the individual COPC concentrations. "J" values or "B"-qualified arsenic values are not included in the total COPC value.

ND = Not detected.
B = Estimated value for inorganics; result is between the instrument detection limit and the reporting limit.

Table 10. Relative Percent Difference (RPD) for Duplicate Samples

Sample ID	Duplicate ID	Job Number	Analyte	S	D	RPD	RL	5xRL	Fail
PIN12−S35B	PIN24−0500	F43599	Arsenic	23.6	21.4	9.8	10	50	
			cis-1,2-Dichloroethylene	71,700	70,600	1.5	1,000	5,000	
			trans-1,2-Dichloroethylene	10,900	10,700	1.9	1,000	5,000	
			Trichloroethylene	19,400	18,100	6.9	1,000	5,000	
			Vinyl chloride	18,700	19,300	3.2	1,000	5,000	
PIN12−0525	PIN24−0504	F43880	cis-1,2-Dichloroethylene	2.5	2.6	3.9	1.0	5.0	
PIN15−0567	PIN24−0501	F43553	Arsenic	15.0	18.4	20.4	10	50	
			cis-1,2-Dichloroethylene	5.2	5.2	0.0	1.0	5.0	
			trans-1,2-Dichloroethylene	1.6	1.8	11.8	1.0	5.0	
			Vinyl chloride	1.1	1.0	9.5	1.0	5.0	
PIN21−0503	PIN24−0505	F43790	Non-detect for VOCs						

S = Original sample (N001), VOC concentrations in µg/L and metals in mg/L.
D = Duplicate sample (N002), VOC concentrations in µg/L and metals in mg/L.
RL = Reporting limit.
Fail = Volatiles "Fail" when the RPD is greater than ± 30% and the concentration is more than 5 times the reporting limit. Metals "Fail" when the samples are more than 5 times the reporting limit and the RPD is greater than 20%. For metals samples that are less than 5 times the reporting limit the difference must be less than ± the reporting limit (this includes the case when only one of the duplicate/sample values is less than 5 times the reporting limit).

Table 11. Summary of Analytical Results for the Building 100 Area Treatment System (reported in micrograms per liter unless otherwise noted)[a]

Location[b]	Date Sampled	TCE	cis-1,2-DCE	trans-1,2-DCE	Total 1,2-DCE[c]	1,1-DCE	Vinyl chloride	Total COPC[d]	$CaCO_3$ mg/L	Fe mg/L
PIN12	**Industrial Drain Leaks Building 100**									
TRTI	6/2/2006	1,390	1,390	46.5	1,436.5	20.4	249	3,095.9	384	5.23
	7/6/2006	1,110	1,120	26.2	1,146.2	<10	113	2,369.2	358	4.79
	8/3/2006	960	1,020	21.3	1,041.3	11.4J	143	2,144.3	383	5.1
TRTE	6/2/2006	602	815	20.5	835.5	5.8	70	1,513.3	384	5.17
	7/6/2006	<0.5	0.93J	<0.5	0.93J	<0.5	<0.5	ND	358	4.71
	8/3/2006	2.2	4.4	<0.5	4.4	<0.5	<0.5	6.6	377	4.98

[a]"<" values are method detection limits.
[b]TRTI is the system influent and TRTE is the system effluent.
[c]Total 1,2-DCE is the sum of cis-1,2-DCE and trans-1,2-DCE.
[d]Total COPC is the sum of the individual COPC concentrations. The cis-1,2-DCE and trans-1,2-DCE values are not part of the total COPC value because this value is included in the total 1,2-DCE value. "J" values are not included in the total COPC value.

J = Estimated value, result is between the reporting limit and the method detection limit.
ND = Not detected.

Table 12. Summary of Historical Ground Water Recovery from the Building 100 Recovery Wells

Report Date	Volume (gallons)	Cumulative Total To Date (gallons)
April−June 2004	188,490	188,490
July−September 2004	410,734	599,224
October−December 2004	589,242	1,188,466
January−March 2005	470,708	1,659,174
April−June 2005	490,041	2,149,215
July−September 2005	498,292	2,647,507
October−December 2005	471,778	3,119,285
January−May 2006	504,053	3,623,338
June−November 2006	378,594	4,001,932

Note: The Building 100 Ground Water Treatment System started operations in May 2004 and ended in August 2006.

Table 13. Estimated Mass of VOCs Recovered from the Building 100 Recovery Wells During January through May 2006

Date	Volume treated (gal)	Concentration[a]					
		TCE (µg/L)	cDCE (µg/L)	tDCE (µg/L)	1,1-DCE (µg/L)	VC (µg/L)	total COPC (µg/L)
June 2006	166,747	1,390	1,390	46.5	20.4	249	3,095.9
July 2006	107,322	1,110	1,120	26.2	<10	113	2,369.2
August 2006	104,525	960	1,020	21.3	11.4J	143	2,144.3

Date	Volume treated (gal)	Mass Recovered[b]					
		TCE (lbs)	cDCE (lbs)	tDCE (lbs)	1,1-DCE (lbs)	VC (lbs)	total COPC (lbs)
June 2006	166,747	1.9	1.9	0.1	0.03	0.3	4.3
July 2006	107,322	1.0	1.0	0.02	0.004	0.1	2.1
August 2006	104,525	0.8	0.9	0.02	0.01	0.1	1.9

[a]These concentrations represent the average of monthly treatment system influent sampling results.
[b]Includes "J" (estimated) values. For any detection of "<", which indicates the laboratory could not detect that analyte, 50 percent of the "<" value was used for the calculation of recovery.

M025 16.41
M024 15.93
0503 16.21
RW01 16.3
RW02 15.88
M012 16.7
M035 16.11
RW03 16.26
M405 15.81
M003 16.16
West Pond
W005 13.85
Pond 5
13.85
14
15
16
M14S 16.1
0563 15.76
0565 15.19
0577 15.36
0575 15.55
M27S 14.52
0573 16.17
0561 15.67
0567 15.01
0530 14.61
0579 15.68
M03S 16.19
M30S 15.4
0515 14.81
M29S 14.47
East Pond
0520 14
M16S 15.87
0581 15.18
M31S 14.93
0507 13.78
E001 13.79
0583 16.14
M32S 15.52
0568 15.52
0510 14.65
0571 14.86
10-0500 15.76
0521 15.52
0523 15.82
RW01 15.38
0504 16.04
0526 14.96
0500 16.18
RW02 16.11
0524 15.82
RW0501 16.05
RW03 15.73
0521 15.67
S35B 14.64
0506 14.81
TE03 14.62
S67C 14.58
S67B 14.48
S72C 13.36
S72B 13.36
S71C 13.89
S71B 14.34
0513 13.74
0526 13.53
S70C 13.83
S70B 13.79
S73C 13.36
S73B 13.54
0517 14.69
0525 14.05
S68C 13.92
S68B 13.54
S69C 13.65
S69B 13.64
21-0503 13.15
Southwest Pond
SW01 13.58
S001 13.59
South Pond
21-0505 13.58
South Pond
21-0512 13.43

S35B 14.64 Well Number and Ground Water Elevation in Feet (MSL)
Monitoring Well
Recovery Well
Surface Sample
14 Water Table Contour in Feet (MSL)
Inferred Contour
Contour Interval = 1.0 Feet
Inferred Ground Water Flow Direction
Slurrywall
Fence
Road
Railroad
Tank
Concrete Pad
NAPL Area B
Building
Pond

3

90 45 0 90 Feet

U.S. DEPARTMENT OF ENERGY
GRAND JUNCTION, COLORADO
PREPARED BY: S.M. Stoller Corporation
A TEAM FOR EXCELLENCE FOR DOE-LM

Plate 1: Sitewide Shallow Surficial Aquifer Contours\

DATE PREPARED: December 13, 2006
FILENAME: N0094700

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M023 15.74
M054 16.18
0502 16.2
M055 16.2
M038D 16.86
M015 16.38
M056 16.18
M064 16.97
M011 16.65
M053 16.01
M001 16.4
M063 16.58
MWL2 16.02
MWL4 15.89
MWL5 16.68
MWL6 16.65
MWL1 16.71
M049 16.62
M057 16.15
M18D 16.01
M441D 15.75
MWL3 16.18
M062 13.08
M058 16.15
M019 16.15
M028 16.53
M060 16.4
M059 16.13
M061 15.92
M40D 16
M2D 16.11
M005 16.27
M036 16.03
M007 16.18
West Pond
Pond 5
M33D 16.01
M24D 15.41
M14D 16.05
0518 15.04
0562 15.59
0564 15.28
0578 15.41
0576 15.37
0574 15.47
M27D 14.93
0560 15.51
0566 15.21
0535 14.93
0580 15.57
East Pond
M30D 15.29
0514 14.89
M29D 14.51
M16D 15.87
M31D 14.89
0582 15.1
0557 16.1
0537 15.45
RW16 15.34
M32D 15.18
0569 14.4
0559 15.26
0572 14.63
0570 15.45
RW02 15.48
0522 15.44
0520 15.06
0508 16.58
0523 15.79
0520 15.38
0509 15.2
S67D 14.4
0514 13.95
0516 14.1
0518 14.71
0524 14.07
S68D 13.85
S69D 13.46
S72D 13.31
S71D 13.84
S70D 13.73
S73D 16.97
Southwest Pond
South Pond
South Pond
16
15
14
90 45 0 90 Feet

Value not used in contouring
0508 16.58 Well Number and Ground Water Elevation in Feet (MSL)
Monitoring Well
Recovery Well
14 Water Table Contour in Feet (MSL)
Contour Interval = 1.0 Feet
Inferred Ground Water Flow Direction
Slurrywall
Fence
Road
Railroad
Tank
Concrete Pad
NAPL Area B
Building
Pond

3

U.S. DEPARTMENT OF ENERGY
GRAND JUNCTION, COLORADO
S.M. Stoller Corporation
A Shaw AECOM Company

Plate 2: Sitewide Deep Surficial Aquifer Contours\R

December 13, 2006
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