DOE–LM/GJ1009–2005

Pinellas Environmental Restoration Project

Sitewide Environmental Monitoring Quarterly Progress Report for the Young - Rainey STAR Center July Through September 2005

October 2005

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 Amendment
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
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
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 Amendment (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 1994). 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. 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), are undergoing remediation activities. Two SWMUs, PIN06 and PIN12, are currently being remediated together because of their similar ground water contamination and proximity. These two SWMUs 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 quarterly progress report for each of these four SWMUs. The results of monitoring activities, a summary of the treatment system performance, 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 dichloromethane (also known as 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 final technology for each task will be identified at a later date.

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 an effective 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.

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 1996).

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. 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 2005* (DOE 2005).

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, 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. In 2003, monitoring well PIN18−0501 was converted to a recovery well. Current activities at the WWNA include ground water extraction from three recovery wells, PIN18−RW02, −RW03, and −RW0501, that discharge to the STAR Center's wastewater system. Table 1 lists the results of the analysis of arsenic in ground water that is being recovered from these three wells.

1.4 Site Update

Significant ongoing site activities consist of the Northeast Site NAPL Area B construction activities, normal operations of the Building 100 recovery wells, and air stripper and WWNA recovery wells. Significant activities 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 2005* (DOE 2005).

Risk Based Corrective Action legislation is currently being evaluated for applicability to assist in expediting closure at some or all of the SWMUs at the STAR Center.

1.5 Quarterly Site Activities

- Obtained water-level measurements from all accessible monitoring wells, recovery wells, and ponds on July 12−13, 2005.
- Conducted the quarterly sampling event in July 2005. The sampling event included collecting water samples from 46 monitoring and recovery wells. VOCs samples were collected at 16 wells and arsenic was sampled at 31 wells. Florida Petroleum Range Organic samples were collected at 14 monitoring wells.
- Reported the results of quarterly sampling events (this document).

2.0 Water-Level Elevations

2.1 Work Conducted and Methods

Within an 8-hour period on July 12, 2005, and a 2-hour period on July 13, 2005, depth-to-water measurements were taken at all accessible monitoring wells and extraction wells at the STAR Center. The water levels were measured with an electronic water-level indicator with the exception of some of the ponds, which are measured with gauging stations. Ground water and surface-water elevations are listed in Table 2.

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, respectively).

The water levels throughout the STAR Center indicate that the water table is highest in the general area around the West Pond (Plates 1 and 2). As ground water flows from this recharge area, it disperses to the west, south, and east. These flow patterns are similar for both the shallow and deep surficial aquifers, and are consistent with previously observed flow patterns.

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 July 2005. As seen on Figure 4, in July 2005 there was a differential of about 0.3 ft between the downgradient and upgradient sides of the wall as measured in monitoring wells PIN15−M24D and −M33D, respectively. As seen the previous four quarters, this differential is less than the historical range of about 2 to 5 ft, and is believed to be the result of not withdrawing ground water at the Northeast Site. This has in turn resulted in a return to more natural ground water flow patterns for the surficial aquifer, with flow primarily to the east. Water-table elevations indicate that the shallow surficial aquifer was slightly recharging the East Pond in July 2005 (Figure 3). This recharge pattern has been consistent during the past year.

In the shallow surficial aquifer at the Northeast Site, the hydraulic gradient was approximately 0.007 feet per foot (ft/ft), with a general component of flow to the east (Plate 1). This flow pattern is similar to previously observed flow patterns under static, non-pumping conditions. Using Darcy's Law, along with approximations of 1 ft/day for hydraulic conductivity and 0.3 for effective porosity, ground water at the Northeast Site is estimated to move about 9 ft/year. This velocity is significantly less than historical estimates of 17 and 22 ft/year, but similar to that observed during the previous four quarters. In January, April, and July 2005, similar flow patterns were observed in the deep surficial aquifer (Plate 2).

In the south-central part of the STAR Center, surficial aquifer flow is influenced by ground water withdrawals from recovery wells PIN18−RW02, −RW03, and –RW0501 at the WWNA, and recovery wells PIN12−RW01 and –RW02 at Building 100 (Figures 5 and 6). The ground water measurement in recovery well −RW0501 is considered erroneous and that water level was not used to construct the Figure 5 contour map. For the past 2 years, shallow ground water beneath Building 100 has been observed to flow to the southeast under a very slight gradient. In July 2005, the overall general component of ground water flow was again to the southeast. 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. Shallow ground water at the WWNA flows to the southeast, except where affected by recovery well withdrawals.

Water-level elevations in the three wells screened in the upper part of the Floridan aquifer are presented in Table 3. The water levels in these wells indicate that the potentiometric surface of the Floridan aquifer at the site was 1 to 2 ft higher in July 2005 than in April 2005.

A downward vertical hydraulic differential of approximately 7.7 ft existed between the surficial aquifer wells and Floridan aquifer wells at the Northeast Site. Table 4 illustrates the vertical hydraulic differential. This differential is consistent with the historical range of 5 to 9 ft.

Surface-water elevations were recorded from the East, South, and Southwest Ponds at the site and are presented in Table 5. A surface water elevation for the West Pond could not be read because construction activities damaged the staff gauge in the West Pond. It is expected that a new staff gauge will be installed prior to January 2006. The ponds are hydraulically connected to the shallow surficial aquifer system (Plate 1). The South and Southwest Ponds elevations have always been essentially the same.

3.0 Ground Water Sampling and Analytical Results

3.1 Work Performed

During quarterly sampling in July 2005, ground water samples were collected from 46 monitoring and recovery wells. VOCs analyses were performed on 16 samples using EPA SW-846 Method 8260. Arsenic was analyzed in 31 samples using EPA SW-846 Method 6010. Fourteen wells were sampled for Florida Petroleum Range Organics. Laboratory reports are provided in Appendix A.

During the period of July1 to September 30, 2005, VOCs, iron, and hardness (as $CaCO_3$) were measured for the Building 100 treatment system and results are provided in Appendix B. Laboratory reports for the three recovery wells and the two effluent samples from the WWNA are provided in Appendix C.

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 but one of the monitoring wells were micropurged using a dedicated bladder pump, and sampling was performed when the field measurements stabilized. The remaining well was conventionally purged with a peristaltic pump; purging was considered complete once field measurements had stabilized. Extraction wells were sampled using their associated flowlines with dedicated sampling ports. Table 6 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 7 shows the results of arsenic sampling at six Northeast Site wells. Arsenic concentrations ranged from nondetect to 0.0664 mg/L in PIN15−M14S.

Table 8 shows the results of petroleum hydrocarbon samples collected from inside and adjacent to the former NAPL Area A. Concentrations ranged from nondetect to 5.78 mg/L in PIN15−0575.

Concentrations of contaminants of potential concern (COPCs) in samples collected from wells at the Northeast Site (PIN15) are included in Table 9, which also shows the previous four quarters of data for comparison purposes. Figure 7 shows the total COPCs (TCOPCs) concentrations.

No COPCs were detected in the four monitoring wells listed below:

PIN15–0560	PIN15–0561	PIN15–0564	PIN15–0565

The 10 monitoring wells listed below contained detectable COPCs:

PIN15–0562	PIN15–0566	PIN15–0573	PIN15–0575	PIN15–0577
PIN15–0563	PIN15–0567	PIN15–0574	PIN15–0576	PIN15–0578

TCOPCs concentrations ranged from below detection limit to 266.8 micrograms per liter (µg/L) in PIN15−0566. The COPC compound detected at the highest concentration was TCE at 160 µg/L.

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

Table 7 shows the results of arsenic sampling in the Building 100 Area. Arsenic values ranged from nondetect to 0.0516 mg/L in PIN12−S68B.

TCOPCs concentrations in samples collected from the two recovery wells sampled at the Building 100 Area are included in Table 10, which also shows the previous four quarters of data for comparison purposes. Figure 8 shows the TCOPCs concentrations. Both wells, PIN12−RW01 and −RW02, showed detectable quantities of VOCs. TCOPCs concentrations ranged from 837.2 to 7,301µg/L. The COPC compound detected at the highest concentration was TCE at 4,220 µg/L in PIN12−RW01.

3.2.3 Wastewater Neutralization Area (PIN18)

The volatile COPC at the WWNA is vinyl chloride. No VOC sampling was performed at the WWNA during this quarter.

Arsenic samples were collected from seven monitoring wells and three recovery wells. Results of arsenic samples from the three recovery wells that are sampled monthly are presented in Table 1. Concentrations of COPCs from quarterly sampling are listed in Table 11 and TCOPCs (arsenic and vinyl chloride) are shown in Figure 9.

No arsenic was detected in the two wells listed below.

PIN18–0521	PIN18−0523

The eight monitoring and recovery wells listed below had detectable arsenic concentrations.

PIN18–0500	PIN18−0522	PIN18–0525	PIN18–RW03
PIN18–0502	PIN18–0524	PIN18–RW02	PIN18–RW0501

The highest concentration of arsenic detected was 240 µg/L in PIN18−RW0501 (note that the units for arsenic are converted from mg/L to µg/L so that TCOPCs for this area could be calculated using consistent units).

3.3 Quality Assurance/Quality Control

The analytical results from the analytical laboratory, Accutest, were checked for quality assurance/quality control (QA/QC) through duplicate samples and trip blanks. Detected analytes (VOCs, arsenic, and Florida Petroleum Range Organics) for each duplicate sample are listed in Table 12. The duplicate sample results were compared and the relative percent differences (RPDs) between the results were calculated. One duplicate was analyzed for VOCs, two for arsenic, and one for Florida Petroleum Range Organics.

A total of 32 duplicate analyses for individual analytes were performed. One sample duplicate pair failed to meet the guidance criteria for arsenic that the RPD should be less than 20 percent at five times the detection limit. The sample/duplicate pair that failed was PIN15−0567. All data passed QA/QC criteria at a Class A level, indicating that all 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 16 ground water samples analyzed for VOCs, with one duplicate VOC sample collected. There were 31 ground water samples analyzed for arsenic, with two duplicate samples. There were 14 Florida Petroleum Range Organics with one duplicate. The duplicate requirements for this sampling event were met.

There were six 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 this quarter. The software prints a report of analytical results that fall outside of historical minimum or maximum values. No anomalous results were identified during the April sampling event.

Anomalous results identified during previous events include location PIN12−S73B, which has been tracked since April 2004 because toluene was detected where it had not previously been present. No VOC sampling was performed in this well this quarter. Tracking of toluene in this well will continue.

4.0 Treatment System and Recovery Well Performance

4.1 Building 100

From July 1 through September 30, 2005, 498,292 gallons of ground water were processed by the Building 100 treatment system from the Building 100 Area recovery wells. Operations for this quarter were continuous with no interruptions to system operation.

Figures 10, 11, and 12 present the monthly volume of ground water recovered during this quarter from the Building 100 recovery wells. Analytical results of samples collected from the Building 100 Area treatment system influent and effluent streams are listed in Table 13.

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 14. Table 15 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.

4.2 Wastewater Neutralization Area

Two WWNA recovery wells (PIN18−RW02 and −RW03) are targeted to each produce approximately 2.5 gallons per minute (gpm) continuously with an electrical submersible pump set in each well at approximately 12 ft below land surface (bls). The third recovery well, PIN18−RW0501 is operating at approximately 0.8 gpm with a submersible electric pump installed at 15 ft below top of casing. Ground water recovery from PIN18−RW0501 was started on June 11, 2003.

The effluent ground water from each well is combined into a common header pipe and discharged into the industrial wastewater-receiving tank at the IWNF. During this quarter, 583,735 gallons of ground water were recovered from the subsurface. To date, there have been no exceedances of the WWNA discharge permit limits for arsenic.

5.0 Conclusions

The following conclusions are based on the quarterly sampling conducted in July.

- The surficial ground water flow rate and flow direction throughout the site were similar to those observed previously.
- The highest concentration of COPCs was detected at the Building 100 Area in well PIN12−RW01.

6.0 Tasks to be Performed Semi-Annually

The following tasks are expected to be conducted during the next semi-annual period (October 2005 through March 2006):

- The next scheduled semi-annual sampling event will occur in October 2005.
- Monthly sampling and analysis of the treatment systems will continue in order to provide compliance and system operations data.
- Utilization of the dedicated bladder pumps for quarterly sampling using the micropurging technique will continue.

7.0 References

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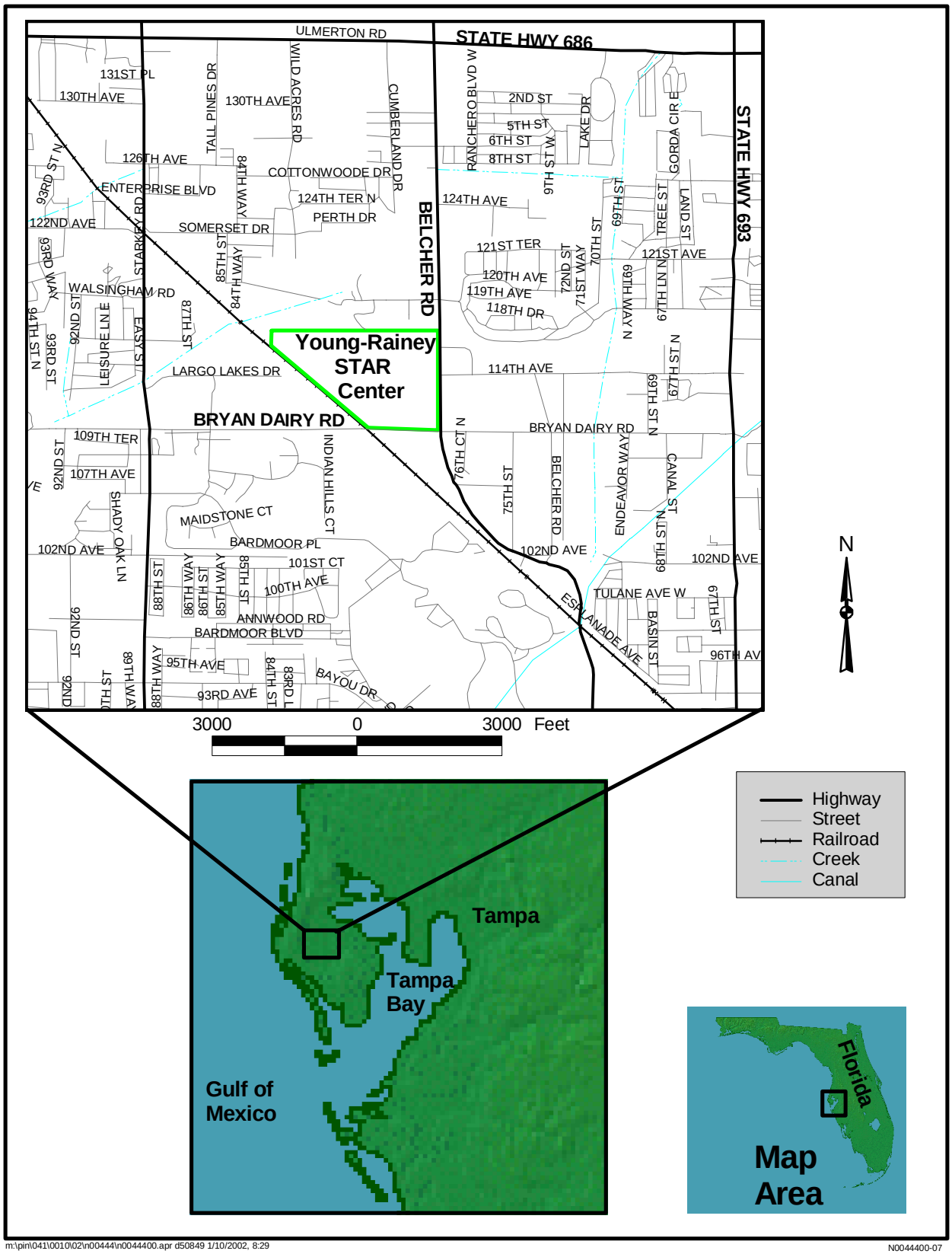
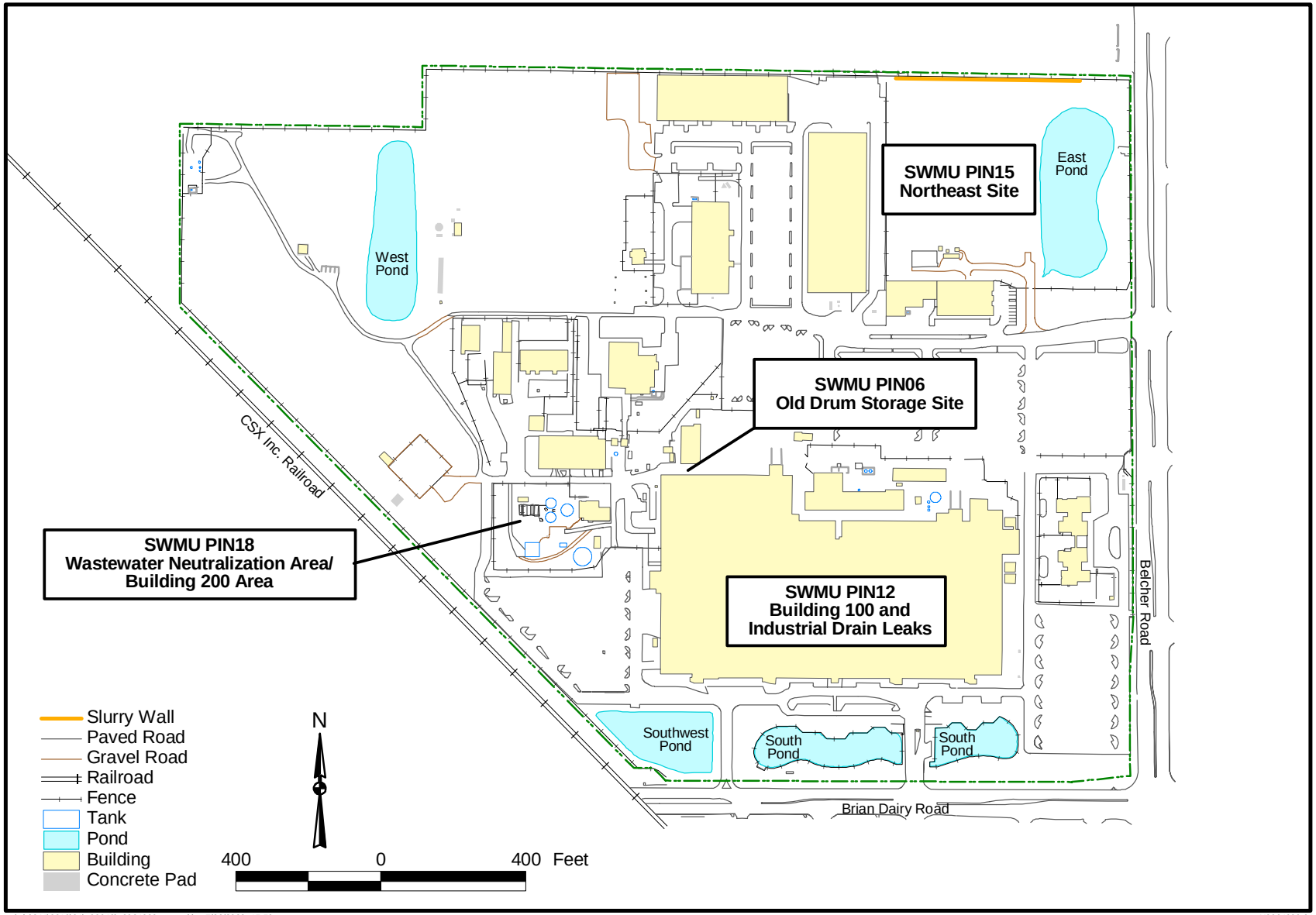


Figure 1. Young - Rainey STAR Center Location



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N0064600-01

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

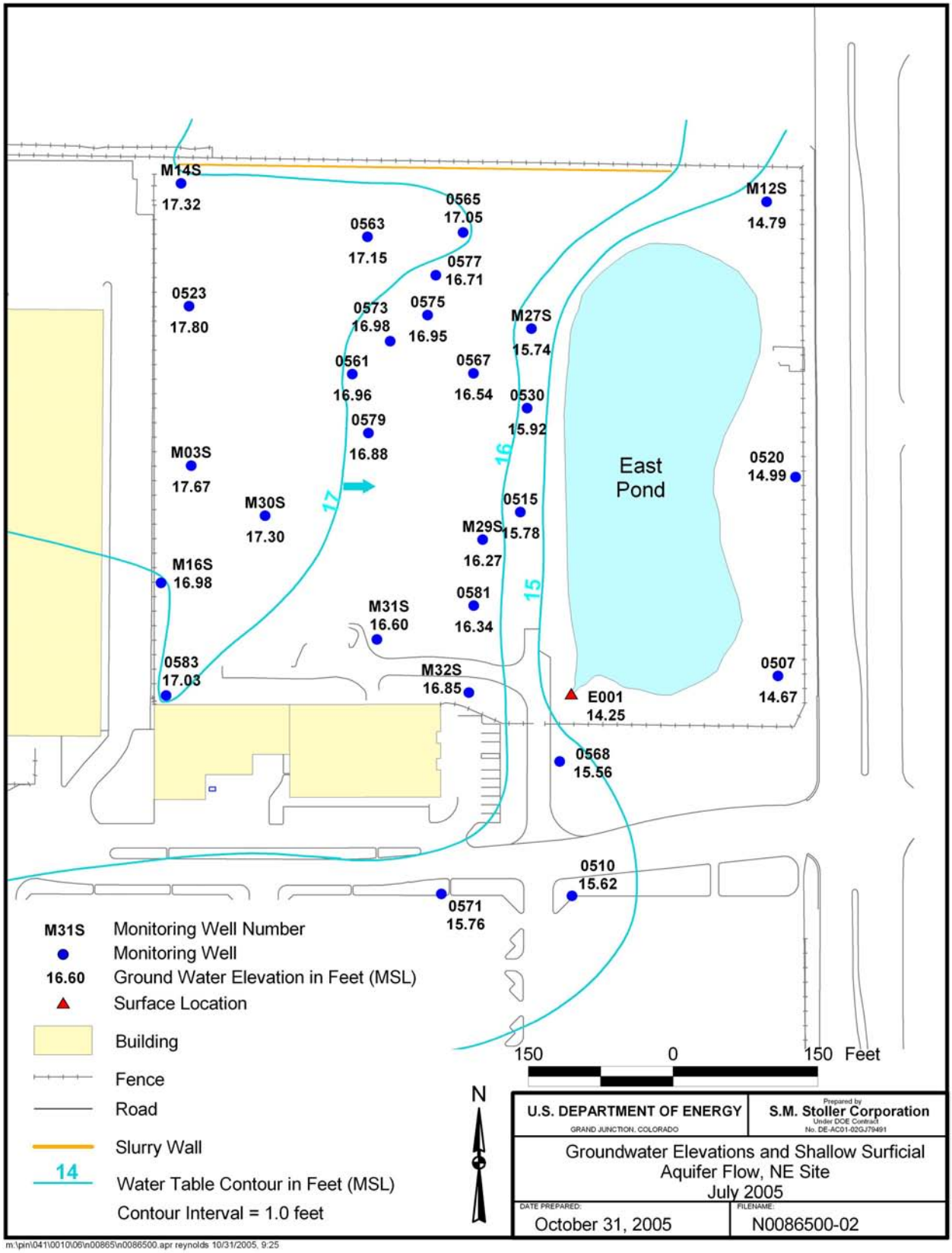


Figure 3. Ground Water Elevations and Shallow Surficial Aquifer Flow, Northeast Site, July 2005

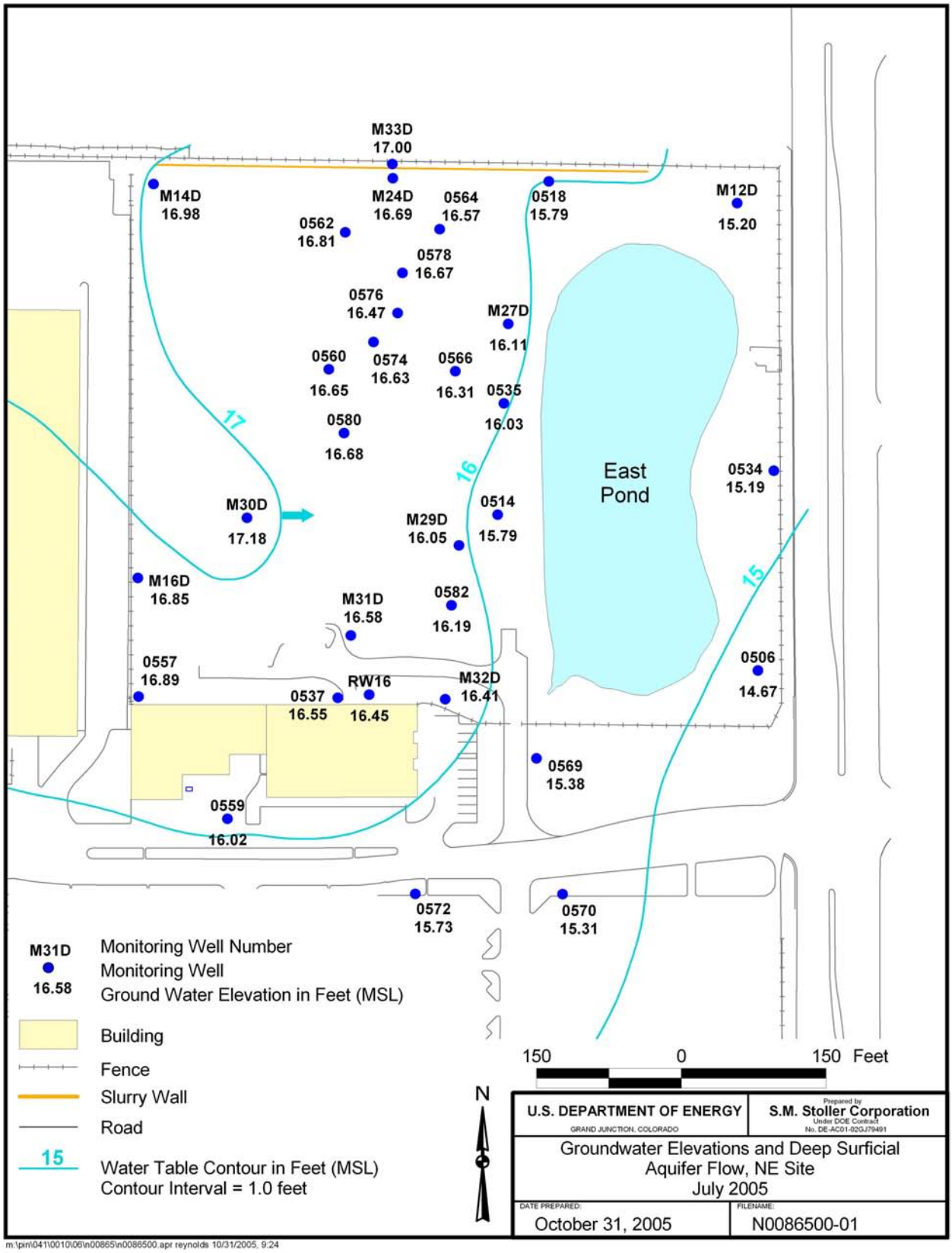


Figure 4. Ground Water Elevations and Deep Surficial Aquifer Flow, Northeast Site, July 2005

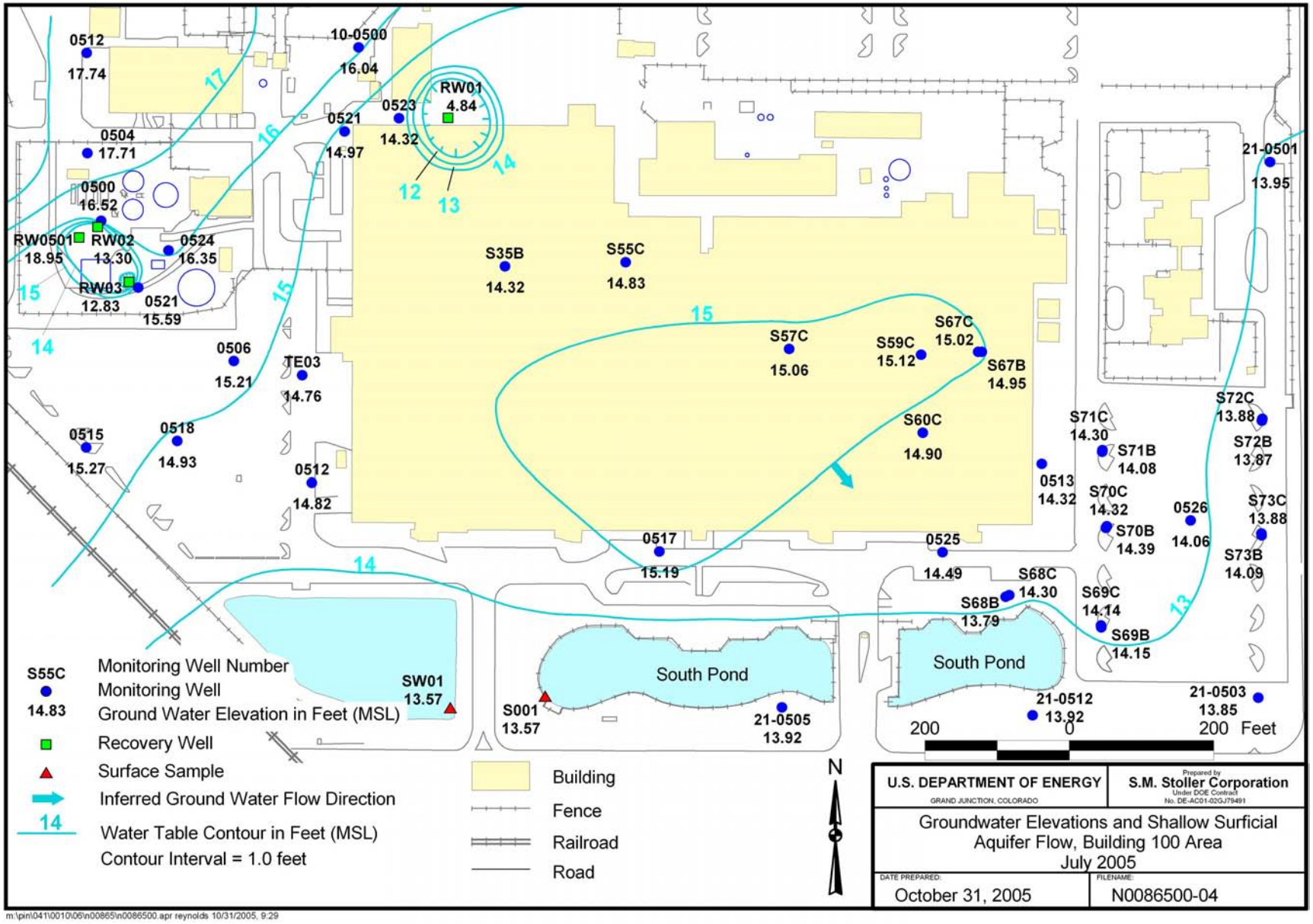


Figure 5. Ground Water Elevations and Shallow Surficial Aquifer Flow, Building 100 Area, July 2005

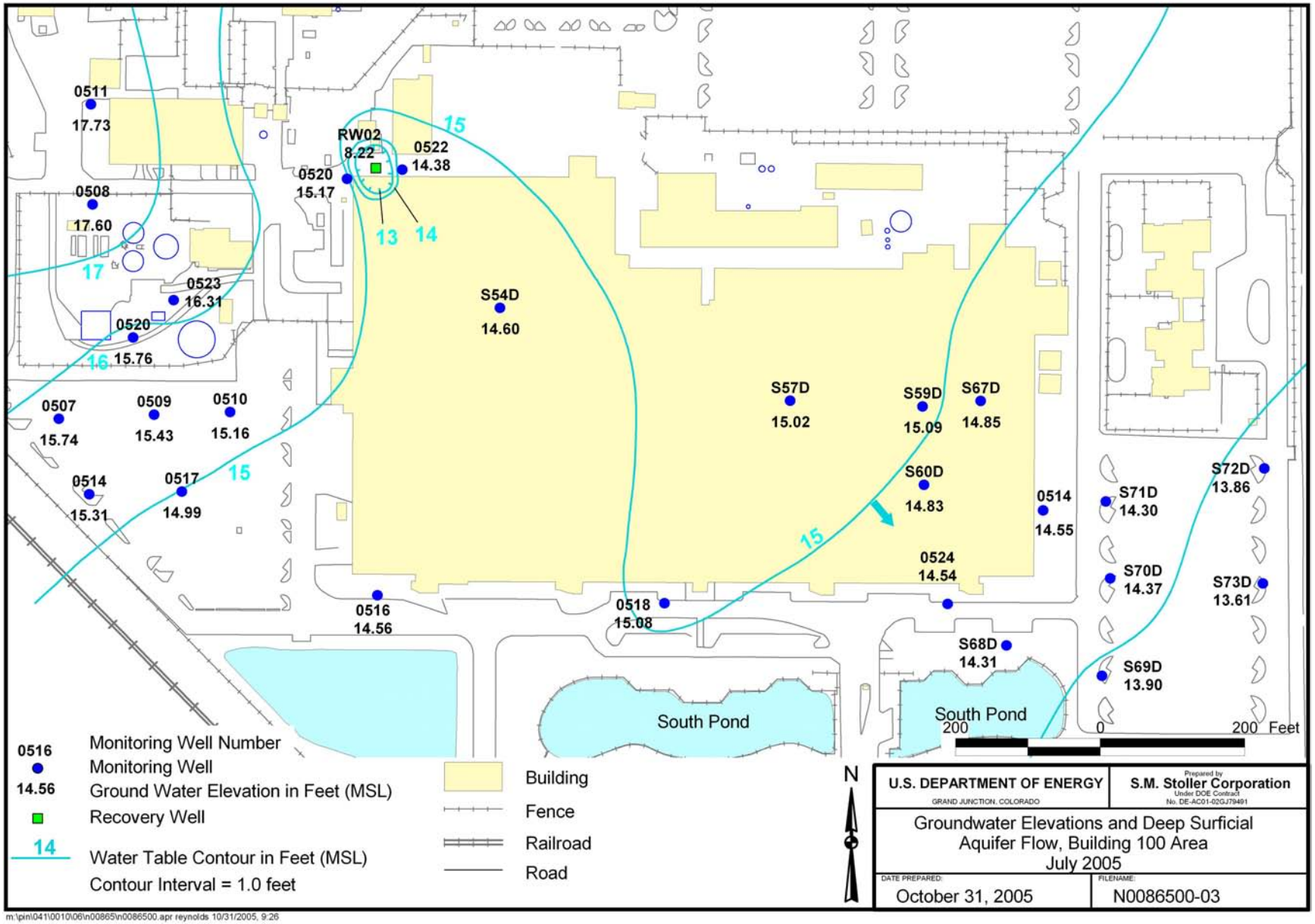


Figure 6. Ground Water Elevations and Deep Surficial Aquifer Flow, Building 100 Area, July 2005

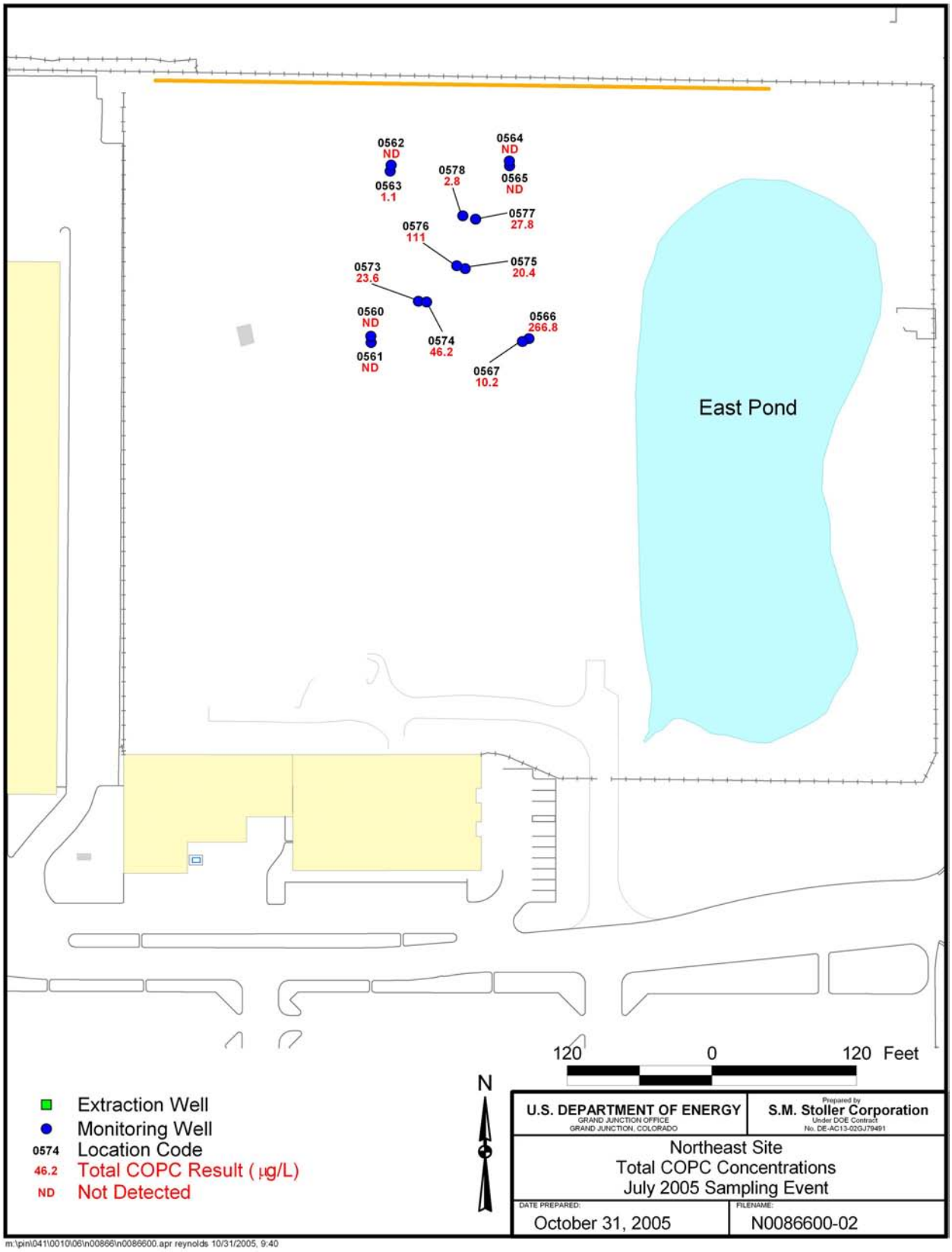


Figure 7. Northeast Site Total COPC Concentrations July 2005 Sampling Event

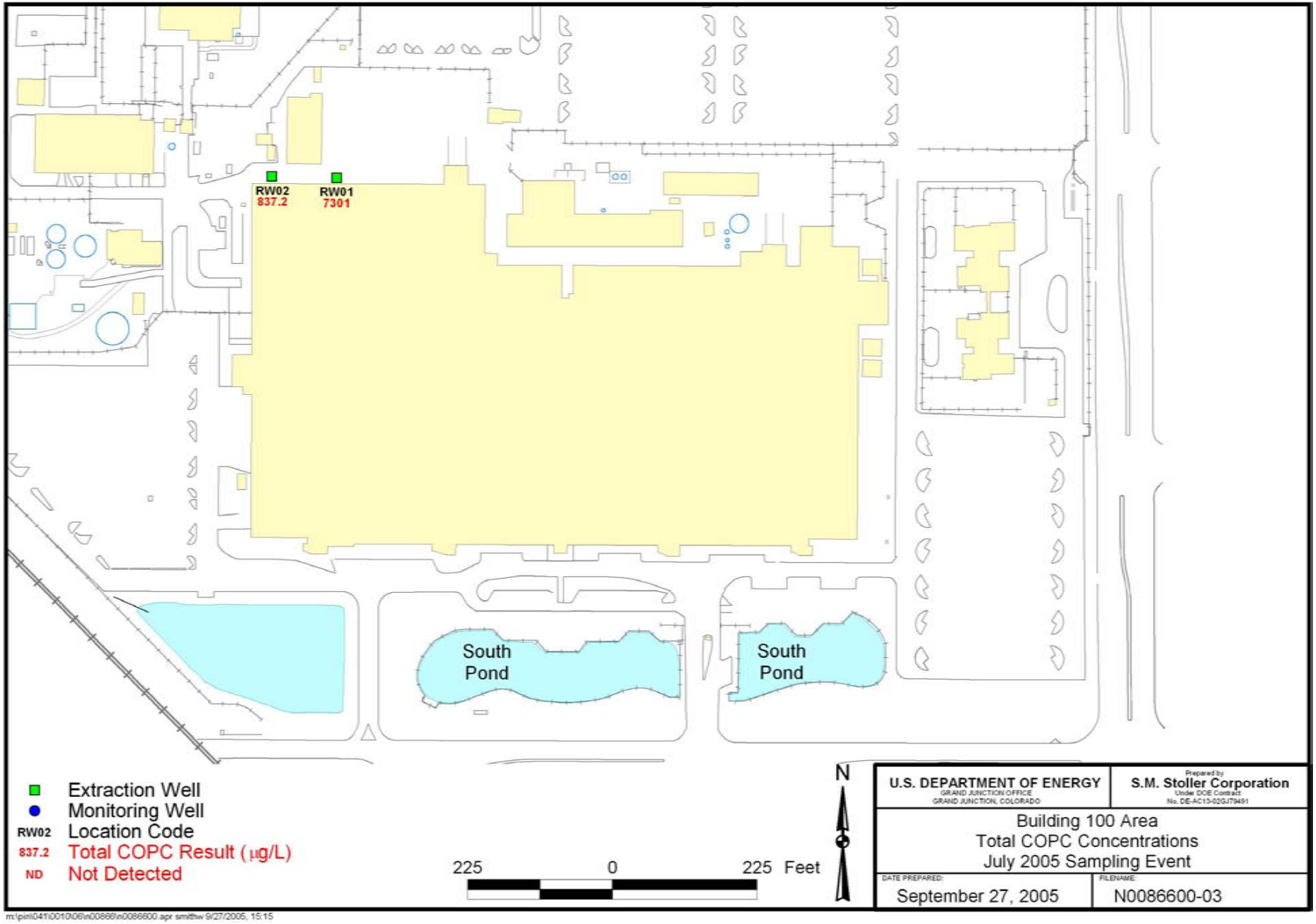


Figure 8. Building 100 Area Total COPC Concentrations July 2005 Sampling Event

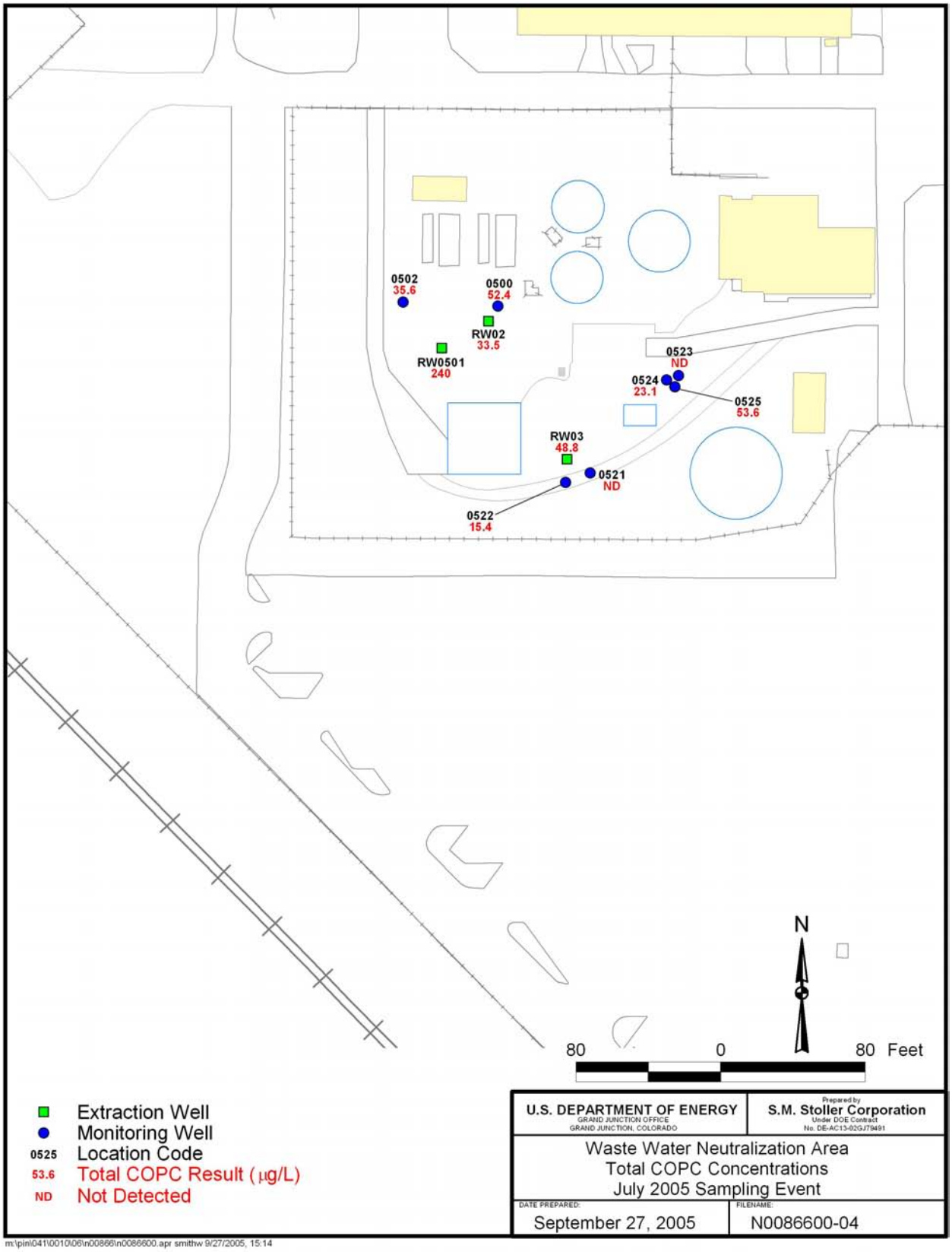


Figure 9. WWNA Total COPC Concentrations July 2005 Sampling Event

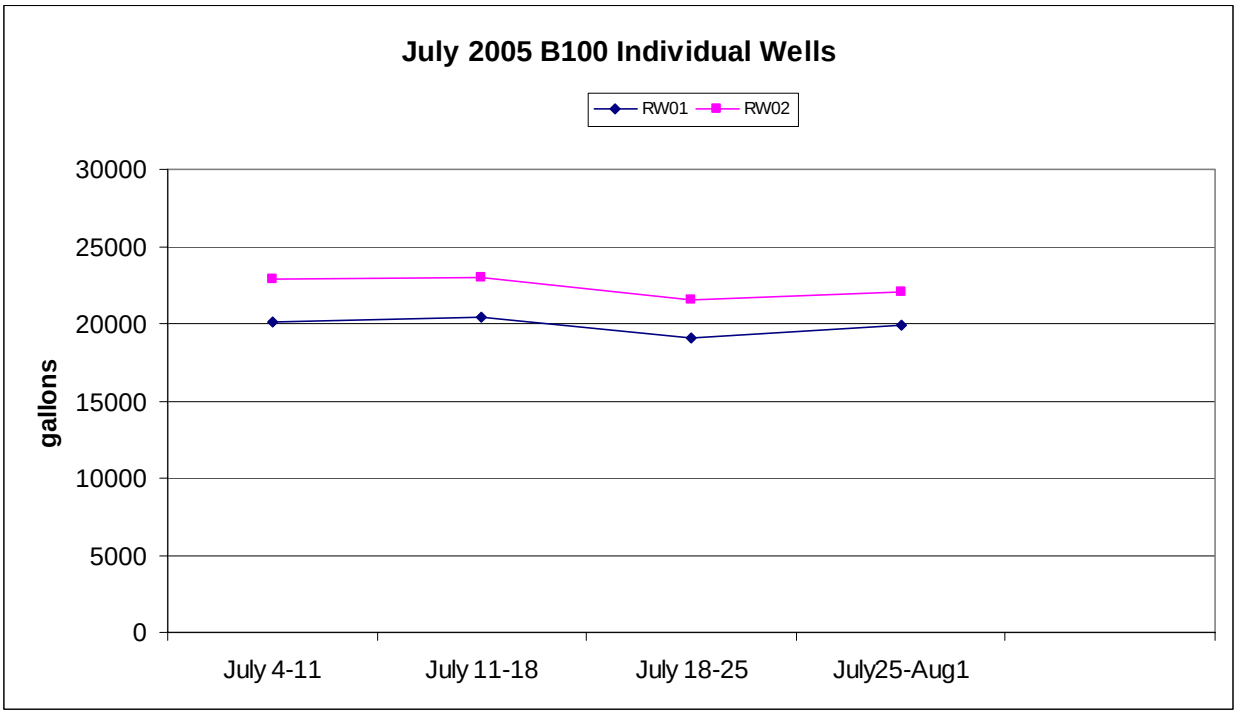


Figure 10. July 2005 Building 100 Ground Water Recovery

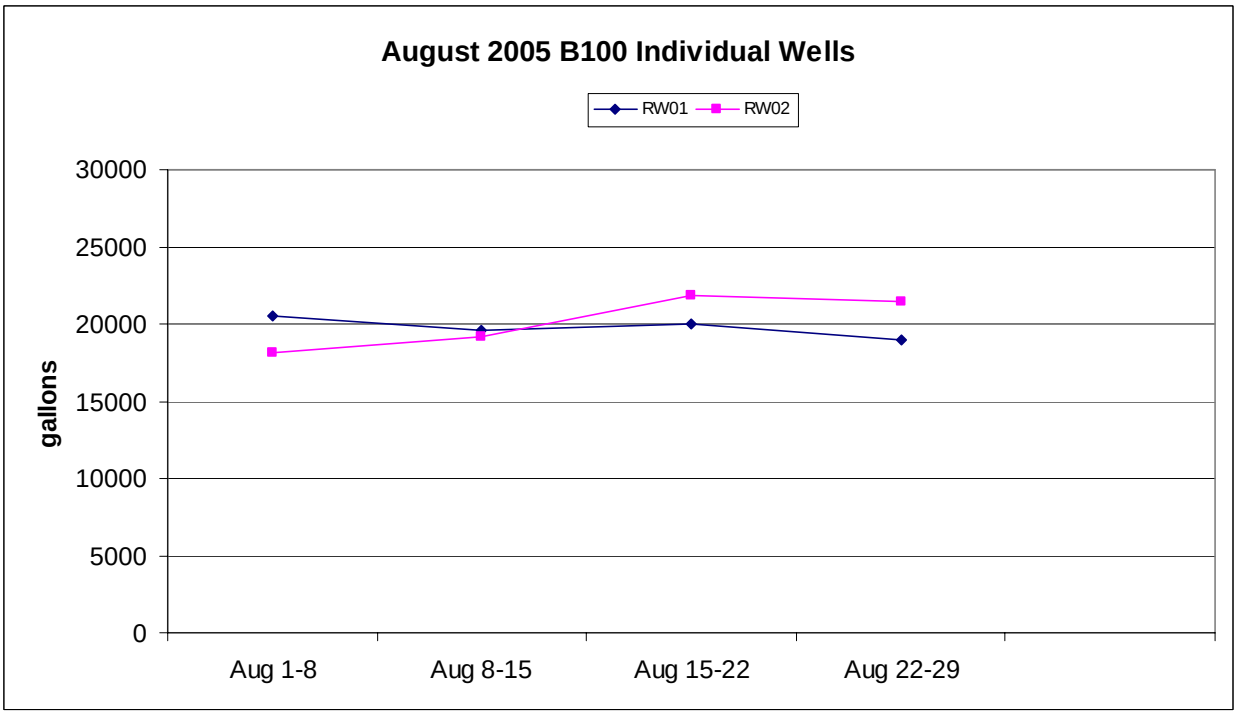


Figure 11. August 2005 Building 100 Ground Water Recovery

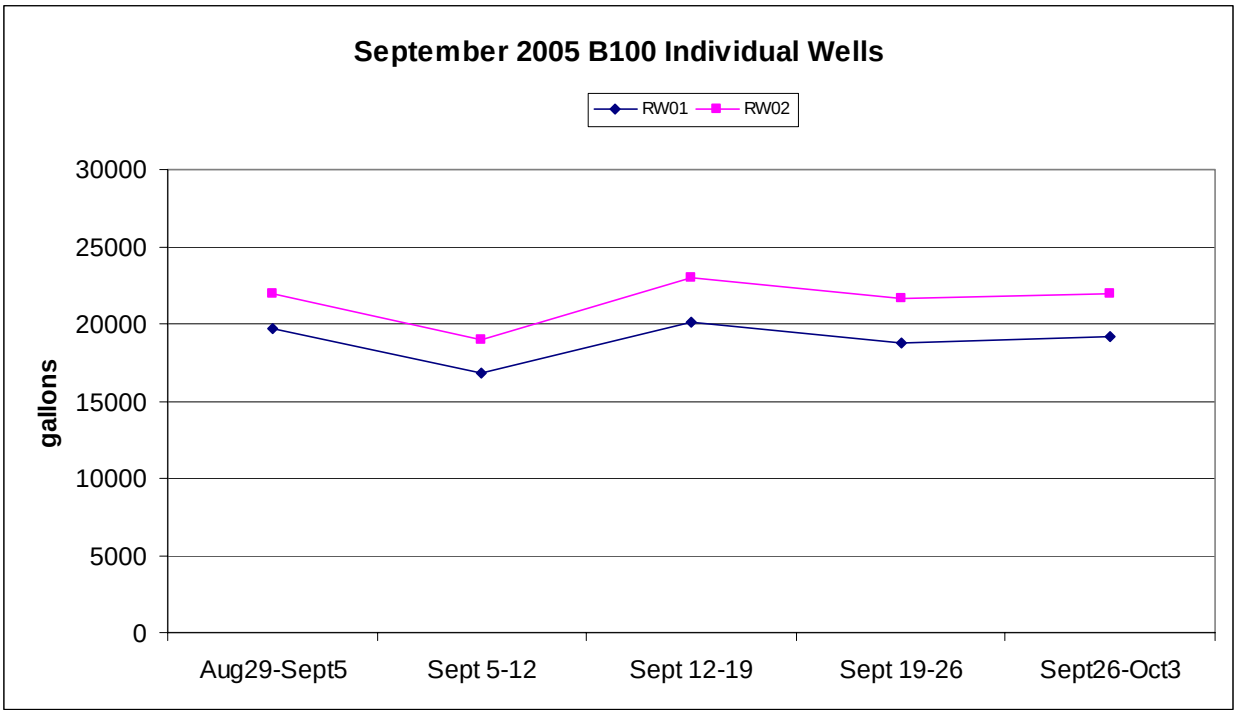


Figure 12. September 2005 Building 100 Ground Water Recovery

Table 1. WWNA Recovery Well Arsenic Concentrations
(reported in milligrams per liter)

Sample Date	RW02	RW03	RW0501[a]	RW02/RW03/RW0501 combined effluent
2/26/2001	0.08	0.1		0.095
2/27/2001	0.074	0.1		0.091
2/28/2001	0.074	0.091		0.074
3/1/2001	0.084	0.096		0.088
3/2/2001	0.088	0.095		0.089
3/5/2001	0.13	0.22		0.1
3/12/2001	0.37	0.11		0.13
3/19/2001	0.42	0.12		0.12
3/26/2001	0.15	0.16		0.8
4/2/2001	0.18	0.12		0.13
4/16/2001	0.18	0.17		0.13
5/1/2001	0.16	0.071		0.1
5/15/2001	0.14	0.15		0.093
5/30/2001	0.13	0.07		0.16
6/11/2001	0.11	0.068		0.083
6/26/2001	0.13	0.067		0.096
7/9/2001	0.14	0.054		0.087
7/23/2001	0.14	0.25		0.074
8/6/2001	0.11	0.2		0.18
8/21/2001	0.13	0.074		0.084
9/5/2001	0.13	0.054		0.091
10/8/2001	0.11	0.14		0.07
11/6/2001	0.095	0.053		0.076
12/7/2001	0.13	0.081		0.084
1/10/2002	0.11	0.081		0.076
2/5/2002	0.11	0.055		0.075
3/6/2002	0.12	0.05		0.076
4/2/2002	0.084	0.055		0.069
4/15/2002	--	0.049		--
4/16/2002	0.078	--		--
5/8/2002	0.11	0.048		0.071
6/4/2002	0.095	0.078		0.058
7/3/2002	0.16	0.056		0.074
7/15/2002	0.098	0.057		--
8/8/2002	0.0036J	0.11		0.065
9/10/2002	0.12	0.097		0.07
10/3/2002	0.097	0.054		0.071
11/22/2002	0.11	0.067		0.057
12/11/2002	0.11	0.056		0.07
1/2/2003	0.097	0.049		0.064
1/13/2003	0.082	0.061		--
2/4/2003	0.12	0.047		0.063
3/4/2003	0.079	0.19		0.059
4/7/2003	0.081	0.071		0.054

Table 1 (continued). WWNA Recovery Well Arsenic Concentrations
(reported in milligrams per liter)

Sample Date	RW02	RW03	RW0501[a]	RW02/RW03/RW0501 combined effluent
5/5/2003	0.074	0.038		0.052
6/3/2003	0.089	0.042		0.054
6/11/2003	0.07	0.044	0.42	0.073
6/12/2003	0.074	0.048	0.32	0.066
6/13/2003	0.072	0.075	0.21	0.066
6/16/2003	0.071	0.3	0.28	0.063
6/17/2003	0.068	0.11	0.26	0.066
6/24/2003	0.07	0.039	0.18	0.071
7/1/2003	0.059	0.038	0.18	0.064
7/10/2003	0.062	0.04	0.17	0.058
7/11/2003	0.056	0.034	0.24	0.054
7/14/2003	0.15	0.04	0.16	0.065
7/15/2003	0.071	0.038	0.19	0.055
7/16/2003	0.11	0.038	0.18	0.051
7/22/2003	0.15	0.041	0.16	0.054
7/31/2003	0.056	0.036	0.17	0.059
8/6/2003	0.069	0.041	0.16	0.062
9/3/2003	0.092	0.041	0.19	0.054
10/2/2003	0.13	0.032	0.14	0.054
11/5/2003	0.054	0.053	0.18	0.056
12/3/2003	0.076	0.044	0.18	0.062
1/7/2004	0.0363	0.0374	0.131	0.0467
2/3/2004	0.0433	0.0665	1.02	0.0481
3/3/2004	0.169	0.0435	0.142	0.0429
4/6/2004	0.0507	0.0483	0.147	0.0404
5/5/2004	0.0309	0.437	0.536	0.0706
6/1/2004	0.0541	0.23	3.13	0.0434
7/6/2004	0.564	0.698	0.123	0.0498
8/10/2004	0.049	0.0479	0.158	0.0339
9/9/2004	0.0427	0.0422	0.199	0.047
10/5/2004	0.0643	0.0353	0.116	0.0404
11/9/2004	0.0382	0.0385	0.137	0.036
12/7/2004	0.046	0.0341	0.0997	0.036
1/6/2005	0.0346	0.0312	0.0888	0.042
2/2/2005	0.0355	0.034	0.0985	0.0402
3/11/2005	0.0393	0.0336	0.0874	0.0487
4/5/2005	0.0509	0.0838	0.0916	0.0559
5/6/2005	0.0298	0.035	0.202	0.0374
6/6/2005	0.0383	0.0363	0.108	0.0427
7/6/2005	0.0335	0.0488	0.24	0.0331
8/4/2005	0.06	0.029	0.11	0.0386
9/7/2005	0.362	0.0395	0.0344	0.0037B

[a]Recovery well RW0501 was brought online on June 11, 2003.
-- = Not Measured.

Table 2. Water-Level Data at the STAR Center

Location	Measurement		Water Depth From Land Surface (ft)	Ground Water Elevation (ft NGVD)	Water Level Flag[a]
	Date	Time			
PIN06	**Industrial Drain Leaks Bldg 100 / Old Drum Storage Site**				
0500	7/13/2005	09:39	2.40	15.60	
0501	7/13/2005	09:37	2.88	15.42	
PIN09					
0500	7/13/2005	09:45	2.29	15.68	
PIN10					
0500	7/13/2005	09:46	1.86	16.04	
PIN12					
0508	7/13/2005	09:55	3.08	15.28	
0509	7/13/2005	09:52	3.10	14.94	
0510	7/13/2005	09:50	3.40	14.66	
0511	7/12/2005	10:23	2.86	14.94	
0512	7/12/2005	10:32	1.99	14.82	
0513	7/12/2005	15:00	4.18	14.32	
0514	7/12/2005	14:59	3.95	14.55	
0515	7/12/2005	10:41	3.23	14.67	
0516	7/12/2005	10:43	3.44	14.56	
0517	7/12/2005	10:55	2.71	15.19	
0518	7/12/2005	10:53	2.86	15.08	
0520	7/13/2005	09:41	2.84	15.17	
0521	7/13/2005	09:42	3.08	14.97	
0522	7/13/2005	09:33	3.82	14.38	
0523	7/13/2005	09:36	3.84	14.32	
0524	7/12/2005	14:01	2.87	14.54	
0525	7/12/2005	14:03	2.93	14.49	
0526	7/12/2005	15:40	2.76	14.06	
0527	7/13/2005	09:26	10.66	7.41	
0528	7/12/2005	10:35	10.00	7.60	
RW01	7/13/2005	09:31	13.41	4.84	
RW02	7/13/2005	09:37	10.11	8.22	
S29C	7/12/2005	08:39	3.89	14.62	
S30B	7/12/2005	08:27	4.07	14.44	
S31B	7/12/2005	08:05	3.33	15.18	
S32B	7/12/2005	08:10	3.78	14.73	
S33C	7/12/2005	08:15	3.91	14.60	
S35B	7/12/2005	08:55	4.19	14.32	
S36B	7/12/2005	07:56	3.97	14.54	
S37B	7/12/2005	08:20	3.90	14.61	
S54D	7/12/2005	08:51	3.91	14.60	
S55B	7/12/2005	09:10	3.74	14.77	
S55C	7/12/2005	09:11	3.68	14.83	

Table 2 (continued). Water-Level Data at the STAR Center

Location	Measurement		Water Depth From Land Surface (ft)	Ground Water Elevation (ft NGVD)	Water Level Flag[a]
	Date	Time			
S56B	7/12/2005	09:02	3.53	14.98	
S56C	7/12/2005	09:02	3.49	15.02	
S56D	7/12/2005	09:03	3.48	15.03	
S57B	7/12/2005	09:19	3.55	14.96	
S57C	7/12/2005	09:19	3.45	15.06	
S57D	7/12/2005	09:20	3.49	15.02	
S59B	7/12/2005	09:43	3.50	15.01	
S59C	7/12/2005	09:43	3.39	15.12	
S59D	7/12/2005	09:44	3.42	15.09	
S60B	7/12/2005	09:50	3.60	14.91	
S60C	7/12/2005	09:50	3.61	14.90	
S60D	7/12/2005	09:51	3.68	14.83	
S67B	7/12/2005	09:59	3.52	14.95	
S67C	7/12/2005	10:05	3.45	15.02	
S67D	7/12/2005	10:02	3.63	14.85	
S68B	7/12/2005	14:13	4.11	13.79	
S68C	7/12/2005	14:09	3.60	14.30	
S68D	7/12/2005	14:16	3.59	14.31	
S69B	7/12/2005	14:37	1.85	14.15	
S69C	7/12/2005	14:39	1.86	14.14	
S69D	7/12/2005	14:39	2.10	13.90	
S70B	7/12/2005	14:46	2.31	14.39	
S70C	7/12/2005	14:47	2.38	14.32	
S70D	7/12/2005	14:48	2.33	14.37	
S71B	7/12/2005	14:57	4.32	14.08	
S71C	7/12/2005	14:54	4.10	14.30	
S71D	7/12/2005	14:56	4.10	14.30	
S72B	7/12/2005	15:18	4.33	13.87	
S72C	7/12/2005	15:19	4.32	13.88	
S72D	7/12/2005	15:20	4.34	13.86	
S73B	7/12/2005	15:35	2.91	14.09	
S73C	7/12/2005	15:32	3.12	13.88	
S73D	7/12/2005	15:30	3.39	13.61	
TE03	7/12/2005	10:29	2.24	14.76	
PIN15	**Northeast Site**				
0506	7/13/2005	08:39	2.33	14.67	
0507	7/13/2005	08:38	2.33	14.67	
0510	7/13/2005	08:02	1.90	15.62	
0513	7/13/2005	08:43	10.15	7.45	
0514	7/13/2005	08:31	1.71	15.79	
0515	7/13/2005	08:32	1.72	15.78	
0516	7/13/2005	08:32	1.90	15.50	

Table 2 (continued). Water-Level Data at the STAR Center

Location	Measurement		Water Depth From Land Surface (ft)	Ground Water Elevation (ft NGVD)	Water Level Flag[a]
	Date	Time			
0518	7/13/2005	08:49	2.01	15.79	
0520	7/13/2005	08:40	2.21	14.99	
0523	7/13/2005	09:44	0.20	17.80	
0530	7/13/2005	08:54	1.48	15.92	
0534	7/13/2005	08:41	2.11	15.19	
0535	7/13/2005	08:55	1.57	16.03	
0537	7/13/2005	08:12	2.05	16.55	
0557	7/13/2005	08:07	2.21	16.89	
0559	7/13/2005	08:25	2.77	16.02	
0560	7/13/2005	09:26	1.35	16.65	
0561	7/13/2005	09:25	1.04	16.96	
0562	7/13/2005	09:24	0.99	16.81	
0563	7/13/2005	09:23	0.65	17.15	
0564	7/13/2005	09:20	0.63	16.57	
0565	7/13/2005	09:19	0.15	17.05	
0566	7/13/2005	08:59	1.19	16.31	
0567	7/13/2005	08:58	0.96	16.54	
0568	7/13/2005	08:08	2.94	15.56	
0569	7/13/2005	08:19	3.00	15.38	
0570	7/12/2005	16:04	2.67	15.31	
0571	7/13/2005	08:12	1.71	15.76	
0572	7/13/2005	08:11	1.78	15.73	
0573	7/13/2005	09:35	1.40	16.98	
0574	7/13/2005	09:31	1.79	16.63	
0575	7/13/2005	09:04	0.89	16.95	
0576	7/13/2005	09:03	1.01	16.47	
0577	7/13/2005	09:07	0.93	16.71	
0578	7/13/2005	09:08	0.85	16.67	
0579	7/13/2005	08:38	1.52	16.88	
0580	7/13/2005	08:39	1.72	16.68	
0581	7/13/2005	08:20	1.06	16.34	
0582	7/13/2005	08:20	1.21	16.19	
0583	7/13/2005	08:10	2.17	17.03	
E001	7/13/2005	08:34	1.77	14.25	
M03D	7/13/2005	07:57			F
M03S	7/13/2005	07:57	0.43	17.67	
M12D	7/13/2005	08:45	2.00	15.20	
M12S	7/13/2005	08:46	2.71	14.79	
M14D	7/13/2005	09:40	1.02	16.98	
M14S	7/13/2005	09:41	0.68	17.32	
M16D	7/13/2005	08:05	1.35	16.85	
M16S	7/13/2005	08:06	1.22	16.98	
M24D	7/13/2005	09:16	1.11	16.69	

Table 2 (continued). Water-Level Data at the STAR Center

Location	Measurement		Water Depth From Land Surface (ft)	Ground Water Elevation (ft NGVD)	Water Level Flag[a]
	Date	Time			
M27D	7/13/2005	09:01	1.49	16.11	
M27S	7/13/2005	09:00	1.86	15.74	
M29D	7/13/2005	08:22	1.55	16.05	
M29S	7/13/2005	08:23	1.33	16.27	
M30D	7/13/2005	08:03	0.72	17.18	
M30S	7/13/2005	08:02	0.50	17.30	
M31D	7/13/2005	08:28	1.42	16.58	
M31S	7/13/2005	08:27	1.40	16.60	
M32D	7/13/2005	08:15	1.39	16.41	
M32S	7/13/2005	08:14	0.95	16.85	
M33D	7/13/2005	09:17	0.60	17.00	
RW16	7/13/2005	08:13	1.55	16.45	
PIN18	**Wastewater Neutralization Area**				
0500	7/12/2005	14:17	3.58	16.52	
0502	7/12/2005	14:23	2.60	17.40	
0503	7/12/2005	15:45	1.93	15.75	
0504	7/12/2005	14:33	1.89	17.71	
0505	7/12/2005	15:38	2.40	15.48	
0506	7/12/2005	15:52	2.50	15.21	
0507	7/12/2005	15:46	1.99	15.74	
0508	7/12/2005	14:26	1.90	17.60	
0509	7/12/2005	15:37	2.40	15.43	
0510	7/12/2005	15:51	2.60	15.16	
0511	7/12/2005	14:43	1.07	17.73	
0512	7/12/2005	14:55	0.86	17.74	
0513	7/12/2005	14:48	1.05	17.75	
0514	7/12/2005	15:15	2.47	15.31	
0515	7/12/2005	15:19	3.14	15.27	
0516	7/12/2005	15:10	3.28	15.13	
0517	7/12/2005	15:28	3.26	14.99	
0518	7/12/2005	15:29	3.27	14.93	
0519	7/12/2005	15:30	3.45	14.83	
0520	7/12/2005	14:11	2.24	15.76	
0521	7/12/2005	14:10	2.51	15.59	
0522	7/12/2005	14:15	2.43	15.67	
0523	7/12/2005	14:02	3.09	16.31	
0524	7/12/2005	14:04	2.65	16.35	
0525	7/12/2005	14:03	2.44	16.46	
0526	7/12/2005	15:02	0.49	18.11	
RW02	7/12/2005	14:19	6.80	13.30	
RW03	7/12/2005	14:06	5.47	12.83	
RW0501	7/12/2005	14:21	1.05	18.95	

Table 2 (continued). Water-Level Data at the STAR Center

Location	Measurement		Water Depth From Land Surface (ft)	Ground Water Elevation (ft NGVD)	Water Level Flag[a]
	Date	Time			
PIN21	**Perimeter Monitoring Wells**				
0500	7/12/2005	16:01	3.95	14.15	
0501	7/12/2005	16:00	4.05	13.95	
0502	7/12/2005	14:31	1.34	13.86	
0503	7/12/2005	14:28	1.35	13.85	
0504	7/12/2005	11:03	3.50	14.10	
0505	7/12/2005	11:01	3.48	13.92	
0512	7/12/2005	14:20	3.38	13.92	
PIN23	**Southwest Pond**				
SW01	7/12/2005	10:47		13.57	
PIN37	**South Pond**				
S001	7/12/2005	10:49		13.57	

[a]Water Level Flags: D=Dry, F=Flowing

Table 3. Floridan Aquifer Monitoring Well Water Elevations

Well Identification	January 2005 Water Level Elevation (ft, MSL)	April 2005 Water Level Elevation (ft, MSL)
PIN15−0513	6.18	7.45
PIN12−0527	6.36	7.41
PIN12−0528	5.55	7.60

Table 4. Vertical Hydraulic Differential

Water Level Measured From	Well Identification	Water Level Elevation (ft, MSL)
Deep Surficial Aquifer	PIN15−M12D	15.20
Floridan Aquifer	PIN15−0513	7.45

Table 5. Surface Water Elevations

Pond Location	January 2005 Water Level Elevation (ft, MSL)	April 2005 Water Level Elevation (ft, MSL)
East Pond	13.70	14.25
South Pond	13.21	13.57
West Pond	16.16	Not measured
Southwest Pond	13.24	13.57

Table 6. 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	29.4	622	3	6.67	-143.8	0.75
0501	3–13	29	438	4.2	6.59	85.7	0.76
PIN09							
0500	3–13	29.1	429	2.2	6.87	-99.6	0.47
PIN10	**Incinerator Ditch**						
0500	3–13	26.5	669	6.4	6.56	-27.8	0.51
PIN12							
0510	3–13	29.1	1,018	16.4	6.41	-33.7	0.43
0525	12–22	27	768	5.7	6.76	-81.2	0.45
S31B	5–15	24.2	605	11	6.68	4.3	0.39
S32B	5.5–15.5	22.6	1,244	4.3	6.69	-63.7	0.63
S33C	11–21	23.1	675	77.5	6.67	-100.5	0.38
S35B	5–15	22.8	1,708	24.5	6.42	-52	0.78
S37B	5–15	21.9	787	15.1	6.75	-86.6	0.44
S68B	10–20	26.58	840	7.66	6.54	-463	0.83
S69B	10–20	29.1	637	16.1	6.85	-92.8	0.79
S73B	10–20	30.72	989	11.4	6.46	-84.5	0.81
S73D	30–40	30.13	2,145	12.3	5.95	-42	0.61
PIN15	**Northeast Site**						
0530	5–14.5	25.9	94.8	40.6	6.42	-37.6	0.78
0560	19–28.5	27.2	519	9.4	6.47	-83.2	0.64
0561	5–14.5	27	704	1.9	6.48	-35.2	0.79
0562	20–29.5	27.7	948	3.8	6.54	-75.1	0.52
0563	5–14.5	27.5	1,701	1.4	6.41	-62.6	0.79
0564	20–29.5	27	738	9.1	6.57	-24	0.62
0565	5–14.5	27.4	470	10.2	6.59	-81.9	0.64
0566	19–28.5	29.9	633	317	6.58	-84.9	0.66
0567	5–14.5	29.1	620	4.3	6.61	-70.2	0.78
0570	20–30	28.6	2,153	72.3	6.56	-38.6	0.7
0573	5–15	31.62	2,142	3.93	6.79	-140.8	0.66
0574	18–28	33.24	1,120	5.1	6.57	-122.2	0.45
0575	5–15	32.48	1,523	3.76	7.26	-180.1	0.41
0576	20–30	37.67	1,441	8.29	6.69	-181.4	0.27
0577	5–15	31.64	1,841	6.09	6.79	-146.1	0.49
0578	20–30	34.52	641	7.27	5.63	2.7	0.61
M03S	2.5–12	27.9	560	11.2	6.84	-36.4	0.63
M14S	4–14	27.5	830	50.04	6.77	-16.3	0.57
M32S	3–13	27.5	594	11.7	6.8	-94.7	0.4

Table 6 (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)
PIN18	**Wastewater Neutralization Area**						
0500	11–16	25.5	427	6.3	7.11	-145.9	0.31
0502	11–16	26.1	664	12.1	6.68	-69.9	0.54
0521	20–30	24.9	852	10	6.81	-69.7	0.48
0522	5–15	26.4	447	9.6	6.71	3.8	0.47
0523	32.5–42.5	25.3	940	36.9	6.79	-76.2	0.32
0524	20–30	25	637	9.7	6.82	-109.3	0.43
0525	5–15	27.5	375	9.7	6.66	19.2	0.49

[a]Temperature corrected to 25°C.
-- Not measured.

Table 7. Sitewide Arsenic Measurements

Location	Sample Date	Concentration (mg/L)
PIN06	**Industrial Drain Leaks Bldg 100 / Old Drum Storage Site**	
0500	7/13/2005	0.0084B
0501	7/13/2005	0.0114
PIN09		
0500	7/13/2005	0.0104
PIN10		
0500	7/13/2005	0.0146
PIN12		
0510	7/14/2005	<0.0029
0525	7/15/2005	0.0206
S31B	7/14/2005	0.0293
S32B	7/14/2005	0.0451
S33C	7/14/2005	0.0083B
S35B	7/14/2005	0.0189
S37B	7/14/2005	0.0037B
S68B	7/15/2005	0.0516
S69B	7/15/2005	0.0047B
S73B	7/15/2005	<0.0029
S73D	7/15/2005	<0.0029
PIN15	**Northeast Site**	
0530	7/15/2005	<0.0029
0567	7/18/2005	0.0277
0570	7/15/2005	<0.0029
M03S	7/15/2005	0.004B
M14S	7/15/2005	0.0664
M32S	7/15/2005	0.0168
PIN18	**Wastewater Neutralization Area**	
0500	7/15/2005	0.0524
0502	7/15/2005	0.0356
0521	7/14/2005	<0.0029
0522	7/14/2005	0.0154
0523	7/14/2005	<0.0029
0524	7/14/2005	0.0231
0525	7/14/2005	0.0536
RW02	7/6/2005	0.0335
RW03	7/6/2005	0.0488
RW0501	7/6/2005	0.24

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

Table 8. Northeast Site Florida Petroleum Range Organics Concentrations

Location	Sample Date	Concentration (mg/L)
PIN15	**Northeast Site**	
0560	7/18/2005	0.413
0561	7/18/2005	0.389
0562	7/18/2005	0.18J
0563	7/18/2005	0.532
0564	7/18/2005	0.27
0565	7/18/2005	0.229J
0566	7/18/2005	1.82
0567	7/18/2005	0.598
0573	7/18/2005	2.09
0574	7/18/2005	0.386
0575	7/18/2005	5.78
0576	7/18/2005	1.17
0577	7/18/2005	3.85
0578	7/18/2005	0.731

J Estimated value, result is between the reporting limit and the method detection limit.
"<" values are method detection limits.

Table 9. 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	4/7/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0507	5–14.5	4/7/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0510	4–13.5	4/8/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0513	135–149.6	4/14/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0514	15.5–25.5	4/6/2005	<0.5	<0.5	ND	<0.5	<1	15.7	<0.5	15.7
0515	7.6–17.6	4/6/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0516	0.3–10.3	4/6/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0518	23–28	4/8/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0520	5–14.5	4/7/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0523	5–14.5	4/14/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0530	5–14.5	4/6/2005	<0.5	<0.5	ND	11	<1	<1	<0.5	11
0534	19.5–29	4/7/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0535	20.5–30	4/6/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0537	17.5–30	7/13/2004	<5	33.3	33.3	522	<10	<5	<5	555.3
		4/6/2005	1.3	129	130.5	413	<1	3.2	<0.5	548
0557	21–31	10/8/2004	<0.5	<0.5	ND	2.9	<1	<0.5	<0.5	2.9
		1/12/2005	<0.5	<0.5	ND	3.1	<1	<0.5	<0.5	3.1
		4/7/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0559	22–31.5	4/13/2005	<0.5	<0.5	ND	1.4	<1	3.1	<0.5	4.5
0560	19–28.5	10/12/2004	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		1/12/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		7/18/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0561	5–14.5	10/12/2004	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		1/12/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		4/15/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		7/18/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0562	20–29.5	10/7/2004	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		1/11/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		4/6/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		7/18/2005	<0.5	<0.5	ND	<0.5	1.1J	<0.5	<0.5	ND
0563	5–14.5	10/8/2004	<0.5	2.1	2.1	<0.5	<1	<0.5	<0.5	2.1
		1/11/2005	<0.5	1.4	1.4	<0.5	<1	<0.5	<0.5	1.4
		4/7/2005	<0.5	1.3	1.3	<0.5	<1	<0.5	<0.5	1.3
		7/18/2005	<0.5	1.1	1.1	<0.5	<1	<0.5	<0.5	1.1
0564	20–29.5	10/12/2004	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		1/11/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		4/14/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		7/18/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND

Table 9 (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**	
0565	5–14.5	10/12/2004	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		1/11/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		4/14/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		7/18/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0566	19–28.5	10/12/2004	<0.5	4.7	4.7	4.5	<1	1.5	<0.5	10.7
		1/12/2005	<0.5	3.8	3.8	3.8	<1	1.3	<0.5	8.9
		4/14/2005	<0.5	4.9	4.9	4.8	<1	1.4	<0.5	11.1
		7/18/2005	160	83	84.3	20.5	<1	2	<0.5	266.8
0567	5–14.5	10/12/2004	1.8	68	83.4	34.5	<1	12.8	<0.5	132.5
		1/12/2005	1.3	52.3	63.8	22.7	<1	7.2	<0.5	95
		4/14/2005	1.2	49.5	60.6	24.7	<1	5.6	<0.5	92.1
		7/18/2005	<0.5	5.7	7.2	3	<1	<0.5	<0.5	10.2
0568	10–20	7/23/2004	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		4/13/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0569	20–30	7/23/2004	<0.5	<0.5	ND	19	<1	0.68J	<0.5	19
		4/12/2005	<0.5	1.3	1.3	33.7	<1	<0.5	10.6	45.6
0570	20–30	7/22/2004	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		4/13/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0571	10–20	7/23/2004	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		4/13/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0572	20–30	7/23/2004	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		4/13/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
0573	5–15	7/13/2004	<2.5	63.3	63.3	<2.5	<5	<2.5	<2.5	63.3
		10/11/2004	<0.5	12.6	12.6	12.7	<1	0.66J	1.2	26.5
		1/11/2005	<0.5	19.7	19.7	22.9	<1	0.89J	1.5	44.1
		4/7/2005	<0.5	5.3	5.3	24.8	<1	0.71J	1.3	31.4
		7/18/2005	<0.5	<0.5	ND	22.4	<1	<0.5	1.2	23.6
0574	18–28	7/13/2004	6.6	351	351	210	<5	<2.5	<2.5	567.6
		10/7/2004	35.4	330	330	58.9	<1	0.96J	0.81J	424.3
		1/11/2005	32.9	86.1	86.1	28.2	<1	0.76J	0.84J	147.2
		4/7/2005	15.4	39	39	13.8	<1	<0.5	<0.5	68.2
		7/18/2005	16.3	22.2	22.2	7.7	<1	<0.5	<0.5	46.2
0575	5–15	7/23/2004	<0.5	1.5	5.4	77.1	<1	<0.5	4.5	87
		10/11/2004	<0.5	4.4	6.3	35.9	<1	2.1	1.9	46.2
		1/11/2005	<0.5	5.4	7.1	34.9	<1	1.9	2.2	46.1
		4/15/2005	<0.5	2.8	3.9	15.1	<1	1.1	1.1	21.2
		7/18/2005	<0.5	<0.5	2.1	15.7	<1	1.4	1.2	20.4
0576	20–30	7/23/2004	<0.5	3	4	<0.5	<1	0.85J	0.6J	4
		10/7/2004	<0.5	14.1	14.1	6.5	<1	0.63J	<0.5	20.6
		1/11/2005	<0.5	18.7	18.7	11.2	<1	0.95J	<0.5	29.9
		4/15/2005	<0.5	27.8	27.8	20.1	<1	0.68J	<0.5	47.9
		7/18/2005	1.1	46.8	46.8	63.1	<1	<0.5	<0.5	111

Table 9 (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**	
0577	5–15	7/23/2004	<0.5	<0.5	23.1	339	<1	<0.5	394	756.1
		10/7/2004	<5	<5	32	441	<10	6.3J	234	707
		1/12/2005	<2.5	14.5	38.2	276	<5	5.7	21.1	341
		4/15/2005	1.3	2.6	14.8	33	<1	4.1	6.6	59.8
		7/18/2005	<0.5	<0.5	11.6	4.9	<1	5.1	6.2	27.8
0578	20–30	7/23/2004	<0.5	5.7	8.3	24.4	<1	<0.5	1.7	34.4
		10/11/2004	<0.5	10.2	12	25.2	<1	<0.5	0.91J	37.2
		1/12/2005	<0.5	8.3	8.3	7.9	<1	<0.5	<0.5	16.2
		4/15/2005	<0.5	4.6	4.6	2.9	<1	<0.5	<0.5	7.5
		7/18/2005	<0.5	1.1	1.1	1.7	<1	<0.5	<0.5	2.8
M03D	15–25	4/15/2005	<0.5	<0.5	ND	0.79J	<1	<0.5	<0.5	ND
M03S	2.5–12	1/11/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		4/15/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M12D	22.5–32.5	4/14/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M12S	5–14.5	4/14/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M14D	18.5–28.5	4/8/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M14S	4–14	4/8/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M16D	18.5–28.5	4/15/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M16S	5–14.5	4/15/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M24D	20–30	4/8/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M27D	21–31	4/7/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M27S	6–16	4/7/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M29D	20–30	10/8/2004	<0.5	<0.5	ND	<0.5	1.2	<0.5	<0.5	1.2
		1/13/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		4/6/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M29S	5–15	10/8/2004	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		1/13/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		4/6/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M30D	20.5–30.5	10/8/2004	<25	500	500	2,120	<50	<25	<25	2,620
		1/12/2005	<0.5	578	579.7	2,020	<1	6.1	<0.5	2,605.8
		4/15/2005	<0.5	294	296	1,440	<1	4.4	<0.5	1,740.4
M30S	5.5–15.5	10/8/2004	<0.5	1.1	1.1	4.3	<1	<0.5	<0.5	5.4
		1/12/2005	<0.5	0.72J	0.72J	2.1	<1	<0.5	<0.5	2.1
		4/15/2005	<0.5	<0.5	ND	1.8	<1	<0.5	<0.5	1.8
M31D	19.5–29.5	7/13/2004	<0.5	<0.5	ND	19.3	<1	17.9	1.8	39
		10/8/2004	<0.5	<0.5	ND	3	1.4	19.8	2.8	27
		1/13/2005	<0.5	<0.5	ND	<0.5	<1	24.5	2	26.5
		4/15/2005	<0.5	<0.5	ND	5.7	<1	17.3	1.6	24.6
M31S	4.5–14.5	7/13/2004	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
		10/8/2004	<0.5	<0.5	ND	0.99J	<1	<0.5	<0.5	ND
		1/13/2005	<0.5	<0.5	ND	4.2	<1	<0.5	<0.5	4.2
		4/15/2005	<0.5	<0.5	ND	1.7	<1	<0.5	<0.5	1.7
M32D	14–24	4/15/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
M32S	3–13	4/15/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND

Table 9 (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**	
M33D	20–30	4/14/2005	<0.5	<0.5	ND	<0.5	<1	<0.5	<0.5	ND
RW16	20–30	7/13/2004	<10	373	373	968	<20	<10	<10	1,341
		4/15/2005	<0.5	1.6	1.6	110	<1	2.5	<0.5	114.1
X11	–	4/11/2005	<50	443	443	3,610	<100	<50	149	4,202

[a]Before December 18, 2003 "<" values are reporting limits. On or after December 18, 2003 "<" values are method detection 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.

Table 10. 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**	
PIN06	**Industrial Drain Leaks Bldg 100 / Old Drum Storage Site**								
0500	3–13	4/12/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0501	3–13	4/12/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
PIN09									
0500	3–13	4/12/2005	<0.5	0.52J	<0.5	0.52J	<0.5	<0.5	ND
PIN10									
0500	3–13	4/12/2005	<0.5	1.8	<0.5	1.8	<0.5	<0.5	1.8
PIN12									
0508	3–13	4/12/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0509	3–13	4/12/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0510	3–13	4/12/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0511	3–13	4/9/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0512	3–13	4/9/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0513	15–25	7/21/2004	<0.5	2.8	2.1	4.9	<0.5	9.1	14
		4/12/2005	<0.5	2.4	1.3	3.7	<0.5	6.1	9.8
0514	30–40	7/21/2004	<0.5	14.6	36.3	50.9	<0.5	71.8	122.7
		4/12/2005	<0.5	5.1	21.8	26.9	<0.5	24.5	51.4
0515	15–25	4/9/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0516	30–40	4/9/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0517	15–25	4/9/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0518	30–40	4/9/2005	<0.5	<0.5	<0.5	ND	<0.5	1.4	1.4
0520	36–46	4/12/2005	<0.5	<0.5	<0.5	ND	<0.5	19.5	19.5
0521	19.5–29.5	4/12/2005	1.5	1.6	<0.5	1.6	<0.5	<0.5	3.1
0522	32–42	4/12/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0523	18–28	4/12/2005	<0.5	0.66J	<0.5	0.66J	<0.5	0.57J	ND
0524	27–37	4/11/2005	356	3,390	<50	3,390	182	1,440	5,368
0525	12–22	4/9/2005	<0.5	2	<0.5	2	<0.5	<0.5	2
0526	19.5–29.5	7/22/2004	<0.5	2.8	1.2	4	<0.5	1.1	5.1
		4/11/2005	<0.5	1.5	0.58J	1.5	<0.5	1.1	2.6
0527	118–137.9	4/14/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0528	127–146.9	4/9/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
RW01	19–29	7/6/2004	4,840	2,950	<50	2,950	<50	874	8,664
		10/5/2004	4,200	2,000	<50	2,000	<50	550	6,750
		1/6/2005	4,250	2,450	<50	2,450	<50	634	7,334
		4/5/2005	4,390	2,770	<50	2,770	<50	996	8,156
		7/6/2005	4,220	2,440	<50	2,440	<50	641	7,301
RW02	25–35	7/6/2004	538	765	60.4	825.4	21.9	95.9	1,481.2
		10/5/2004	349	590	48.9	638.9	16.8	66	1,070.7
		1/6/2005	432	670	55.4	725.4	17.3	58.4	1,233.1
		4/5/2005	298	556	42.6	598.6	13.6	89.4	999.6
		7/6/2005	264	470	34.9	504.9	12.7	55.6	837.2

Table 10 (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**	
S29C	14–24	4/6/2005	<0.5	<0.5	3.3	3.3	<0.5	<0.5	3.3
S30B	5–15	4/6/2005	545	18,800	919	19,719	376	2,210	22,850
S31B	5–15	4/6/2005	<0.5	0.95J	<0.5	0.95J	<0.5	<0.5	ND
S32B	5.5–15.5	4/6/2005	<0.5	1.6	<0.5	1.6	<0.5	<0.5	1.6
S33C	11–21	4/6/2005	<5	74.1	18	92.1	<5	385	477.1
S35B	5–15	4/8/2005	23,800	67,600	8,210	75,810	211	15,000	114,821
S36B	5–15	4/6/2005	<0.5	1.1	<0.5	1.1	<0.5	2.2	3.3
S37B	5–15	4/6/2005	<0.5	58.9	1.1	60	<0.5	80.8	140.8
S54D	36–41	4/8/2005	7,280	36,200	308	36,508	465	6,460	50,713
S55B	10–19.8	4/7/2005	7	1,030	13.1	1,043.1	4.8	6,690	7,744.9
S55C	20.5–30.3	4/7/2005	4.7	6,450	44.7	6,494.7	38.8	1,460	7,998.2
S56B	10–19.8	4/7/2005	1.9	74.1	0.99J	74.1	0.91J	46.3	122.3
S56C	20.5–30.3	4/7/2005	1.4	56.9	1.3	58.2	<0.5	39.8	99.4
S56D	31–40.8	4/7/2005	1.8	33.5	0.9J	33.5	0.64J	10.4	45.7
S57B	10–19.8	4/7/2005	<0.5	<0.5	0.74J	0.74J	<0.5	0.92J	ND
S57C	20.5–30.3	4/7/2005	820	5,950	39.1	5,989.1	207	6,030	13,046.1
S57D	31.5–41.3	4/7/2005	37.5	857	11.7	868.7	38.4	565	1,509.6
S59B	10–19.8	4/7/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
S59C	20.5–30.3	4/7/2005	<0.5	7.9	<0.5	7.9	<0.5	8.2	16.1
S59D	31–40.8	4/7/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
S60B	10–19.8	4/7/2005	<0.5	3.9	<0.5	3.9	0.86J	<0.5	3.9
S60C	20.5–30.3	4/7/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
S60D	31–40.8	4/7/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
S67B	10–19.83	4/12/2005	<5	25.1	<5	25.1	<5	572	597.1
S67C	20–29.83	4/12/2005	<10	616	88.2	704.2	<10	304	1,008.2
S67D	30–39.83	4/11/2005	<1	147	16	163	1.6J	126	289
S68B	10–20	4/11/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
S68C	18–28	4/11/2005	<0.5	3.6	<0.5	3.6	<0.5	4.6	8.2
S68D	30–40	4/11/2005	<0.5	56.7	0.87J	56.7	<0.5	45.6	102.3
S69B	10–20	4/12/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
S69C	20–30	4/12/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
S69D	30–40	4/12/2005	<0.5	0.53J	<0.5	0.53J	<0.5	<0.5	ND
S70B	10–20	4/12/2005	<0.5	18.5	<0.5	18.5	<0.5	<0.5	18.5
S70C	20–30	4/12/2005	<0.5	18.1	4.7	22.8	0.59J	<0.5	22.8
S70D	30–40	4/12/2005	<0.5	11.3	4.1	15.4	0.51J	<0.5	15.4
S71B	10–20	4/13/2005	<0.5	0.58J	<0.5	0.58J	<0.5	<0.5	ND
S71C	20–30	4/13/2005	<0.5	53.2	26.8	80	1.2	59.3	140.5
S71D	30–40	4/13/2005	<0.5	5.2	1.6	6.8	<0.5	2.7	9.5
S72B	10–20	4/13/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
S72C	20–30	4/13/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
S72D	30–40	4/13/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND

Table 10 (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**	
S73B	10–20	7/22/2004	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
		4/13/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
S73C	20–30	7/22/2004	<0.5	6.6	5.2	11.8	<0.5	10	21.8
S73C	20–30	4/13/2005	<0.5	2	5.1	7.1	<0.5	13	20.1
S73D	30–40	7/22/2004	<0.5	0.66J	<0.5	0.66J	<0.5	<0.5	ND
S73D	30–40	4/13/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
TE03	–	4/9/2005	<0.5	<0.5	<0.5	ND	<0.5	4.2	4.2
PIN21	**Perimeter Monitoring Wells**								
0500	7–17	4/13/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0501	20–28	4/13/2005	<0.5	1.5	<0.5	1.5	<0.5	<0.5	1.5
0502	7–17	4/12/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0503	20–28	4/12/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0504	7–17	4/11/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0505	20–28	4/11/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND
0512	20–29.5	4/12/2005	<0.5	1.7	<0.5	1.7	<0.5	<0.5	1.7

[a]Before December 18, 2003 "<" values are reporting limits. On or after December 18, 2003 "<" values are method detection 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.

Table 11. COPC Concentrations at the Wastewater Neutralization Area (reported in micrograms per liter)[a]

Location	Screen Depth (ft)	Date Sampled	Vinyl chloride	Arsenic	Total COPC[b]
FDEP MCL			**1**	**10**	
PIN18	**Wastewater Neutralization Area**				
0500	11–16	7/21/2004	--	68.1	68.1
		10/13/2004	--	63.4	63.4
		1/14/2005	--	60.1	60.1
		4/11/2005	<0.5	44.1	44.1
		7/15/2005	--	52.4	52.4
0502	11–16	7/21/2004	--	41	41
		10/13/2004	--	10	10
		1/14/2005	--	38	38
		4/11/2005	<0.5	16.9	16.9
		7/15/2005	--	35.6	35.6
0503	10–20	4/9/2005	<0.5	<3.5	ND
0504	13–22	4/11/2005	<0.5	<3.5	ND
0505	10.5–20.5	4/9/2005	<0.5	<3.5	ND
0506	12–22	4/9/2005	<0.5	<3.5	ND
0507	27–37	4/9/2005	<0.5	<3.5	ND
0508	31–41	4/11/2005	<0.5	<3.5	ND
0509	27.5–37.5	4/9/2005	<0.5	<3.5	ND
0510	27.5–37.5	4/9/2005	<0.5	<3.5	ND
0511	32–42	4/9/2005	<0.5	<3.5	ND
0512	21–31	4/9/2005	<0.5	<3.5	ND
0513	12–22	4/9/2005	<0.5	<3.5	ND
0514	32.5–42.5	4/9/2005	<0.5	<3.5	ND
0515	22.5–32.5	4/9/2005	<0.5	<3.5	ND
0516	12.5–22	4/9/2005	<0.5	<3.5	ND
0517	31.5–41.5	4/9/2005	<0.5	<3.5	ND
0518	22.5–32.5	4/9/2005	<0.5	<3.5	ND
0519	12.5–22.5	4/9/2005	<0.5	<3.5	ND
0520	32.5–42.5	4/11/2005	<0.5	<3.5	ND
0521	20–30	7/21/2004	--	6.5B	ND
		10/12/2004	--	<3.5	ND
		1/14/2005	--	<3.5	ND
		4/11/2005	<0.5	<3.5	ND
		7/14/2005	--	<2.9	ND
0522	5–15	7/21/2004	--	9.8B	ND
		10/12/2004	--	8.2B	ND
		1/14/2005	--	11.5	11.5
		4/11/2005	<0.5	5.5B	ND
		7/14/2005	--	15.4	15.4

Table 11 (continued). COPC Concentrations at the Wastewater Neutralization Area (reported in micrograms per liter)[a]

Location	Screen Depth (ft)	Date Sampled	Vinyl chloride	Arsenic	Total COPC[b]
FDEP MCL			**1**	**10**	
0523	32.5–42.5	7/21/2004	--	<3.5	ND
		10/12/2004	--	<3.5	ND
		1/14/2005	--	<3.5	ND
		4/11/2005	<0.5	<3.5	ND
		7/14/2005	--	<2.9	ND
0524	20–30	7/21/2004	--	10.9	10.9
		10/12/2004	--	11.8	11.8
		1/14/2005	--	<3.5	ND
		4/11/2005	<0.5	14.6	14.6
		7/14/2005	--	23.1	23.1
0525	5–15	7/21/2004	--	130	130
		10/12/2004	--	53.7	53.7
		1/14/2005	--	60.5	60.5
		4/11/2005	<0.5	62.7	62.7
		7/14/2005	--	53.6	53.6
0526	19.5–29	4/9/2005	<0.5	<3.5	ND
RW02	10–20	7/6/2004	<0.5	564	564
		10/5/2004	--	64.3	64.3
		1/6/2005	--	34.6	34.6
		4/5/2005	<0.5	50.9	50.9
		7/6/2005	--	33.5	33.5
RW03	9–24	7/6/2004	<0.5	698	698
		10/5/2004	--	35.3	35.3
		1/6/2005	--	31.2	31.2
		4/5/2005	<0.5	83.8	83.8
		7/6/2005	--	48.8	48.8
RW0501	11–16	7/6/2004	<0.5	123	123
		10/5/2004	--	116	116
		1/6/2005	--	88.8	88.8
		4/5/2005	<0.5	91.6	91.6
		7/6/2005	--	240	240

[a]Before December 18, 2003 "<" values are reporting limits. On or after December 18, 2003 "<" values are method detection 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.
-- = Not measured.
J = Estimated value for VOCs; result is between the reporting limit and the method detection limit.
B = Estimated value for inorganics; result is between the instrument detection limit and the reporting limit.

Table 12. Relative Percent Difference (RPD) for Duplicate Samples

Sample ID	Duplicate ID	Report Number	Anayte	S	D	Ratio	DL	5xDL	Fail
PIN15–0567	PIN24–0500	F33318	Arsenic	0	0	45.7	0.0029	0	Fail
			cis-1,2-Dichloroethene	5.7	6	1.7	0.5	2.5	
			trans-1,2-Dichloroethene	1.5	2	6.5	0.5	2.5	
			Vinyl chloride	3	3	6.5	0.5	2.5	
			Florida Petroleum Range Organics	0.6	1	17.5	0.16	0.8	
PIN15–M32S	PIN24–0501	F33318	Arsenic	0	0	1.2	0.0029	0	

[a]S = Original sample (N001), VOC concentrations in µg/L and metals in mg/L.
[b]D = Duplicate sample (N002), VOC concentrations in µg/L and metals in mg/L.
[c]RL = Reporting limit.
[d]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 13. 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 Bldg 100**									
TRTI	7/6/2005	1,050	1,340	28J	1,340	<25	189	2,579	372	4.93
	8/4/2005	1,240	1,490	27.6	1,517.6	<10	172	2,929.6	361	4.79
	9/7/2005	679	853	18.9J	853	<10	88.6	1,620.6	347	4.06
TRTE	7/6/2005	0.87J	2.2	<0.5	2.2	<0.5	<0.5	2.2	381	5.04
	8/4/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND	347	4.61
	9/7/2005	<0.5	<0.5	<0.5	ND	<0.5	<0.5	ND	368	4.53

[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.
-- = Not measured.

Table 14. Summary of Historical Ground Water Recovery from the Building 100 Recovery Wells

Report Date	Quarterly (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

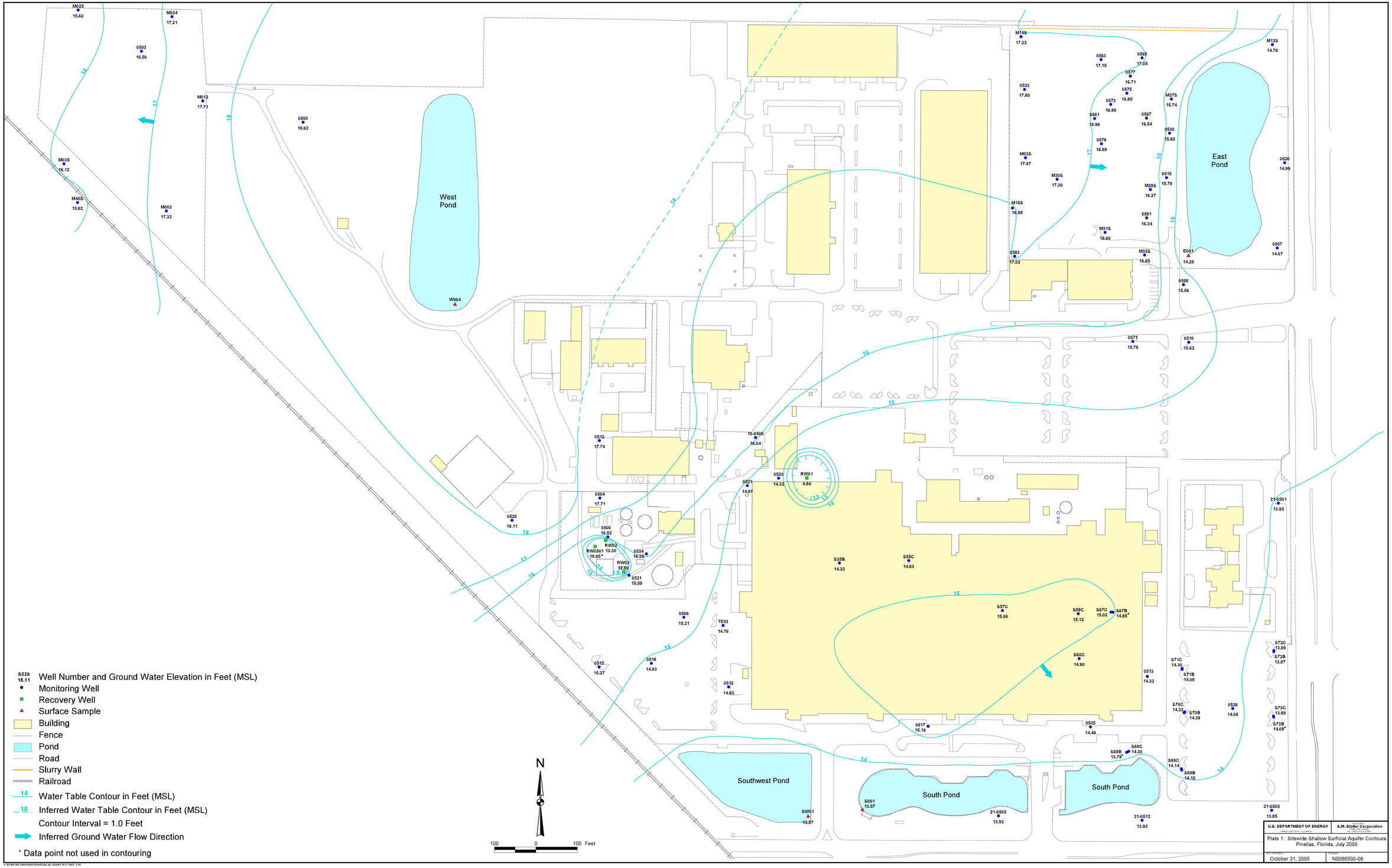
Note: The Building 100 Ground Water Treatment System started operations in May 2004.

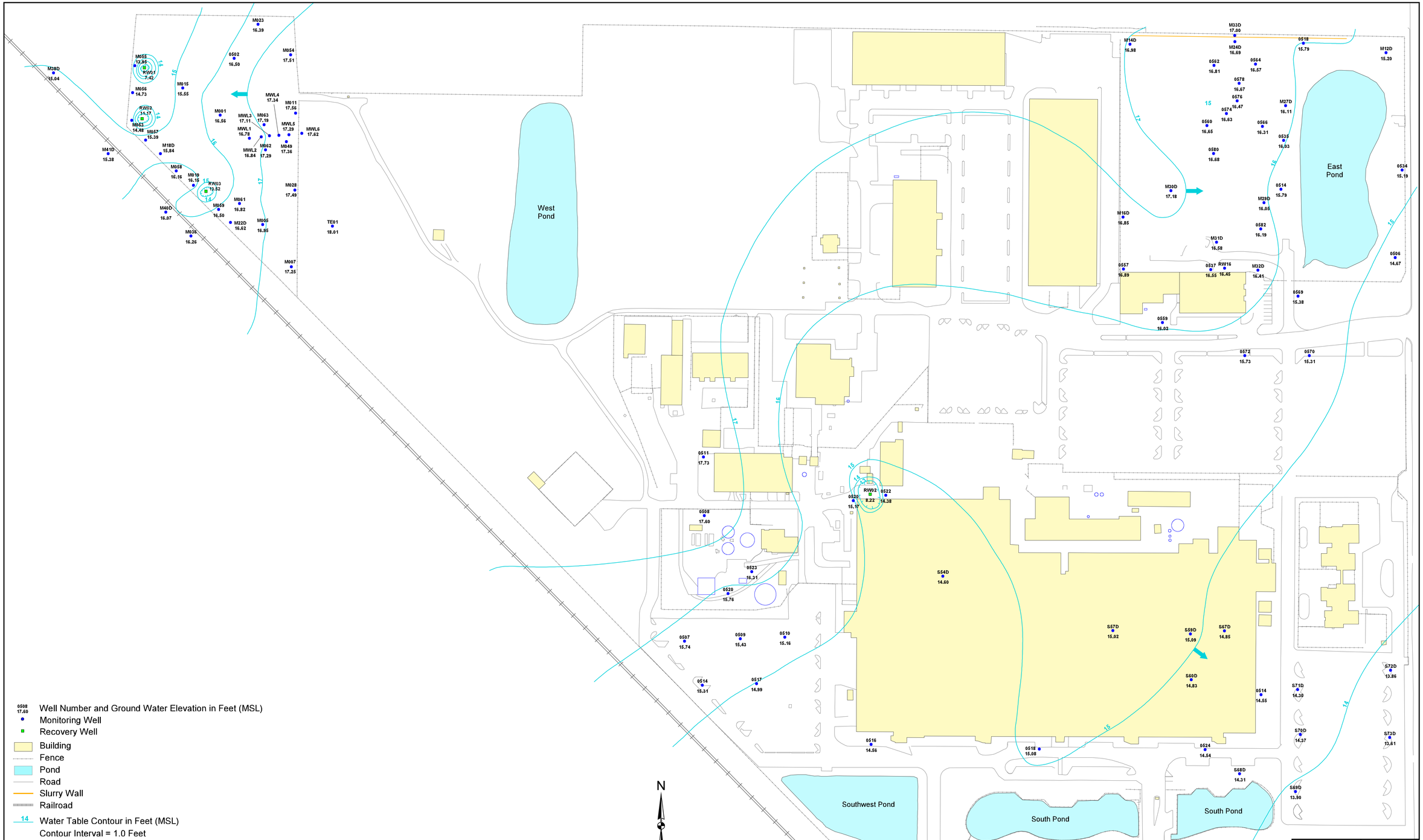
Table 15. Estimated Mass of VOCs Recovered from the Building 100 Recovery Wells During July, August, and September 2005

Month	Volume Treated (gallons)	Concentration[a]						
		cis-1,2-DCE (µg/L)	trans-1,2-DCE (µg/L)	Toluene (µg/L)	TCE (µg/L)	Methylene Chloride (µg/L)	Vinyl Chloride (µg/L)	Total VOCs (µg/L)
July 2005	161,731	1,340	28.0	12.5	1,050	25.0	189.0	2,645
August 2005	160,636	1,490	27.6	5.0	1,240	10.0	172.0	2,945
September 2005	175,925	853	18.9	5.0	679	10.0	88.6	1,655

Month	Volume Treated (gallons)	Mass Recovered[b]						
		cis-1,2-DCE (lbs)	trans-1,2-DCE (lbs)	Toluene (lbs)	TCE (lbs)	Methylene Chloride (lbs)	Vinyl Chloride (lbs)	Total VOCs (lbs)
July 2005	161,731	1.81	0.04	0.02	1.42	0.03	0.26	3.57
August 2005	160,636	2.00	0.04	0.01	1.66	0.01	0.23	3.95
September 2005	175,925	1.25	0.03	0.01	1.00	0.01	0.13	2.43

[a]These concentrations represent the average of monthly 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.


West Pond
East Pond
Southwest Pond
South Pond
South Pond
M025 15.82
M024 17.21
0503 16.50
M012 17.71
0500 18.62
M035 16.12
M040 15.82
M003 17.32
W004
M14S 17.32
0563 17.15
0565 17.05
0577 16.71
0575 16.95
0573 16.98
0561 16.96
0579 16.88
0523 17.80
M03S 17.67
M30S 17.30
M16S 16.98
0583 17.03
M31S 16.80
M27S 15.74
0567 16.54
0530 15.92
0515 15.78
M29S 16.27
0581 16.34
M32S 16.85
0568 15.56
E001 14.25
M12S 14.79
0520 14.99
0507 14.67
0571 15.76
0510 15.62
0512 17.74
10-0500 16.04
0523 14.32
RW01 4.84
0521 14.97
0504 17.71
0526 18.11
0500 16.52
RW02
RW0501 18.55*
RW03 12.89
0524 16.35
0521 15.59
S35B 14.32
S55C 14.83
S57C 15.06
S59C 15.12
S67C 15.02
S67B 14.85*
S60C 14.90
0506 15.21
TE03 14.76
0515 15.27
0518 14.93
0512 14.82
0517 15.19
0525 14.49
S68B 13.79*
S68C 14.30
S69C 14.14
S69B 14.15
0513 14.32
S71C 14.30
S71B 14.08
S70C 14.32
S70B 14.39
0526 14.06
21-0501 13.95
S72C 13.88
S72B 13.87
S73C 13.88
S73B 14.09*
21-0503 13.85
21-0512 13.92
21-0505 13.92
S001 13.57
SW01 13.57
N
100 0 100 Feet
S526 18.11 Well Number and Ground Water Elevation in Feet (MSL)
Monitoring Well
Recovery Well
Surface Sample
Building
Fence
Pond
Road
Slurry Wall
Railroad
14 Water Table Contour in Feet (MSL)
18 Inferred Water Table Contour in Feet (MSL)
Contour Interval = 1.0 Feet
Inferred Ground Water Flow Direction
* Data point not used in contouring
U.S. DEPARTMENT OF ENERGY
GRAND JUNCTION, COLORADO
S.M. Stoller Corporation
GRAND JUNCTION, COLORADO
Plate 1: Sitewide Shallow Surficial Aquifer Contours
Pinellas, Florida, July 2005
DATE PREPARED: October 31, 2005
DRAWING NO. N0086500-08



U.S. DEPARTMENT OF ENERGY	S.M. Stoller Corporation
GRAND JUNCTION, COLORADO	Prepared by: S.M. STOLLER CORPORATION

Plate 2: Sitewide Deep Surficial Aquifer Contours
Pinellas, Florida, July 2005

DATE PREPARED:	REPORT:
October 31, 2005	N0086500-07

Appendix A

Laboratory Reports—July 2005 Quarterly Results

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Appendix B

Laboratory Reports for
Building 100 Treatment System—July through September 2005

Click here to view technical report F33040
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Appendix C

Laboratory Reports for WWNA—July through September 2005

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