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Lawrence Livermore National Laboratory
University of California, Livermore, California 94550

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Interim Remedial Design for the Building 854 Operable Unit at Lawrence Livermore National Laboratory Site 300

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December 2003

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Certification

I certify that the work presented in this report was performed under my supervision. To the best of my knowledge, the data contained herein are true and accurate, and the work was performed in accordance with professional standards.

12/5/03

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Executive Summary

The U.S. Department of Energy (DOE) and Lawrence Livermore National Laboratory (LLNL) have prepared this Remedial Design (RD) report for the Building 854 Operable Unit (OU) at Site 300 in accordance with the Federal Facility Agreement (FFA). LLNL Site 300 is a DOE-owned experimental test facility operated by the University of California. A presumptive remedial action for the Building 854 OU was selected in the Interim Site-Wide Record of Decision (DOE, 2001). The selected remedy consists of monitoring, exposure control, ground water and soil vapor extraction (SVE) and treatment.

This RD report summarizes the site history, geology, hydrogeology, treatability studies, removal actions, and presents the existing and planned remedial designs for the Building 854 OU. In addition, it summarizes performance data for existing treatment facilities and presents a Remedial Action Work Plan for the selected remedy. All necessary administrative controls for the existing and planned remedial designs are described in the Risk and Hazard Management Program. The Risk and Hazard Management Program is included in the Site-Wide Compliance Monitoring Plan (CMP) (DOE, 2002).

For the purpose of this RD report, the Building 854 OU is divided into three treatment areas: (1) source area (SRC), (2) proximal area (PRX), and (3) distal area (DIS). The source area refers to the Building 854 Complex where most of the hazardous chemicals were used in experiments from the 1960s to 1980s. The highest concentrations of the volatile organic compound (VOC), trichloroethylene (TCE), have been detected in soil and ground water in the Building 854 Complex near Buildings F and H. In addition to TCE, perchlorate (ClO_4^-) and nitrate (NO_3^-) have been detected in ground water beneath the source area at concentrations above the action level of 4 μg/L for perchlorate and above the maximum contaminant levels for TCE (5 μg/L) and nitrate (45 mg/L). The proximal area refers to the area downgradient (southeast) of the source area, where VOCs, perchlorate, and nitrate have been detected in ground water. The distal area refers to the area downgradient of the source and proximal areas in the southern part of the OU where VOCs and nitrate have been detected in low concentrations in ground water. A former water-supply well (well 13, located in this area, was abandoned in 1996 because it was suspected to be a conduit allowing communication between two separate water-bearing zones, the shallower zone containing TCE-bearing ground water. The distal area also contains two springs (Springs 10 and 11) and is considered ecologically sensitive because of the presence of endangered or protected plant and animal species.

The selected interim remedy for the Building 854 OU is conventional ground water and SVE and treatment. The initial phase of this remedy began in 1999 with the installation of a treatment facility in the Building 854 source area (B854-SRC) and a second facility (B854-PRX) which was installed in the proximal area in 2000. Each of these facilities treat ground water extracted from a single well. An initial extraction wellfield consisting of six extraction wells and one additional facility (B854-DIS) is planned for long-term ground water cleanup in this RD report. Additional extraction wells will be added to the wellfield as needed based on extraction well field performance, which will be evaluated and reported on an annual basis in accordance with CMP requirements.

Ground water treatment technologies, including aqueous-phase granular activated carbon (GAC), ion exchange, and bioremediation using an *ex situ* containerized wetland or biotreatment unit (BTU), were tested to evaluate their efficiency for treating ground water contaminants, primarily perchlorate and nitrate. GAC is a proven technology for removing VOCs from ground water, so no additional testing is required. Based on long-term treatability studies, the containerized wetland was found to be cost-effective for nitrate and perchlorate destruction and ion exchange was found to be cost-effective for perchlorate removal. GAC did not prove to be a cost-effective technology for perchlorate or nitrate removal. Therefore, ion-exchange technology and/or the containerized wetland biotreatment technology will be used to remove or destroy any perchlorate or nitrate remaining after GAC treatment. Discharge of treated effluent will be accomplished using one of two methods: (1) a misting system to discharge to the atmosphere, or (2) an infiltration trench to discharge to the subsurface.

Encouraging results from a recent SVE treatability study conducted in the Building 854 source area indicate that this technology could be used to accelerate source area VOC mass removal. Additional treatability studies are planned and this technology will be incorporated as part of the remedial design for the Building 854 OU, if the results of the longer term studies indicate that mass removal rates can be sustained.

The interim remedial strategy for the Building 854 OU consists of: (1) continued ground water extraction in the source area and proximal area, (2) continued SVE treatability studies to evaluate efficacy of long-term SVE for mass removal, and (3) installation of a ground water extraction and treatment system in the distal portion of the plume.

1. Introduction

This report presents the remedial design for the Building 854 Operable Unit (OU) at Lawrence Livermore National Laboratory (LLNL), Site 300. Site 300 is a U.S. Department of Energy (DOE)-owned experimental test facility operated by the University of California. The site is located in the southeastern Altamont Hills of the Diablo Range, about 17 miles east-southeast of Livermore and 8.5 miles southwest of Tracy, California (Figure 1).

In 2001, an Interim Site-Wide Record of Decision (ROD) (DOE, 2001) was signed by DOE and the regulatory agencies. In the Interim ROD, interim remedial actions were selected for a majority of the Site 300 OUs, including the Building 854 OU. The selected remedy for the Building 854 OU is ground water and soil vapor extraction (SVE) and treatment with compliance monitoring and administrative controls (e.g., risk and hazard management). A Remedial Design Work Plan (RDWP) (Ferry et al., 2001) presents the strategic approach and schedule to implement the remedies selected in the Interim ROD.

DOE is the lead agency for cleanup at Site 300 with regulatory oversight by the U.S. Environmental Protection Agency (EPA), the California Department of Toxic Substances Control (DTSC), and the Regional Water Quality Control Board (RWQCB)—Central Valley Region.

The scope and format of this Remedial Design (RD) report are consistent with EPA guidance documents (EPA, 1989; 1990). As suggested by EPA, this RD report contains engineering design specifications for the ground water extraction and treatment systems, including Piping and Instrumentation Diagrams (P&IDs), system descriptions, monitoring and construction schedules, and cost estimates. This RD report also includes Quality Assurance/Quality Control (QA/QC) Plans and Health and Safety Plans for both construction and operation and maintenance (O&M), and the requirements for onsite storage and offsite shipment of hazardous waste and project closeout.

Section 1 of this RD report describes the location of the Building 854 OU, the history of the OU, previous investigations and removal actions, and regulatory history. Section 2 summarizes the hydrogeology and contaminant distribution. Section 3 describes the treatability studies conducted in the OU. Section 4 presents the current long-term remedial design. Section 5 contains the Remedial Action Work Plan. The following appendices and attachment are also included:

Appendix A: Polychlorinated Biphenyl (PCB) Surface Soil Sampling and Analysis Results

Appendix B: Substantive Requirements for the Building 854 Treatment Facilities

Appendix C: Construction Quality Assurance/Quality Control Plan

Appendix D: Construction Health and Safety Plan

Appendix E: Operations and Maintenance Quality Assurance/Quality Control Plan

Appendix F: Operations and Maintenance Health and Safety Plan

Attachment A: Analytical Data Tables

1.1. Location

The Building 854 OU covers an area of approximately 1.5 square miles in the southwestern portion of Site 300 (Figure 2). Topography, springs, and monitor well locations in the Building 854 OU are shown on Figure 3. The Building 854 Complex is situated in an area of steep topography. There is a steep upward slope and narrow ridge of bedrock outcrops to the west and southwest of the Building 854 Complex. A hummocky land surface slopes gently downward to the east and southeast from the Building 854 Complex. The hummocky nature of this land surface is typical of areas impacted by landslides. To the south, a deep ravine trends southwest-northeast and contains Springs 10 and 11. A deeply incised drainage channel trends southeast just west of Building 857 and empties into this ravine. Due to the rugged terrain, safe and accessible drilling locations are often limited to paved areas near buildings and roads. Figure 4 shows the buildings in the Building 854 **Core** Complex, the former locations of trichloroethylene (TCE) storage tanks and aboveground piping, and other release sites.

For the purpose of this RD report, the Building 854 OU is divided into three treatment areas: (1) source area (SRC), (2) proximal area (PRX), and (3) distal area (DIS). The source area refers to the Building 854 Complex where most of the hazardous chemicals were used in experiments from the 1960s to 1980s. The proximal area refers to the area downgradient (southeast) of the source area. The distal area refers to the area downgradient of the source and proximal areas in the southern part of the OU.

1.2. Site History

The Building 854 OU contains thirteen buildings built between 1959 and 1970, which include the Building 854 Complex (Buildings 854 A, B, C, D, E, F, G, H, J, and V), the Building 855 Complex, Building 856, and Building 857. Facilities in this OU were used to test the stability of weapons and weapons components under various environmental conditions and mechanical and thermal stresses. Various chemicals were released to soil and ground water as a result of accidental leaks during experiments or from waste fluid discharge practices that are no longer permitted at Site 300. TCE, nitrate, and perchlorate have been detected in ground water at concentrations exceeding their respective maximum contaminant levels (MCLs) for TCE and nitrate and above the action level for perchlorate. Several other contaminants, including trace amounts of high explosives (HE), polychlorinated biphenyls (PCBs), and other solvents have been identified in soil.

1.3. Site Characterization

Site characterization activities began in the early 1990s in the Building 854 OU. Early site characterization work in this OU was summarized in the Final Site-Wide Remedial Investigation (SWRI) report (Webster-Scholten, 1994). Investigations completed after the SWRI report were summarized in two Characterization Summary reports (Ziagos and Reber-Cox, 1998; Ferry and Kearns, 2002) that were submitted to the regulatory agencies. Site characterization activities have focused primarily on determining the nature and extent of TCE and PCB contamination in soil and TCE and perchlorate contamination in ground water.

Site characterization work at the Building 854 OU, especially installation of ground water monitor wells in Neroly bedrock water-bearing zones, is challenging. These water-bearing zones are generally low-yield (< 0.5 to 2 gallons per minute [gpm]) and can be difficult to identify using typical bedrock drilling techniques such as air-mist or mud rotary. The recent use of an oriented, digital, optical camera (optical televiewer), has proven valuable for characterizing fractures and low-yield water-bearing zones. Based on the integration of optical televiewer data with other hydrologic data, it is clear that fractures represent an important flow-controlling feature in the Neroly bedrock water-bearing zones at Site 300.

Recent ground water characterization work involved the installation of three monitor wells to fill data gaps in the central part of the TCE plume. The data from these recently installed wells are discussed in Section 2.2.3 and summarized in Table 1. Other recent characterization work completed in support of this report includes soil sampling to determine the source and extent of PCB contamination in the Building 854 source area. The PCB soil results are summarized in Section 2.2.1 and Appendix A.

1.4. Previous Remediation

The following remediation has been completed or initiated in the Building 854 OU:

- Excavation of TCE-contaminated soil near Building F and H in the Building B854 Complex in 1983.
- Sealing and abandoning of water-supply well 13 in 1996 because TCE was detected in this well and it was a potential vertical conduit for contaminant migration.
- Installation of two treatment facilities; B854-SRC (1999) and B854-PRX (2000) to extract and treat ground water.

This previous remediation represents the initial phase of environmental cleanup at this OU. The interim remedial actions discussed in this RD report specify the main components for long-term cleanup.

1.5. Regulatory History

Site 300 was placed on the EPA's National Priorities List in 1990. In June 1992, DOE, EPA, DTSC, and the RWQCB signed a Federal Facility Agreement (FFA) to facilitate compliance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA). As part of the CERCLA process, DOE/LLNL prepared a series of reports for the Building 854 OU:

- The Final Site-Wide Remedial Investigation report, Chapter 11 (Webster-Scholten, 1994) provided information on the site hydrogeology and contaminant distribution.
- The Building 854 Operable Unit Characterization Summary (Ziagos and Reber-Cox, 1998) further described the site hydrogeology and contaminant distribution.
- The Site-Wide Feasibility Study (SWFS) (Ferry et al., 1999) screened and evaluated remedial alternatives for many OUs at Site 300.

- The Interim Site-Wide Record of Decision (ROD) (DOE, 2001) specified ground water and SVE and treatment, ground water monitoring, and administrative controls (i.e., risk and hazard management) as components of the remedy for the Building 854 OU.
- The Remedial Design Work Plan (RDWP) (Ferry et al., 2001) described the strategic approach and schedule for implementing cleanup as established in the Interim Site-Wide ROD.
- The Building 854 Operable Unit Characterization Summary (Ferry and Kearns, 2002) updated the nature and extent of contamination within the previously identified ground water plume and delineated the downgradient extent of the TCE plume in ground water.
- The Compliance Monitoring Plan/Contingency Plan (CMP/CP) for Interim Remedies (Ferry et al., 2002).

2. Hydrogeology and Contaminant Distribution

2.1. Hydrogeology

The geology and hydrogeology of the Building 854 OU are discussed in Chapter 11 of the SWRI report (Webster-Scholten, 1994), and Section 4 of Building 854 Characterization Summary Report (Ferry and Kearns, 2002). The following section briefly describes the main aspects of the Building 854 OU hydrogeology that are relevant to this RD report.

As shown on the geologic map presented in Figure 5 and the cross-section presented in Figure 6, the Building 854 OU is underlain by Quaternary landslide (Qls) deposits, fractured bedrock of the Neroly Formation, and the relatively unfractured Cierbo Formation (Tmss). The Building 854 OU is located on the southern limb of the Patterson Anticline. The axis of the anticline is located immediately north of the area shown in Figure 5.

The landslide deposit that underlies most of the Building 854 OU is characterized by large, angular, weathered bedrock fragments and rotated beds arising from slumping along a plane of detachment that can be as deep as 50 feet (ft). The underlying Neroly Formation strikes N55E to N70E and dips from 8 to 30 degrees southeast along the southern limb of the Patterson Anticline.

The stratigraphy and hydrostratigraphy for the Building 854 OU are summarized in Figure8. As shown in this figure, the Building 854 OU contains three main water-bearing zones:

- Quaternary landslide (Ql) ephemeral perched water-bearing zones.
- Neroly ($Tnbs_1$/$Tnsc_0$) fractured bedrock water-bearing zone.
- Cierbo (Tmss) regional bedrock aquifer.

The well symbols shown on the map in Figure 3 identify the water-bearing zone in which each well is completed.

The Qls contains variably saturated ephemeral perched ground water. Springs 10 and 11, located in a canyon in the southern part of the OU, appear to discharge from the toe of this landslide. The landslide deposit is underlain by up to 200 feet of sandstone, siltstone, and claystone of the lower Neroly Formation. Although the lower Neroly $Tnbs_1$ and the $Tnsc_0$ are distinct stratigraphic units, the ground water contained in these units appears to be in hydraulic communication. For the purposes of this RD report, these stratigraphic units comprise a single water-bearing zone or hydrostratigraphic unit (HSU). An HSU is a continuous water-bearing zone that exhibits similar hydraulic and chemical properties.

The $Tnbs_1/Tnsc_0$ HSU is the main contaminated zone at the Building 854 OU and the focus of the remedial action described in this RD report. Several independent data sets, including hydrologic, chemical, and optical televiewer data, indicate that fractures are an important flow-controlling feature in the $Tnbs_1/Tnsc_0$ HSU. Fracture orientation data are summarized on a composite fracture density diagram in Figure 7, showing four major fracture orientations (N, vertical; N27E, 72SW; N53W, 47NE; and N74W, 26NE). Neroly bedrock outcrops in the area also exhibit fractures and fault offsets along similar orientations. The magnitude and speed of water level response observed in monitor well W-854-11 from pumping at well W-854-02 (Figure 9) suggests preferential flow along fractures. Note that the two wells are located along a transect that is sub-parallel to one of the main fracture orientations (Figure 7). Fracture orientation also appears to influence the $Tnbs_1/Tnsc_0$ ground water gradient direction (Figure 10). In the northern portion of the OU, ground water generally flows east-southeast; in the central and southern portions of the site, ground water generally flows to the south.

The $Tnbs_1/Tnsc_0$ ground water elevation map exhibits an average hydraulic gradient of 0.1 beneath the Building 854 OU. However, this gradient is flatter (0.08) in the Building 854 source area and steeper (0.13) in the Building 854 proximal area. A north-south trending fault divides the flatter and steeper ground water gradients and is also a likely flow-controlling feature. Hydraulic conductivity in this HSU is estimated from hydraulic tests to be 3 to 5 ft/day. This hydraulic conductivity is also consistent with results from capture zone modeling. Assuming a matrix porosity of 0.3, the ground water flow velocity is approximately 1.5 ft/day. Ground water elevation data is located in Attachment A, Table A-1.

As presented in Figure 8, the Cierbo aquifer contains a separate and distinct water table from the overlying Neroly water-bearing zone and the upper part of the Cierbo Formation is unsaturated beneath the Building 854 source area. This interpretation is supported by the fact that well W-854-12, which is screened in the upper Cierbo, has always been dry. Ground water in the Cierbo aquifer is of low quality and it is used mainly for fire suppression.

2.2. Contaminant Distribution

Details of the nature and extent of contamination in the Building 854 OU are discussed in Chapter 11, Section 13-4 of the SWRI report (Webster-Scholten, 1994), Chapter of the SWFS (Ferry et al., 1999), Section 5 of the Building 854 Characterization Summary Report (2002), and summarized below by environmental media.

2.2.1. Soil and Bedrock

Subsurface soil and bedrock samples have been collected from 56 boreholes in the Building 854 OU and analyzed for VOCs. In general, soil and bedrock recovery during drilling operations is very poor due to the highly-fractured nature of this material. The highest TCE concentration detected in soil or bedrock is 1,000 milligrams per kilogram (mg/kg) as reported in Carpenter (1983). This shallow soil sample was collected in the vicinity of the Building 854H drain outfall. The TCE contaminated soil was excavated and removed from the Building 854H drain outfall in 1983. TCE-contaminated soil at the northeast corner of Building 854F was also removed at this time. Subsurface soil collected from a confirmatory borehole drilled in the vicinity of the Building 854H drain outfall following soil excavation did not contain detectable TCE.

Subsurface soil samples were collected in December 2002 and January 2003 in the Building 854 source area during the drilling of well W-854-1834 and boreholes B-854-1835, B-854-1836, and B-854-1862. TCE was not detected in any of the recovered samples. Analytical data for VOCs in soil and bedrock are included in Attachment A, Table A-3.

Contaminants of concern (COCs) in surface soil include lead, zinc, cyclotetramethylene tetranitramine (HMX), tritium, and PCBs. Although lead, zinc, HMX, and tritium have been detected at elevated levels, no risk or hazard to human health or ecological receptors have been identified. Vadose zone modeling presented in the SWFS indicates that HMX, lead, and zinc in surface soil will not impact ground water above MCLs. No Further Action remedy for metals, HMX, and tritium was selected for the Building 854 OU in the Interim ROD. Analytical data for metals, high explosives, and tritium in soil and bedrock are included in Attachment A, Tables A-16 and A-17, A-7, and A-9, respectively.

PCB compounds (Aroclors 1242, 1248, and 1254) were detected in surface soil samples collected in 1995 at maximum concentrations of 34, 52, and 0.16 mg/kg, respectively. A baseline human health risk of 7×10^{-5} was identified that results from the incidental ingestions and direct dermal contact with PCB-contaminated soil. To obtain more information on the nature and extent of PCBs in surface soil, 38 additional surface soil samples were collected in January 2003. PCBs were detected in surface soil samples 3SS-854-112 and 3SS-854-113 located within the former Building 855 lagoon. PCBs were not detected in any other samples at levels greater than 1 mg/kg. The sample collected from location 3SS-854-112 contained 3.6 mg/kg of Aroclor-1248 and 4.7 mg/kg of Aroclor-1254 and a sample collected from the edge of the lagoon, 3SS-854-113, contained 0.023 mg/kg of Aroclor-1254. LLNL will be conducting depth sampling to profile the vertical extent of PCB contamination within the former disposal lagoon and will pursue a removal/excavation if appropriate. Analytical data for PCBs in soil and bedrock are included in Attachment A, Table A-23. Additional discussion and data are included in Appendix A.

2.2.2. Soil Vapor

As part of a soil vapor survey (SVS) conducted in 1996, TCE was detected at concentrations greater than 10 parts per million by volume (ppm_v) in two samples (SVV-854-017 and SVV-854-029) collected from the vadose zone in the vicinity Buildings 854C and 854F (Attachment A, Tables A-4 and A-5). Due to the results of soil vapor surveys, the following human health risks have been identified.

- 1×10^{-5} for inhalation of VOCs outside Building 854F due to VOCs volatilizing from subsurface soil
- 9×10^{-6} for inhalation of VOCs inside Building 854F due to VOCs volatilizing from subsurface soil.

- 1 × 10^{-6} for inhalation of VOCs inside Building 854A due to VOCs volatilizing from subsurface soil.

In February 2003, a treatability study was performed to evaluate the efficacy of SVE technology to remove VOCs from the vadose zone in these areas. VOCs were detected in the vapor stream at concentrations of 3 to 4 ppm_v during the Building 854F test. No VOCs were detected during the Building 854C test. The specifics of this treatability test are discussed in Section 3.2.

2.2.3. Ground Water

TCE is the primary COC for ground water at the Building 854 OU, while perchlorate and nitrate are secondary COCs. The current (fourth quarter, 2002) distribution of TCE and perchlorate in ground water at the Building 854 OU, is presented in Figures 11 and 12, respectively. Nitrate has also been detected in ground water at concentrations exceeding the 45 mg/L drinking water MCL. The current distribution of nitrate in ground water is presented in Figure 13. The nitrate in the ground water is most likely due to both natural and anthropogenic sources. Analytical data for TCE, perchlorate, tetrabutyl ortho silicate (TBOS), and nitrate in ground water are included in Attachment A, Tables A-2, A-24, A-18, and A-14, respectively. Although TBOS was recently detected in two of seven wells sampled to date (W-854-1823 and W-854-1902), further characterization is needed before this chemical is confirmed as a ground water COC in this OU.

The maximum historical TCE ground water concentration (2,900 micrograms per liter [μg/L]) was detected in a sample collected in May 1997 from well W-854-02, located near Building 854F in the Building 854 source area. Recent data (October 2002) from the same well indicate that the current maximum TCE concentration has decreased to 360 μg/L. Three wells (W-854-1822, W-854-1823, and W-854-1902) were installed during fourth quarter 2002 to characterize the central part of the TCE plume emanating from the Building 854 source area (Table 1). Although perchlorate was detected in ground water samples collected from these wells, TCE was not. These three wells define the current downgradient extent of the TCE plume emanating from Building 854 source area. In light of these new data, the TCE ground water contamination in the vicinity of wells W-854-06, W-854-07, and former well 13 now appears to be the result of a separate, localized release and not the distal portion of the TCE plume extending from Building 854F. The absence of TCE in wells (W-854-14, W-854-45, W-854-1707, and W-854-1731) downgradient of well 13 suggests that this contamination is localized.

The total dissolved mass of TCE in the ground water was revised from the previous estimate of 24 kilograms which was reported in the Site-Wide Feasibility Study (SWFS) (Ferry et al., 1999). The revised estimate is based on EarthVision volumetrics and the new interpretation of the TCE plume. The bounding surfaces for the EarthVision volumetrics are the top and bottom of the $Tnbs_1/Tnsc_0$ HSU and ground water elevation surface for both pre-pumping and current conditions. The dissolved mass of TCE above the 0.5 μg/L reporting limit was estimated for pre-pumping conditions using ground water elevations and TCE concentrations from fourth quarter 1996, and current conditions using fourth quarter 2002 data. The pre-pumping TCE mass estimate ranges from 9 to 16 kilograms and the current mass ranges from 5 to 10 kilograms.

To date, TCE has not been detected in the Tmss aquifer except for a single detection of TCE at a concentration of 0.62 μg/L in a ground water sample collected from well W-854-04 in

December 1996. No TCE was detected in previous or subsequent samples collected from this well. An additional well will be installed and completed in the Cierbo Formation to monitor this aquifer in the vicinity of former well 13. TCE has sporadically been detected in water samples from Springs 10 and 11, located in the Building 854 distal area. Maximum historical TCE concentrations of 1.0 μg/L were detected in Spring 11 and 32 μg/L in Spring 10, both in August 2000. TCE has not been detected in Spring 11 since August 2000 but continues to be sporadically detected in Spring 10, although at much lower concentrations.

The maximum perchlorate concentration of 27 μg/L in ground water was detected in a sample collected from the recently installed well W-854-1823 in March 2003. Additional monitoring will be performed in this area to confirm this detection. Perchlorate has not been detected in ground water samples collected from wells W-854-06 and W-854-07. These wells are used to define the downgradient extent of the perchlorate plume. Perchlorate has not been detected in ground water from the Qls or the Cierbo aquifers.

A maximum historical concentration of nitrate (as NO_3) of 200 milligrams per liter (mg/L) was detected in a ground water sample collected from well W-854-14 in December 2000. Recent data (October 2002) indicate that the current maximum nitrate concentration is 55 mg/L, in a sample collected from well W-854-02. The distribution of nitrate in ground water, as shown in Figure 13, does not suggest specific source areas. Nitrate concentrations in ground water are most likely the result of both anthropogenic and natural sources.

3. Treatability Studies

A number of treatability studies are being conducted at Site 300, primarily to evaluate the efficacy of different ground water extraction and treatment technologies. Ground water treatment in the Building 854 OU is complicated by the fact that extracted ground water contains multiple contaminants including VOCs, perchlorate, and nitrate. Where these contaminants are co-mingled, several treatment units, configured in-series, are needed to meet discharge requirements.

Two long-term treatability studies are being conducted specifically for ground water extraction and treatment. One treatability study is being conducted at the B854-SRC facility to determine the effectiveness of aqueous-phase granular activated carbon (GAC) for removing TCE and ion-exchange resin for removing perchlorate. A second treatability study is being conducted at the B854-PRX facility to evaluate the effectiveness of GAC for removing TCE and a containerized wetland system or biotreatment unit (BTU) for treating nitrate and perchlorate. These studies are briefly discussed in Sections 3.1.1, 3.1.2, and 3.1.3, respectively. The long-term performance of these treatment technologies are summarized in the Performance Summary, Section 4.5.

In addition to these long-term ground water extraction and treatment studies, a short-term SVE and treatment study was conducted to evaluate this technology for source area cleanup. The results of this short-term SVE study are summarized in Section 3.2.

3.1. Ground Water Extraction and Treatment

3.1.1. Aqueous-phase GAC

The B854-SRC and B854-PRX studies began in December 1999 and November 2000, respectively. B854-SRC extracts ground water from monitor well W-854-02 located near Building F and B854-PRX extracts ground water from monitor well W-854-03, located southeast of the Building 854 complex (Figure 3). Analytical results from these treatability studies are presented in Table 2 and long-term treatment facility performance is summarized in Sections 4.5.1 and 4.5.2.

Both studies are being conducted with treatment facilities outfitted with aqueous-phase GAC. The B854-SRC study was operated initially at a 3 gpm flow rate, but eventually was dropped to 1 gpm due to lowering of the water table. The B854-PRX study is being conducted at a 1 gpm flow rate. Ground water levels are monitored and ground water samples were collected during these studies to evaluate performance. Based on this and other similar studies at Site 300, it has been determined that GAC is an effective and efficient technology for removing VOC from the ground water at the concentrations and flow rates measured and anticipated for the 854 OU treatment facilities.

3.1.2. Ion exchange

The efficiency of ion-exchange technology to remove perchlorate from ground water is being tested at the B854-SRC facility. Perchlorate is removed at the B854-SRC facility by two ion-exchange columns (72 gallon capacity each) that precede the aqueous-phase GAC units. The resin chosen for this application is Sybron SR-7™. The flow rate was initially 3 gpm, but was lowered to approximately 1 gpm. The long-term performance of the B854-SRC facility to remove perchlorate is summarized in Section 4.5.1. Based on the capacity and cost of the tested resin and the various system parameters, it was determined that ion-exchange resin was the most effective and efficient primary treatment technology for removing perchlorate from ground water at all B854 OU facilities except B854 Proximal. At B854-PRX facility, it was determined that ion-exchange resin is most efficient as polishing (secondary) treatment step for removing residual perchlorate after the biotreatment unit.

3.1.3. Biotreatment Unit

A containerized wetland system BTU is being tested at the B854-PRX to determine its efficiency for treating nitrate and perchlorate. The BTU consists of four tanks containing coarse aquarium-grade gravel. Two tanks are 500-gallon capacity (72-inch diameter) and two are 1,100-gallon capacity (96-inch diameter). The containers were planted with cattails (*Typha* spp.) and sedges (*Cyperus* spp.). The plant species were obtained from local arroyos and chosen for their availability and vigor. No inocula was added to the system. The ground water is allowed to circulate through the bioreactor for three weeks to acclimate the wetland plants and to build a biofilm from indigenous flora. The recirculation system is then replaced with a constant flow of untreated ground water.

The tank volume was chosen to accommodate a 1 gpm total flow rate with a hydraulic retention time of about 17 to 20 hours. As the plants matured, the retention time may have decreased due the increased dentris and rootlets consuming tank volume. Two 500-gallon tanks, in parallel, were raised about 24 inches above ground to allow for gravity flow into two 1,100-gallon tanks in parallel. The water flows from top to bottom in each tank, then through a conduit into the next tank in series. The split-flow of 0.5 gpm through each parallel 500- and 1,100-gallon tank series configurations is combined at the discharge of the BTU. Water levels in each tank are maintained by a system of adjustable weirs. The hydraulic retention time is the total time it takes the ground water to flow from the reactor influent hose through the tanks into the effluent hose. The hydraulic retention time is controlled by the influent flow control valve. As a precaution, the BTU effluent water is filtered through Sybron ASB-7 ion-exchange resin to insure that the perchlorate is removed prior to flowing into an infiltration trench. Acetic acid (i.e., vinegar) is injected at the BTU inlet to provide a nutrient source for the denitrifying microorganisms. Testing demonstrated that an electrically-powered acetic acid (i.e., vinegar) pump is more reliable than a hydraulically powered system.

Analytical results from the BTUstudy are shown in Figure 14. The results indicate that this BTU is capable of reducing nitrate and perchlorate to concentrations below discharge limits at a 1 gpm flow rate. Based on these results, it was determined that the biotreatment unit is an effective treatment technology for facilities with low flow rates (< 5 gpm). Additionally, this technology has the advantage of very low O&M costs and it transforms contaminants into benign by-products rather than transfer from one medium to another.

3.2. Soil Vapor Extraction and Treatment

A short-term treatability study was performed to evaluate the efficacy of SVE as a treatment technology to remove VOCs from subsurface vapors. As presented in Figure 15, two areas within the Building 854 Complex were selected for treatability studies (Building 854C and 854F). The two areas were selected based on TCE concentrations greater than 10 ppm_v detected in active soil vapor samples (SVV-854-017 and SVV-854-029) collected in the vicinity of these test cells in 1996 as part of source area characterization activities. The data are presented in Attachment A, Table A-5.

As shown in Figure 15, two boreholes were drilled at each location for the SVE study. Test borehole completion details are summarized in Table 3. Instrumented membrane technology was used in these boreholes to monitor and extract soil vapors from the subsurface during the tests. The Building 854C boreholes (B-854-1836 and B-854-1862) were drilled to a depth of 86 feet. An instrumented membrane liner was deployed in B-854-1836 with soil vapor sample ports located every 10 feet from 36 to 86 feet and an extraction membrane was deployed in B-854-1862 with a screen from 66 to 86 feet. The Building 854F boreholes (B-854-1834 and B-854-1835) were drilled to a depth of 120 feet. An instrumented membrane was deployed in B-854-1834 with soil vapor sample ports located every 15 feet from 60 to 120 feet. Borehole B-854-1835 was completed as an SVE well with polyvinyl chloride (PVC) casing and a screen from 100 to 120 feet because borehole conditions were too unstable to use instrumented membrane technology.

A skid-mounted SVE system capable of generating vapor flow rates in excess of 50 standard cubic feet per minute (SCFM) was used for this treatability study. This SVE system contains vapor-phase GAC for removing VOCs from the vapor stream. Two field instruments were used to measure the concentration of VOCs: (1) a hand-held Organic Vapor Analyzer (OVA) for "grab" samples; and (2) an in-line Total Hydrocarbon Analyzer (THA) for continuous measurement of VOCs in the process gas stream. Both instruments use Flame Ionization Detectors (FID). The OVA was calibrated with certified "zero air" in addition to various concentrations of methane. The THA was calibrated daily throughout the study with "zero air" and propane. Generally, ambient air readings with both the THA and OVA were higher than readings of "zero air" presumably due to background concentrations of methane in ambient air that average 1.8 ppm_v (Dlugokencky, 1994). A Campbell Scientific 21X data logger was used to record soil gas flow rates. VOC vapor concentrations were measured by the in-line THA throughout the test study. Soil gas pressure was also monitored at each sample port in the instrumented monitoring membrane and recorded using a Campbell Scientific CR10. Periodic soil vapor samples were collected using Tedlar bags and analyzed in the laboratory using EPA method TO-14 to confirm VOC field measurements.

During the Building 854C test, the SVE system was operated at 17 to 24.5 SCFM for 24 hours with 70 to 80 inches of water vacuum. As presented in Table 2, VOCs were not detected above the 0.4 ppm_v detection limit based on soil vapor samples collected using Tedlar bags and analyzed using the TO-14 method. A second test was conducted at Building 854F. During this test, the SVE system was operated at 68 to 69 SCFM for 48 hours with 41.5 to 43.5 inches of water vacuum. As shown in Figure 16, VOCs increased to a stable concentration of 3 to 4 ppm_v within 24 hours of the start of the test. Tedlar bag samples collected at the influent to the SVE system ranged from 1.9 to 4.2 ppm_v, confirming the OVA field measurements.

Results from both tests indicate that the pneumatic conductivity of the vadose zone beneath the Building 854 Complex appears to be very high. These results are consistent with observations made during the drilling of these boreholes in that the landslide deposits and bedrock material in this area appears to be highly fractured. Although high pneumatic conductivity was observed during the test at Building 854C, VOCs were not detected in the vapor stream. Therefore, SVE would not be an appropriate technology for source area cleanup at this location. However, stable VOC vapor concentrations in the 3 to 4 ppm_v range observed during the Building 854F test, indicate that significant mass removal, on the order of a kilogram of TCE per month, could be achieved, if the VOC influent concentrations and the high flow rates can be sustained (Figure 16). SVE, therefore, is a viable technology for source cleanup at the Building 854F area and significantly reduce overall cleanup time at the Building 854 OU if the VOC influent concentrations and mass removal rates are sustainable.

4. Remedial Design

This section presents the remedial design for ground water cleanup at the Building 854 OU. Treatment areas and treatment facility locations are shown in Figure 3. Design specifications, including treatment technology, influent flow rate and contaminant levels, extraction wells, and effluent discharge method for each treatment area are summarized in Table 4. The existing extraction wellfield and wellfield expansion are shown in Figure 3 along with the existing and planned treatment facilities.

This remedial design includes the following major components:

- Expand B854-SRC ground water extraction wellfield by converting two existing monitor wells (W-854-10 and W-854-18A) to extraction wells. Total flow to this facility will be increased to 4 gpm.
- Conduct a long-term SVE treatability study using a portable SVE system at B854-SRC and SVE wells W-854-1834 and W-854-1835.
- Excavate and dispose of PCB-contaminated soil in the vicinity of the former Building 855 lagoon.
- Install a new ground water extraction well near existing monitor well W-854-09. Connect this well to existing facility B854-PRX and increase the total flow to this facility to 3 gpm.
- Install three additional ground water monitor wells. One well will be located near well W-854-19 and completed in the $Tnbs_1/Tnsc_0$ HSU, a second well near former well 3 and completed in the Cierbo aquifer, and a third well located near well W-854-03 and completed in the $Tnbs_1/Tnsc_0$ HSU.
- Install one planned ground water treatment facility (B854-DIS) in the Building 854 distal area and convert one existing monitor well (W-854-07) to an extraction well. The facility will operate at a flow rate of about 0.25 to 0.5 gpm.

4.1. Remedial Strategy

The planned remedial strategy for the Building 854 OU is consistent with the objectives for ground water cleanup presented in the Interim ROD and the risk-based approach presented in the RDWP (Ferry et al., 2001).

The overall objective of this project is to achieve closure under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of the Building 854 OU Remedial Action by 1) reducing contaminant concentrations in ground water to levels protective of human health and the environment, 2) reducing contaminant concentrations in soil vapor to levels protective of human health and the environment, thereby mitigating contaminant inhalation risk inside and around Buildings 854A and F, 3) mitigating PCB/dioxin/furan inhalation, ingestion, and dermal risk near the Building 855 lagoon, and 4) preventing future migration of contaminants.

The remedial strategy for ground water cleanup in the Building 854 OU utilizes a phased, risk-based approach with the following priorities:

1. Mitigate risk to onsite workers in and around Buildings 854A and F.
2. Mitigate risk to onsite works near the Building 855 lagoon.
3. Prevent further migration of contaminants in the regional aquifer.
4. Cost-effective contaminant mass removal.

This remedial strategy, which is based on hydrogeologic and engineering analysis, relies mainly on ground water extraction and treatment to capture and remove or destroy dissolved contaminants from the ground water in the $Tnbs_1/Tnsc_0$ HSU. The planned treatment technologies are well-proven, presumptive technologies for ground water cleanup, such as conventional aqueous-phase GAC to remove VOCs and ion exchange to remove perchlorate. An innovative technology, containerized wetland, is a component of this remedial strategy because it transforms nitrate and perchlorate into benign by-products rather than simply transfer contaminants from one medium to another.

4.2. Extraction Wellfield Design

This section summarizes the analysis that was done to design an extraction wellfield for ground water cleanup at the Building 854 OU. This analysis is based on the hydraulic test analyses summarized in Section 4.2.1 and the capture zone modeling summarized in Section 4.2.2. Additional logistical and engineering considerations were included in the design of this wellfield. For example, many areas of the Building 854 OU are too steep to locate extraction wells or treatment facilities and were excluded from consideration.

4.2.1. Hydraulic Testing

Hydraulic tests performed in the Building 854 OU are summarized in Table 5. These tests were performed to determine hydraulic parameters, in the main contaminated water-bearing zone, the $Tnbs_1/Tnsc_0$ HSU. Although the broad range of hydraulic conductivity observed during these tests suggest both fracture and porous media flow, the hydraulic conductivity estimates assume an equivalent porous medium. In other words, the estimated hydraulic conductivity is considered to be representative of the average or effective hydraulic conductivity of both the matrix and the fracture network together.

A step-drawdown test was conducted at well W-854-02, the extraction well for the B854-SRC treatment facility. Well W-854-02 was pumped at flow rates up to 7 gpm during the step-drawdown test, while monitoring water levels in nearby wells W-854-01, W-854-10, W-854-11, W-854-17, and W-854-18A. Test results indicate that this well can sustain an extraction flow rate up to 4 gpm and that the estimated hydraulic conductivity is 100–1,000 gallons per day (gpd)/ft^2. This test was conducted during a period of high water levels following the 1998 El Niño rain event. This well has been operating for several years and water levels have declined decreasing the amount of available drawdown. The long-term sustainable yield for this well appears to be in the 1–3 gpm range.

As presented in Figure 9, a significant water level response was observed in well W-854-11 while pumping at well W-854-02. The magnitude and rapid timing of this response suggests preferential flow, most likely along fractures. No significant response was observed in any of the other wells monitored during this test, indicating that these wells are not hydraulically connected via preferential flow paths.

Wells W-854-07 and W-854-10 exhibit low sustainable yield (< 0.5 gpm) and were tested using the slug/bail method. The conclusion from these tests is that the hydraulic conductivity of the $Tnbs_1/Tnsc_0$ HSU in the vicinity of these wells is relatively low ranging from 25 to 40 gpd/ft^2. Presumably, these well screens are not exposed to preferential flow paths or fractures.

4.2.2. Ground Water Capture Zone Analysis

A two-dimensional (2-D) analytical model, WinFlow, was used to simulate capture zones associated with the planned extraction wellfield. WinFlow, is an interactive, analytical element code developed by Rumbaugh (1991) that simulates steady-state and transient ground water flow and can be used as a decision-making tool to design and optimize wellfield extraction. It assumes a constant rate of extraction from a homogeneous, isotropic porous aquifer of constant thickness, uniform gradient, horizontal flow, and infinite extent. Because of these assumptions, the capture zones presented in Figures 17 and 18, are considered to be minimum reasonable capture zones.

WinFlow requires the following input parameters:

- Hydraulic conductivity.
- Regional gradient and direction of flow.
- Aquifer thickness.
- Reference head.

Initial estimates for hydraulic conductivity were obtained via hydraulic tests summarized in Section 4.2.1 and Table 5. The gradient was calculated using the groundwater elevation map presented in Figure 10. For the purposes of this model, an average (regional) gradient calculated from wells W-854-17 (in the source area) and W-854-07 (in the distal area) was used, resulting in a gradient of 0.1 ft/ft. An average aquifer thickness of 20 feet was used based on the average saturated thickness observed in the $Tnbs_1/Tnsc_0$ HSU. The reference head for the model was based on the third quarter, 2002 groundwater elevation of 1,241.5 feet, measured at well W-854-05.

The steady-state model was then calibrated using the ground water extraction history from wells W-853-02 and W-854-03. Hydraulic conductivity for the calibrated model was 40 to 50 gpd/ft^2. The calibrated hydraulic conductivity is within the range estimated from $Tnbs_1/Tnsc_0$ hydraulic tests. The calibration was achieved using drawdown information obtained at wells W-854-02, W-854-03, and W-854-11. The simulated drawdown compares favorably to the observed drawdown. After the initial calibration, modeled drawdown at all wells were compared to available drawdown to determine if available drawdown was exceeded at any location. The modeled drawdown at all wells were within the available range.

A sensitivity analysis was performed to evaluate the range of model results with respect to different parameters including pumping rate, hydraulic conductivity, and aquifer thickness. For example, doubling the hydraulic conductivity or aquifer thickness reduces the drawdown and maximum capture width by one half. If the pumping rate is doubled the maximum capture width and drawdown also double. Since the $Tnbs_1/Tnsc_0$ HSU is of limited extent with reducing saturated thickness towards the recharge area, and the effective hydraulic conductivity of the HSU is likely to be higher due to the higher conductivity fracture network, the actual capture zones observed in the field are expected to be larger than predicted using the WinFlow model and the inherent conservative assumptions.

Figure 17 shows the simulated capture zones for existing extraction wells (W-854-02 and W-854-03). Well W-854-02 and W-854-03 are currently pumped at 1 to 2 gpm. The planned extraction wellfield design for this OU, which consists of wells W-854-02, W-854-10, and W-854-18A for the B854-SRC facility, wells W-854-03 and W-854-09 for the B854-PRX facility, and well W-854-07 for the B854-DIS facility, is presented in Figure 18. The estimated flow rates for each extraction well are summarized in Table 6. The actual capture zones are likely to be larger than those presented in Figure 18, which are based on the conservative set of assumptions mentioned above. Actual capture zones are expected to be larger due to the presence of fractures and the proximity of the edge of saturation to the source area extraction wells.

4.2.3. Extraction Wellfield Configuration

As presented in Figure 18, the planned extraction wellfield consists of six wells with an estimated total extraction rate of 7 to 8 gpm. Captures zones are likely to be larger than those presented in Figure 18 and are expected to capture the TCE plume at concentrations above the MCL and the perchlorate plume at concentrations above the action level within 5 to 10 years following startup of the extraction wellfield. Additional extraction wells will be added as needed, based on long-term monitoring and extraction wellfield performance which will be reported annually according to Section □0.1.1.1 of the CMP/CP. For example, the recently installed monitor wells (W-854-1701, W-854-1822, W-854-1823, and W-854-1902) and the planned monitor well located near W-854-19 in the proximal area, will be monitored to determine the adequacy of VOC capture from the B854-SRC and B854-PRX treatment facility well fields. If VOCs are detected, these wells will be considered for conversion to extraction wells or new extraction wells will be installed in the area. Ground water elevations will be measured in wells W-854-17 and W-854-11 to assess the capture of W-854-02. Note that although W-854-11 is currently dry, historically it has contained water and is expected to contain water after rainfall events. Ground water elevations will be measured in W-854-13 to monitor capture of W-854-03. An additional monitor well will be added cross-gradient of W-854-03 (see Figure 3) to assess capture width.Due to poor mechanical conditions in planned extraction well W-854-09, a replacement well will be installed near this well and connected to the B854-PRX facility. The well W-854-09 location is a key location for controlling the TCE plume emanating from the Building 854F area because TCE concentrations at this location have steadily increased from <0.5 μg/L in 1996 when it was installed to 20 μg/L.

4.2.4. Ground Water Cleanup Time Estimate

A "mixed-tank" model was used to estimate the time required to cleanup TCE in the ground water to the 5 μg/L MCL and to background (<0.5 μg/L). This simple model is based on an exponential decay function and idealizes the plume as a well mixed tank that is always accessible to the extraction wells (Isherwood et al, 1991). The estimated time to cleanup to the MCL, which is presented in Figure 19, ranges from 36 to 58 years. The estimated time-to-cleanup to background, presented in Figure 19, ranges from 107 to 129 years. These estimates are based on the planned total extraction flow rate specified in Table 6 (7.5 gpm), the current dissolved TCE mass (5 to 10 kg) presented in Section 2.2.3, a retardation factor of 1.5, and zero degradation. Cleanup goals for all COCs will be established in the Final Site-Wide ROD.

4.3. Treatment System Design and Specifications

The Building 854 OU treatment systems are designed to remove VOCs, nitrate, and perchlorate from extracted ground water to meet Substantive Requirements for water discharge issued by the RWQCB. Two ground water extraction and treatment facilities are currently in operation in the Building 854 OU as discussed in Sections 4.3.1 and 4.3.2. One additional treatment facility is planned for the Building 854 OU as described in Section 4.3.3. The locations of the existing and additional facilities are shown in Figure 3. Relevant engineering data for each facility, including flow rates, influent concentrations, treatment methods, and effluent discharge methods are summarized in Table 4.

4.3.1. Treatment Facility B854-SRC

B854-SRC treats ground water contaminated with TCE (130 to 630 μg/L), perchlorate (4.5 to 9.9 μg/L), and nitrate (31 to 60 mg/L) extracted from well W-854-02 which is located near the Building 854F in the Building 854 complex. Additional extraction wells will be added to this facility including wells W-854-10 and W-854-18A. The main objectives of this facility are to mitigate risk to on-site workers in the Building 854F area, hydraulically control the contaminant source area, and minimize ground water plume migration. This treatment facility has been in operation since December 1999. It is equipped with an aqueous-phase GAC treatment unit to treat VOCs and ion-exchange units to treat perchlorate. Currently, the system is powered by utility lines from an adjacent building. Equipment specifications for this treatment facility are presented in Table 7. The P&ID for this facility is shown in Figure 20A. Treated effluent is discharged to a misting tower configuration presented in Figure 20B and described in Section 4.8.2.

4.3.1.1. Ion exchange

Ground water is pumped from well W-854-02 through 1-in. inside-diameter Schedule 80 steel pipe using a Grundfos submersible pump. Prior to entering the first ion-exchange column, the ground water passes through a five-micron filtration system to remove suspended particles from the ground water. Influent water passes from the filtration system into two ion-exchange vessels connected in series for perchlorate removal. Each ion-exchange canister is filled with approximately 5.2 cubic feet of Sybron SR-7™ resin. Although SR-7 resin has a high affinity for nitrate, operational data indicate the resin has a high selectivity for perchlorate as well. Perchlorate loading on the resin column is expected to be low because of the low influent concentration (< 20 μg/L).

4.3.1.2. Aqueous-Phase Granular Activated Carbon

After the ground water has exited the ion-exchange columns, it enters the STU consisting of three aqueous-phase GAC canisters connected in series. Each GAC canister contains 200 pounds (lbs) of GAC. The influent water passes through the first and second GAC canister for sorption of VOCs. The third GAC canister is a safeguard against breakthrough of VOCs. When VOCs are detected between the second and third GAC canister above the effluent discharge limits, the GAC in the first canister is replaced with new, clean GAC and the first GAC canister is placed in the third position. The remaining partially-saturated GAC canisters move up in position (e.g., the third GAC canister moves to the second position and the second GAC canister moves to the first position) to optimize GAC use.

Monitoring of effluent from the third GAC canister is conducted for compliance with Substantive Requirements issued by the RWQCB. The spent GAC is removed by a vendor for regeneration or offsite disposal at a Resource Conservation and Recovery Act (RCRA)-permitted facility. DOE/LLNL complies with the Offsite Rule (40 Code of Federal Regulations [CFR]

300.440) for the offsite shipment of CERCLA waste. Following treatment in the GAC units, ground water is stored in a 100-gallon tank and discharged in batch mode to a misting tower located 300 ft south of Building 854F, where nitrate is treated via uptake by native grasslands.

4.3.1.3. Long-term SVE Treatability Study

A long-term SVE treatability study is included as part of this remedial design. This study will be conducted using the same SVE well (W-854-1835) that was used during the short-term study discussed in Section 3.4. In addition, borehole B-854-1834 will be completed with PVC casing and also used as an SVE well. The purpose of the long-term study is to determine whether soil vapor mass removal rates achieved during the short-term study are sustainable over longer periods. A portable SVE system will be used during the long-term study and it will be operated at flow rates similar to those used during the short-term study (50 to 60 SCFM). The SVE system will be operated continuously while influent VOC vapors concentrations are monitored. The system will be operated until VOC vapor concentrations decrease below detectable levels of 0.4 ppm$_v$. At this point, the SVE system will be shut down for a three to six month period to monitor any rebound in soil vapor VOC concentrations. If rebound occurs, the SVE system will be restarted and operated until VOC concentrations decline again. The system will be operated in a cyclic fashion, until no further rebound in VOC concentrations is observed.

4.3.2. Treatment Facility B854-PRX

B854-PRX treats ground water contaminated with TCE (55 to 150 μg/L), perchlorate (5.8 to 14 μg/L), and nitrate (41 to 50 mg/L) extracted from well W-854-03 located southeast of the Building 854 complex. Future additional extraction wells may be added to this facility including well W-854-09.

This facility has been in operation since November 2000. It consists of aqueous-phase GAC for VOC removal, an above-ground containerized wetland BTU to remove nitrate and perchlorate, and ion-exchange resin as a final polishing step for perchlorate removal. These treatment sub-units are connected in series. Each sub-unit is briefly described in the following sections. Equipment specifications for the treatment system are presented in Table 7 and the P&ID is shown in Figures 21A through 21D. Treated effluent is discharged to an infiltration trench.

4.3.2.1. Aqueous-Phase Granular Activated Carbon

Ground water is pumped from well W-854-03 using a solar-powered Shurflo submersible pump. Prior to treatment with aqueous-phase GAC, the ground water passes through a five-micron filter to remove suspended particles. The three aqueous-phase GAC canisters are connected in series in an STU. Each GAC canister has a 200 lb capacity. The influent water passes through the first and second GAC canister for VOC removal. The third GAC canister is a safeguard against breakthrough of VOCs. The monitoring and replacement of the GAC units are conducted as described in Section 4.3.1.2.

The spent GAC is removed by a vendor for regeneration or offsite disposal at a RCRA-permitted facility. DOE/LLNL complies with the Offsite Rule (40 CFR 300.440) for the offsite shipment of CERCLA waste. Following treatment with GAC, ground water is infused with acetic acid as a nutrient source for the denitrifying microorganisms within the BTU.

4.3.2.2. Biotreatment Unit

After the ground water leaves the STU it enters a containerized wetland system or BTU. The wetland BTU consist of four tanks containing coarse aquarium-grade gravel. The two parallel lead tanks are 500-gallon capacity (72-inch diameter) each and the two parallel lag tanks are 1,100 gallons (96-inch diameter) each. The containers are planted with cattails (*Typha* spp.) and sedges (*Cyperus* spp.). The plant species were obtained from local arroyos and chosen for their availability and vigor. No inocula was added to the system. The ground water was allowed to circulate through the bioreactor for three weeks to acclimate the wetland plants and to build a biofilm from indigenous flora. The recirculation system was then replaced with a constant flow of ground water. Acetic acid (i.e., vinegar) is injected at the BTU inlet to provide a nutrient source for the denitrifying microorganisms.

The tank volume was chosen to accommodate a 1 gpm total flow rate with an hydraulic retention time of about 17 to 20 hours. As the plants matured the retention time has decreased due the increased dentris and rootlets consuming tank volume. The two 500-gallon tanks were raised about 24 inches above ground to allow for gravity flow into the two 1,100-gallon tanks in parallel flow. The water flows from top to bottom in each tank, then through a conduit into the next tank in series. The split-flow through each parallel 500- and 1,100-gallon tank series configuration is combined at the discharge of the BTU. Water levels in each tank are maintained by a system of adjustable weirs. The hydraulic retention time is the total time it takes the ground water to flow from the reactor influent hose through the tanks into the effluent hose. The hydraulic retention time is controlled by the influent flow control valve.

The BTU may need to be expanded to accommodate the increase in the facility's flow capacity up to 5 gpm (17-hour retention time) as a result of the wellfield expansion. This may include the addition of two primary tanks (70 ft^3 each), two secondary tanks (150 ft^3 each), and two isolated wetland emplacements (1,500 ft^3 each). As a precaution, the bioreactor effluent water is filtered through Sybron ASB-7 ion-exchange resin to ensure that the perchlorate is removed prior to flowing into an infiltration trench.

4.3.2.3. Ion exchange

Ground water discharged from the bioreactor flows into two ion-exchange canisters connected in series for perchlorate removal prior to discharge (Figure 21A). Each ion-exchange canister is filled with approximately 3 cubic feet of Sybron SR-7™ resin. Although SR-7 resin has an affinity for nitrate, operational data indicate the resin has greater selectivity for perchlorate. Perchlorate loading on the resin column is expected to be low because of the low influent concentration (< 20 μg/L). The treated ground water is discharged to the infiltration trench.

4.3.3. Planned Treatment Facility B854-DIS

The planned treatment facility (B854-DIS) will be located several hundred feet south of the B854-PRX facility. At least one existing ground water monitor well (W-854-07) will be converted to an extraction well for this facility. The estimated sustainable flow rate is between 0.25 and 1 gpm. Contaminated ground water will be treated by aqueous-phase GAC and ion-exchange resin as needed for removal of VOCs and perchlorate, respectively. Water containing nitrate will be processed and discharged through a BTU and infiltration trench or by misting towers to native grasses for treatment. The P&ID for this facility is shown in Figures 22A and 22B.

4.4. Risk and Hazard Management

The goals of the Building 854 OU Risk and Hazard Management Program as described in the CMP/CP are to control exposure to contaminants and to ensure the selected interim remedies for the Building 854 OU protect human health and the environment while the Remedial Objectives are being achieved.

The risk and hazard management components of the selected interim remedies for the Building 854 OU include:

- Annual modeling and risk estimation for indoor ambient air at Buildings 854A and 854F and outdoor ambient air at Building 854F until the estimated inhalation risk is below 10^{-6} and the hazard index is below 1 for two years.
- Building occupancy restrictions will be maintained and annual modeling continued, as long as the risk exceeds 10^{-6} and the hazard index is greater than 1.
- If and when building occupancy is planned and the risk exceeds 10^{-6} and the hazard index is greater than 1, engineered controls will be implemented to prevent exposure.
- Surface soil sampling for PCBs to evaluate if soil removal is warranted. (This sampling was conducted in 2003 and the results are described in Appendix A).
- Every five years, performing site-wide ecological surveys and data reviews to ensure changes in contaminant concentrations do not threaten wildlife populations and vegetation communities.
- Reviewing data to evaluate compliance with Remedial Action Objectives.

The results of the sampling and risk evaluation conducted as part of the Risk and Hazard Management Plan will be reported in the semi-annual Compliance Monitoring Reports.

4.5. Performance Summary

This section summarizes performance data for the two existing Building 854 OU treatment facilities, B854-SRC (Section 4.5.1) and B854-PRX (Section 4.5.2), and presents expected performance for the planned facility, B854-DIS (Section 4.5.3). Treatment facility performance is expected to vary greatly within the Building 854 OU depending on a number of factors, including logistics, operational limitations, extraction well yield, influent concentrations, and effluent disposal method. The relatively low sustainable well yield is the main limiting factor regarding treatment facility performance in this OU.

To evaluate treatment facility performance, several operating parameters are measured and recorded including flow rate, influent concentrations, and effluent concentrations. This information is used to calculate extracted ground water volumes and contaminant mass on a monthly basis. To evaluate overall remedial performance in the OU, ground water elevations and contaminant concentrations are regularly monitored and reported on a semi-annual basis as specified by the CMP. These data are used to generate ground water elevation and plume maps to demonstrate hydraulic control of the plume and document decreasing plume concentrations.

4.5.1. B854-SRC Performance

The primary objectives of treatment facility B854-SRC are to hydraulically control the contaminant source area and prevent further ground water plume migration through ground water extraction and treatment. In addition, extraction and treatment of VOCs in ground water and soil vapor are necessary to mitigate the inhalation risk to on-site workers at the Building 854F.

As of May 2003, 2,991,502 gallons of water were extracted and treated. During this time, influent concentrations of VOCs ranged from 130–630 μg/L, influent concentrations of perchlorate ranged from 5–10 μg/L, and influent concentrations of nitrate ranged from 30–60 mg/L. To date, 3.3 kilograms of VOCs have been removed by the GAC, 67 grams of perchlorate have been removed by the ion-exchange unit, and 605 kilograms of nitrate have been discharged by the misting system and treated by native grasses. Detailed performance data for the B854-SRC treatment facility are presented in Table 8 and VOC mass removal is summarized in Figure 23.

4.5.2. B854-PRX Performance

The primary objectives of treatment facility B854-PRX are to capture the proximal and distal portions of the ground water plume emanating from the Building 854 Complex. In addition to contaminant mass removal, this facility is designed to prevent further migration of ground water contaminants into ecologically-sensitive areas in the southern part of the Building 854 OU. The major limitations on this system's performance are well yield and BTU efficiency. As of May 2003, 589,536 gallons of water were extracted and treated. During this time, influent concentrations of VOCs ranged from 55–120 μg/L, influent concentrations of perchlorate ranged from 6–14 μg/L, and influent concentrations of nitrate ranged from 41–50 mg/L. To date, 217 grams of VOCs were removed by the GAC and 23 grams of perchlorate and 91 kilograms of nitrate were treated by the BTU. Detailed performance data for the B854-PRX treatment facility are presented in Table 8 and VOC mass removal is summarized in Figure 24.

4.5.3. Expected Performance for B854-DIS

The primary objectives of treatment facility B854-DIS are to capture the small-scale contaminant plume in the vicinity of former well 13, and prevent further migration of contaminants into ecologically-sensitive areas in the southern part of the Building 854 OU. The sustainable flow rate for the ground water extraction well for this facility (W-854-07) is estimated to be between 0.25 and 1 gpm. Contaminated ground water will be treated by aqueous-phase GAC and ion-exchange resin as needed for removal of VOCs and perchlorate, respectively. The estimated VOC mass removal rate from this facility is about 3 grams per month. Water containing nitrate will be processed and discharged through a BTU and infiltration trench or by misting towers.

4.5.4. Contingency Planning

The CMP/CP describes how DOE and the regulatory agencies plan to address foreseeable problems that may arise during the remediation and monitoring of contaminants conducted under the Interim ROD at the Building 854 OU. It also describes the approaches for modifying Site 300 remediation systems as remediation progresses and as additional information is collected.

The CMP/CP addresses routine and long-term contingencies and uncontrollable natural events (i.e., earthquakes) that could impact the effectiveness of the interim remedial actions at the Building 854 OU.

4.6. Performance Standards and Monitoring

Ground water treatment system performance standards are set by effluent discharge requirements contained in the Substantive Requirements for waste discharge issued by the RWQCB (Appendix B). To ensure these standards are met, periodic monitoring of influent and effluent concentrations is completed in accordance with the CMP. Facility sample port locations for B854-SRC and B854-PRX are identified in the P&IDs (Figures 19A and 19B and 20A through 20D). System performance will also be monitored and optimized, as needed, to maximize mass removal or prevent migration of contaminants. Performance standards for the soil vapor treatment system to be used in the SVE treatability study will be specified in a permit from the San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD).

4.7. Controls and Safeguards

All Building 854 OU ground water extraction and treatment facilities are designed to be fail-safe. The failure of key components will cause the system to shut down safely. Following a shutdown, the treatment facility operator will identify and correct the problem that caused the shutdown before restarting the facility.

System shutdown, which involves the de-energizing extraction, injection, and transfer pumps, may be initiated by the following interlocks:

- Thermal overload on pump motors due to low flow rates.
- Low flow rate in the combined influent line.
- Loss of power to controls and instrumentation.
- High pressure at the particulate filter influent due to discharge line blockage.
- High water level in a transfer tank.

In addition to the interlock fail-safe system, all facility pipelines will be visually monitored weekly for leaks. A preventative maintenance schedule for the treatment systems is presented in Appendix E. An SVE and treatment system shutdown involves de-energizing the vacuum pump. A SVE and treatment system shutdown would be initiated by the loss of power to controls and instrumentation.

4.8. Discharge of Treated Ground Water

This section describes the two discharge methods (infiltration trench and misting system) currently being used in the Building 854 OU to discharge treated ground water effluent. The planned treatment facility, B854-DIS, will also use one of the methods described below to discharge treated ground water.

4.8.1. Infiltration Trench

At B854-PRX, treated water is currently discharged directly into an engineered infiltration trench that introduces the treated water into the shallow subsurface without causing any accumulation of water at the ground surface. This trench was specifically designed for an anticipated maximum flow rate not to exceed 10 gpm. It is 28 ft long, 2 ft wide, and 3 ft deep. Treated ground water is conveyed to a perforated pipe at 2.5 ft below grade along the entire length of the trench. The perforated pipe is PVC with 0.5 inch holes every 2 inches. The perforated pipe rests on 0.5 ft of gravel and is covered with 0.5 ft of gravel to approximately 2 ft below grade. Two sheets of geo-textile are placed over the gravel to prevent infiltration of fine particulate matter that could reduce the permeability of the gravel within the trench. Two feet of compacted native soil were placed above the geo-textile to grade.

4.8.2. Misting System

At B854-SRC, treated water is collected in a holding tank prior to discharge using a misting system. When a pre-determined volume has accumulated, the water is pumped via a high pressure pump through a pipeline to a misting tower. The tower consists of several misting heads about 10 to 12 ft above the ground and spaced to minimize the overlapping of the spray pattern. The number of heads is dependent on the flow requirement of the discharge system. The purpose of the misting tower is to distribute the treated water into the atmosphere over a large area of soil and vegetation in the form of a mist.

The impact of misting nitrate-bearing, treated ground water from the facility B854-SRC on nearby soil and ground water will be evaluated by:

- Visually inspecting nearby grasses and vegetation to determine the area of impact due to misting.
- Sampling soil in the misting area to establish pre-application background nitrate soil concentrations and moisture content.
- Periodic, post-application soil sampling to evaluate changes in nitrate soil concentrations and moisture content.
- Collecting meteorological data such as air temperature, humidity, wind direction, and wind speed to evaluate fate of misted water.
- Continuing ground water monitoring.

These data will be used to estimate nitrate loading to nearby soil on a per acre basis due to misting operations. If acceptable levels are exceeded, then modifications to reduce nitrate loading will be considered.

4.9. Discharge of Treated Vapor

The treated vapor from the soil vapor treatment system to be used in the long-term treatability study, and any subsequent soil vapor treatment, will be discharged to the atmosphere in accordance with air permits to be obtained from the SJVUAPCD.

4.10. Construction, Startup, and Document Schedule

DOE/LLNL has completed the design, construction, and startup of two of the three treatment facilities planned for the Building 854 OU. B854-SRC began operation in December 1999 and B854-PRX began operation in November 2000. The design and construction of the additional facility (B854-DIS) is planned for 2006.The schedule for the additional treatment system and extraction wellfield expansions for the existing facilities is shown in Table 9. The submittal dates for the Building 854 OU Five-Year Review documents are also included in Table 9.

4.11. Cost Estimates

Cost estimates for design, construction, startup, and O&M of treatment facilities B854-SRC, B854-PRX, and B854-DIS, and any wellfield expansion associated with these facilities are summarized in Tables 10, 11 and 12 respectively. These cost estimates are based on experience of constructing and operating similar units in the Building 854 OU and over 30 treatment facilities at other LLNL locations. The capital cost for design, construction, and startup of existing ground water extraction and treatment facilities, B854-SRC and B854-PRX, have already been incurred and therefore are not presented in Tables 10 and 11.

4.11.1. B854-SRC Wellfield Expansion and Facility O&M

Expansion of the extraction wellfield for treatment facility B854-SRC will include the modification of two existing monitor wells to serve as extraction wells (W-854-10 and W-854-18A). The scope of work required to complete this wellfield expansion includes design time, modification of the wellheads, pump installation, transducer installation, construction of the pipeline and utility conduit, and controls and instrumentation. Equipment and materials needed include pumps, transducers, pipe, electrical and signal cable, conduit, pipe supports, flow rate meters, and miscellaneous plumbing fittings.

Cost estimates are provided in Table 10 and are $108,500 for design and construction of the wellfield expansion, $12,940 for startup, and $49,980 for annual O&M.

4.11.2. B854-PRX Wellfield and Treatment Facility Expansion and O&M

Expansion of treatment facility B854-PRX and associated wellfield expansion includes the installation of a new extraction well near existing monitor well (W-854-09) and the addition of two primary tanks (70 ft^3 each), two secondary tanks (150 ft^3 each), and two isolated wetland emplacements (1,500 ft^3 each). Water from the new extraction well will be conducted to the treatment unit through above ground pipelines with a length of approximately 400 ft. This expansion is designed to accommodate the increase in the facility's flow capacity to 5 gpm (17-hour retention time) as a result of the wellfield expansion. The scope of work required to complete this facility and wellfield expansion includes design time, modification of the wellhead, pump installation, flow rate meter, construction of the wetland emplacements, pipeline and utility conduit, and enhanced control and instrumentation system. Equipment and materials needed include high density polyethylene liner, pumps, pipe, electrical conduit, pipe supports, flow rate meters, and miscellaneous plumbing fittings.

Cost estimates are provided in Table 11 and are $158,000 for design and construction, $12,940 for startup, and $48,980 for annual O&M.

4.11.3. B854-DIS Treatment Facility Construction, Startup and O&M

Treatment facility B854-DIS is designed to treat ground water contaminants in the distal treatment area of the Building 854 OU (Figure 3). One extraction well is planned for this facility. Additional extraction wells may be added, if necessary, to achieve cleanup. As presented in Table 6, the estimated maximum flow rate from the planned extraction well is 0.25 to 0.5 gpm.Water from the new extraction well will be conducted to the treatment unit through above ground pipelines with a length of approximately 100 ft. Treatment will be done using aqueous-phase GAC to remove VOCs from the ground water followed by ion-exchange columns to remove perchlorate. Water containing nitrate will be processed and discharged through a bioreactor and infiltration trench or by misting towers. The scope of work required to complete this facility includes design time, treatment facility fabrication, installation of a power transformer, modification of the wellhead, pump installation, transducer installation, construction of the pipeline and utility conduit, and automation set point calibration. Equipment and materials needed include the portable ground water treatment unit, power transformer, pump, transducer, pipe, electrical and signal cable, conduit, pipe supports, and miscellaneous plumbing fittings.

Cost estimates are provided in Table 12 and are $168,370 for design and construction, $12,940 for startup, and $66,080 for annual O&M.

5. Remedial Action Work Plan

The Remedial Action Work Plan for the Building 854 OU treatment facilities includes design and implementation of extraction and treatment systems as described in Section 4, QA/QC Plans and Health and Safety Plans for construction, and O&M that are attached in Appendices C, D, E, and F. The Remedial Action Work Plan also includes the Substantive Requirements (Appendix B). Monitoring and reporting requirements for the ground water treatment systems and monitor wells are included in the CMP (September 2002). In addition, requirements for onsite storage and offsite shipment of hazardous waste, preliminary remediation completion criteria, and procedures for facility and well closure are discussed in this section.

5.1. Quality Assurance/Quality Control and Health and Safety Plans

The QA/QC and the Health and Safety Plans for construction are presented as Appendices C and D of this document. The QA/QC Plan for construction defines the quality objectives and areas of responsibility for the construction of additional extraction and treatment facilities in the Building 854 OU. The Health and Safety Plan for treatment system construction defines areas of responsibility for health and safety during construction activities and references existing LLNL Health and Safety documents which address construction health and safety issues.

The QA/QC Plan for O&M of the Building 854 OU treatment facilities is presented in Appendix E. This plan describes the organizational structure, responsibilities, and authority for O&M QA/QC and the objectives, quality goals, and QA elements for O&M of the Building 854 OU treatment facilities. Appendix F contains the Health and Safety Plan for O&M of the Building 854 OU treatment facilities. This plan presents: (1) organizational structure and responsibilities, (2) hazard analyses and control measures, (3) training requirements for the Building 854 OU treatment facilities O&M, and (4) emergency safety procedures.

5.2. Monitoring and Reporting Programs

Monitoring and reporting requirements for the ground water treatment systems and monitor wells are described in the CMP.

5.2.1. Ground Water Treatment System Influent and Effluent

The Site 300 Extraction and Treatment Facility Monitoring Program described in the CMP includes regular sampling, flow measurements, maintenance of ground water and SVE wells and treatment facilities, and reporting requirements. Discharge specifications, prohibitions, and effluent discharge limitations for treated ground water are contained in the Substantive Requirements for the Building 832 Canyon OU and Building 854 OU Treatability Studies (Appendix B). Quarterly treatment facility influent and monthly effluent monitoring will be conducted and the results used to evaluate facility performance and to verify that discharge requirements are met. The treatment facility influent and effluent samples will be analyzed for VOCs, nitrate, and perchlorate.

5.2.2. Ground Water Extraction and Monitor Wells

Ground water concentrations will be determined by analyzing samples collected from extraction and monitor wells to track changes in plume concentration and extent that result from remediation and natural processes such as dispersion, adsorption, advection, and biodegradation. Chemical analyses will be performed according to EPA Methods or analytical methods contained in the ERD Standard Operating Procedures (Dibley and Depue, 2003). Results will be evaluated according to QA/QC procedures contained in the Quality Assurance Project Plan (QAPP) (Dibley, 1999). Measured ground water concentrations will be used to prepare contaminant isoconcentration contour maps to assess the cleanup progress. Semi-annual monitoring for primary COCs (VOCs) and annual monitoring for secondary COCs (nitrate and perchlorate) will be conducted in Building 854 OU ground water extraction and monitor wells.

5.2.3. Soil Vapor Treatment System Influent and Effluent

VOC concentrations in the soil vapor treatment system effluent will be measured weekly to evaluate compliance with SJVUAPCD Permit to Operate. Although not required by the permit, VOC concentrations in soil vapor will be measured periodically before, during, and after treatment to evaluate performance of the vadose zone remediation system. Based on treatability study data and experience at other sites, contaminant concentrations in soil vapor are anticipated to change over time intervals of weeks under stressed conditions (i.e., during SVE), or months to years under natural conditions.

5.3. Hazardous Waste Handling

Aqueous-phase GAC and the ion-exchange resin in the Building 854 OU treatment facilities will be replaced as needed to remain in compliance with the RWQCB Substantive Requirements discharge limits. Aqueous-phase GAC containing sorbed VOCs will be shipped offsite for regeneration or disposal, and will be managed as hazardous waste, if appropriate. The spent ion-exchange resin with perchlorate will be shipped offsite for disposal and will be managed as hazardous waste, if appropriate.

Shipment and disposal are in accordance with Department of Transportation (DOT) 49 CFR and EPA 40 CFR. Additionally, waste shipments are made according to California Code of Regulations (CCR), Title 22 requirements. The spent GAC and resin from the facilities will be packaged and labeled for shipment by the LLNL Radioactive and Hazardous Waste Management Division (RHWMD). Once packaged, the GAC and/or resin will be shipped to a RCRA-permitted facility for regeneration or disposal. DOE/LLNL will comply with the Offsite Rule (40 CFR 300.440) for the offsite shipment of CERCLA waste.

5.4. Performance Assessment

As described in the CMP, the Discharger shall measure water levels to an accuracy of 0.01 feet mean sea level (MSL) in extraction ad monitor wells. This information shall be used to determine the magnitude and direction of ground water flow and as input to groundwater models to determine plume capture efficiency. Upon periodic review of the capture zone analysis, it may be determined that due to an erroneous design assumption or a change in hydrogeologic conditions that the plume is not being captured as intended. Increased monitoring and characterization followed by extraction flow adjustments and or installation of additional extraction wells would be performed to optimize the system.

The volume of contaminant mass removed by the ground water extraction systems shall be calculated and reported in the semi-annual monitoring reports. Additionally, each extraction well will be assessed for its mass removal, source control, and plume capture ability. Trends in influent contaminant concentration and mass removal will be analyzed and used to optimize system operations to achieve cleanup standards.

5.5. Requirements for Closure

This section specifies requirements for determining when ground water cleanup has been completed and site closure activities, including post-closure monitoring, can begin.

5.5.1. Ground Water Cleanup

Building 854 OU ground water cleanup will be complete when ground water samples demonstrate that cleanup standards, which will be selected and codified in the Final Site-Wide ROD, are achieved. This will be achieved when contaminant concentrations in samples collected from all monitor wells within the OU are below the cleanup standards. When contaminant concentrations in ground water have been reduced to the agreed upon cleanup standards, the ground water extraction and treatment systems will be shut off and placed on standby with agreement from the regulatory agencies. Contaminant concentrations may rise in ground water after extraction ceases due to slow desorption from fine-grained sediments. Therefore, ground water post-closure monitoring will be performed for two years after pumping ceases. Should contaminant concentrations in ground water rebound above cleanup standards, re-initiation of remediation efforts will be discussed with the regulatory agencies.

Cleanup will be considered complete when contaminant concentrations in ground water remain below the cleanup standards for two years. After concurrence with the regulatory agencies that cleanup is complete, the Building 854 OU extraction wells and monitor wells will be decommissioned. Wells will be closed by *in situ* casing perforation and pressure grouting, or by well removal as appropriate, consistent with the approved LLNL Livermore Site and Site 300 Environmental Restoration Project Standard Operating Procedures (SOPs) (Dibley and Depue, 2003). Wellhead abandonment will include removal of any protective covers, instruments, and concrete pads. The upper 2 to 3 ft will be filled with low-permeability soil to restore grade.

After remediation is complete, the Building 854 OU ground water treatment systems and their influent and discharge piping will be decontaminated, dismantled, salvaged, or used at other locations. Any wash water containing hazardous materials will be collected, sampled, and disposed at one of several offsite RCRA-permitted facilities. GAC with sorbed VOCs and spent ion-exchange resin will be disposed according to the specifications described in Section 3.3 "Hazardous Waste Handling."

5.5.2. Soil Vapor Cleanup

If the SVE treatability study results indicate that long-term SVE is an effective mass removal technology in the B854-SRC area, the SVE system will operate until it is demonstrated that VOC removal from the vadose zone is no longer technically or economically feasible in meeting the aquifer cleanup standards sooner, more cost effectively, and more reliably.

6. References for LLNL Facilities Standards, Specifications, and Guide Documents

6.1. General

Designs, construction drawings, and specifications will conform to and comply with the applicable requirements of the latest adopted edition of the references listed herein, which will be considered minimum requirements.

6.2. Regulations

U.S. Department of Energy (DOE)

DOE 5480.7A	Fire Protection Program
DOE 6430.1A	General Design Criteria

Code of Federal Regulations (CFR)

10 CFR 435	Energy Conservation Standards
29 CFR 1910	Occupational Safety and Health Standards (OSHA)
29 CFR 1910.7	Definitions and Requirements for a Nationally Recognized Testing Laboratory (NRTL)
47 CFR 15	Telecommunication (FCC Rules, Part 15)

State of California Department of Labor (DOL)

DOL Labor Code	Division 5—Safety in Employment Chapter 9—Miscellaneous Labor Provisions

California Code of Regulations (CCR)

CCR Title 8	Industrial Relations; Chapter 4, Subchapter 6
CCR Title 20	Public Utilities; Chapter 53—Energy Conservation in New Building Construction

University of California, Lawrence Livermore National Laboratory (LLNL)

UCRL 15910	Design and Evaluation Guidelines for Department of Energy Facilities Subjected to Natural Phenomena Hazards
UCRL 15714	Suspended Ceiling System Survey and Seismic Bracing Recommendations

6.3. Codes

American Concrete Institute (ACI)

ACI 318	Building Code Requirements for Reinforced Concrete

American Institute of Steel Construction (AISC)

AISC	Steel Construction Manual (Allowable Stress Design)

American National Standards Institute (ANSI)

ANSI A58.1	Building Code Requirements for Minimum Design Loads for Buildings and Other Structures

American Welding Society (AWS)

AWS D 1.1	Welding Code—Steel

International Conference of Building Officials (ICBO)

ICBO UBC	Uniform Building Code
ICBO UMC	Uniform Mechanical Code
ICBO UPC	Uniform Plumbing Code

National Fire Protection Association (NFPA)

NFPA 70	National Electrical Code
NFPA 90A	Installation of Air Conditioning and Ventilating Conditioning Systems

6.4. Standards

American Concrete Institute (ACI)

ACI 347	Recommended Practice for Concrete Form Work

American Society for Testing and Materials

American Water Works Association

Construction Specifications Institute

National Electric Manufacturers Association

Sheet Metal and Air Conditioning Contractors National Association, Inc.

6.5. LLNL Manuals and Reports

M-010 LLNL Health and Safety Manual

LLNL Site Development and Facilities Utilization Plan

LLNL Landscape Master Plan and Design Guidelines

7. References

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Figures

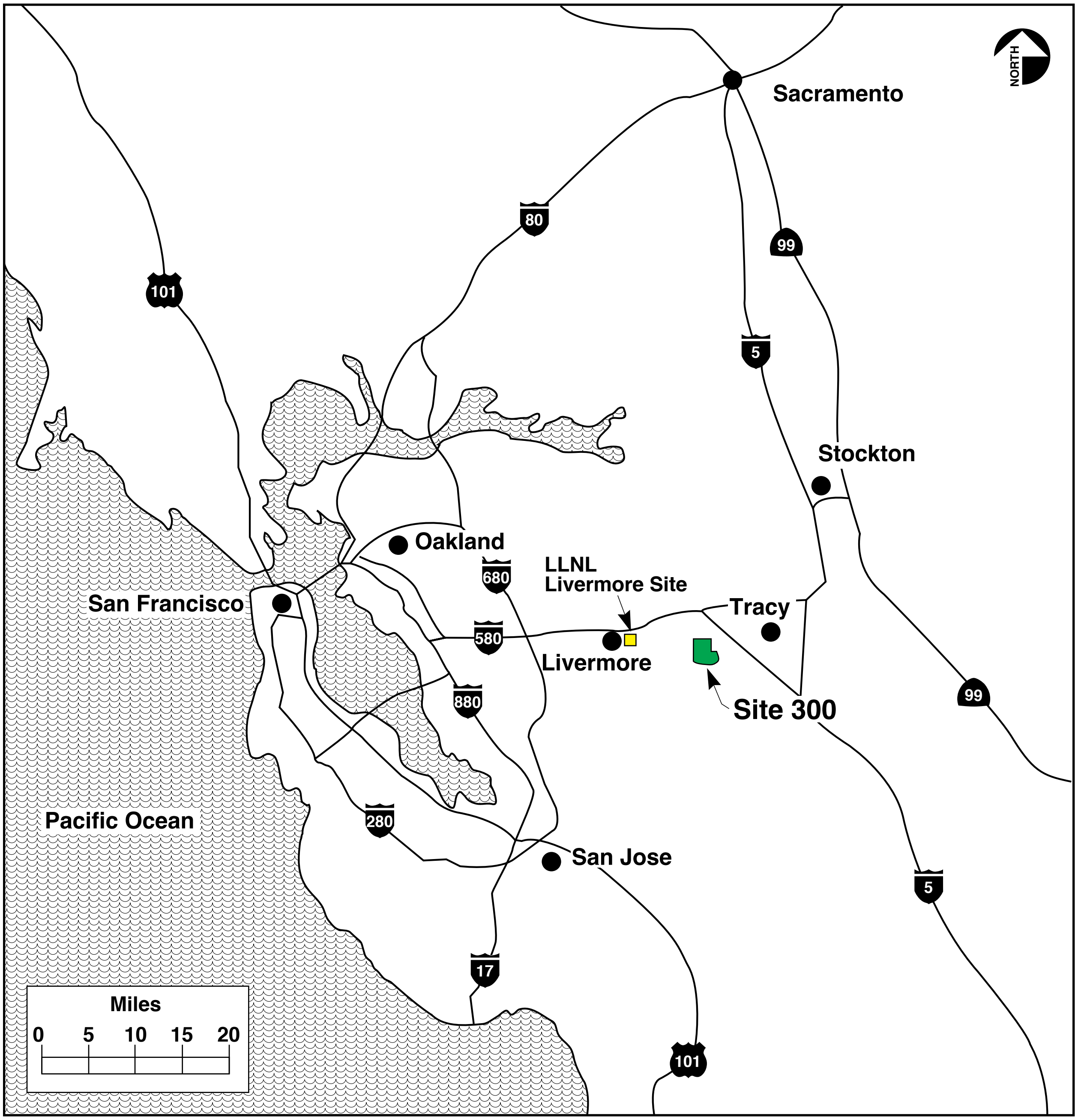

Figure 1. Location of LLNL Site 300.

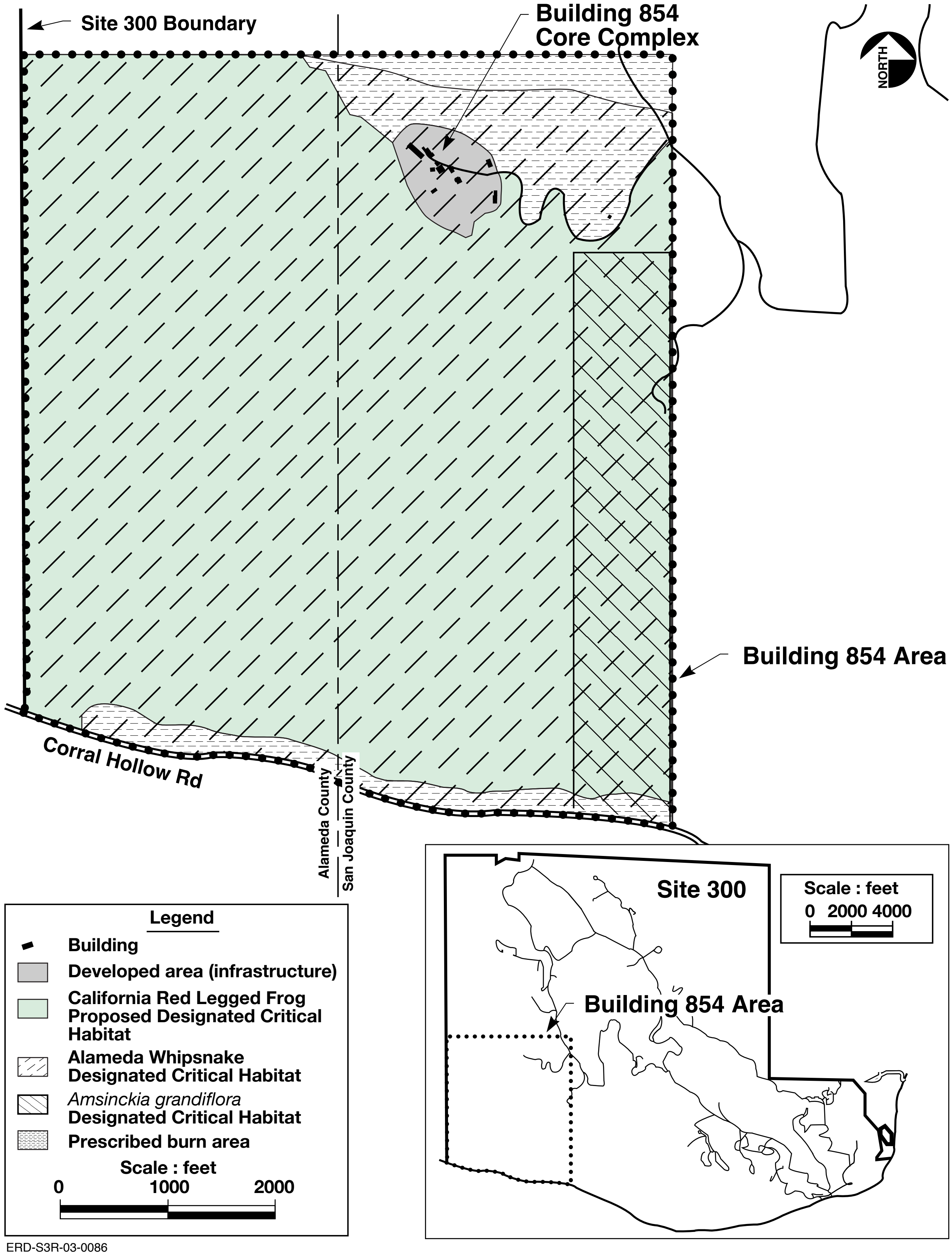

Figure 2. Map of southwest Site 300 showing locations of the Building 854 Area and critical habitats.

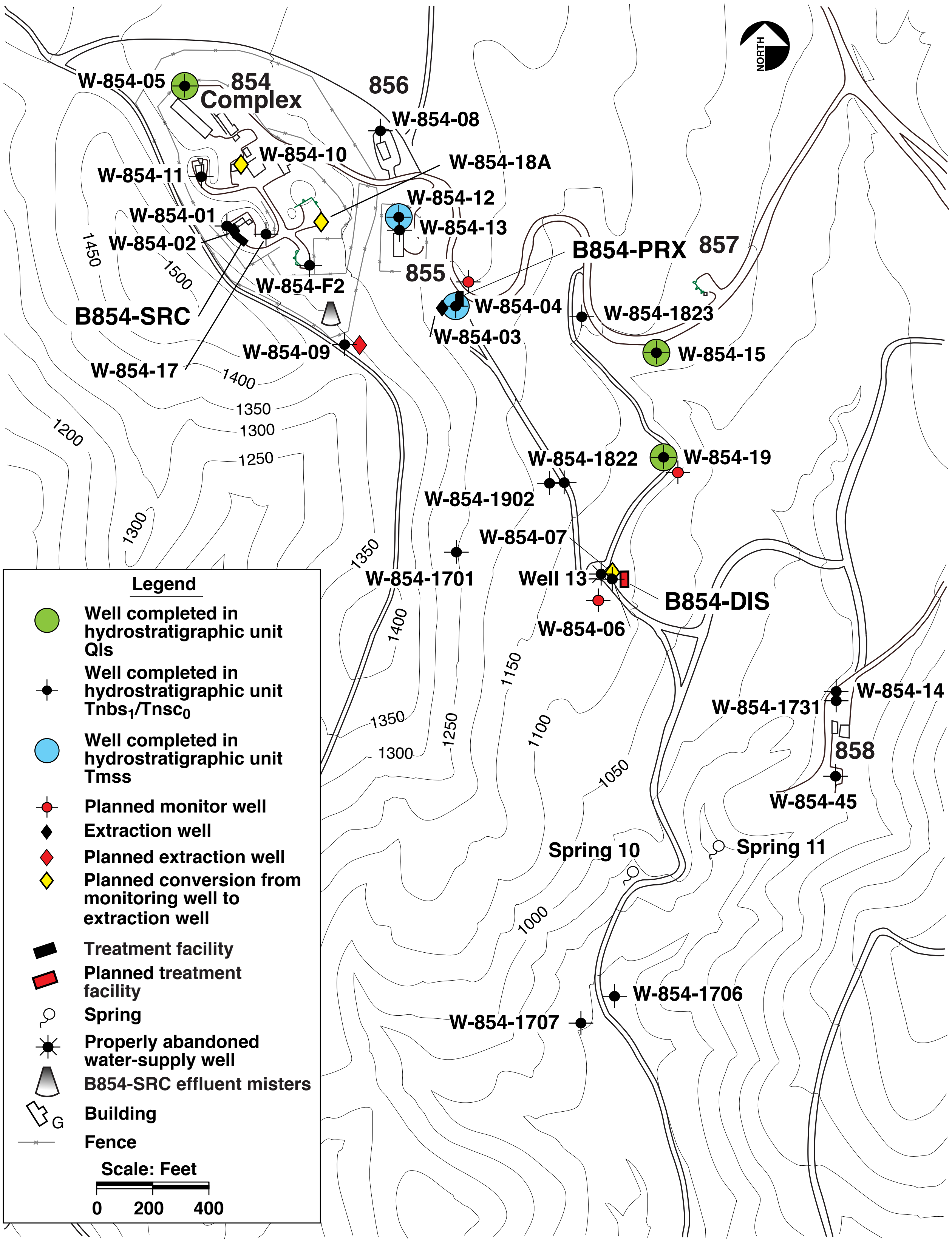

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Figure 3. Building 854 OU map showing buildings, topography, roads, ground water monitor wells, extraction wells, water-supply wells, and existing and planned facilities.

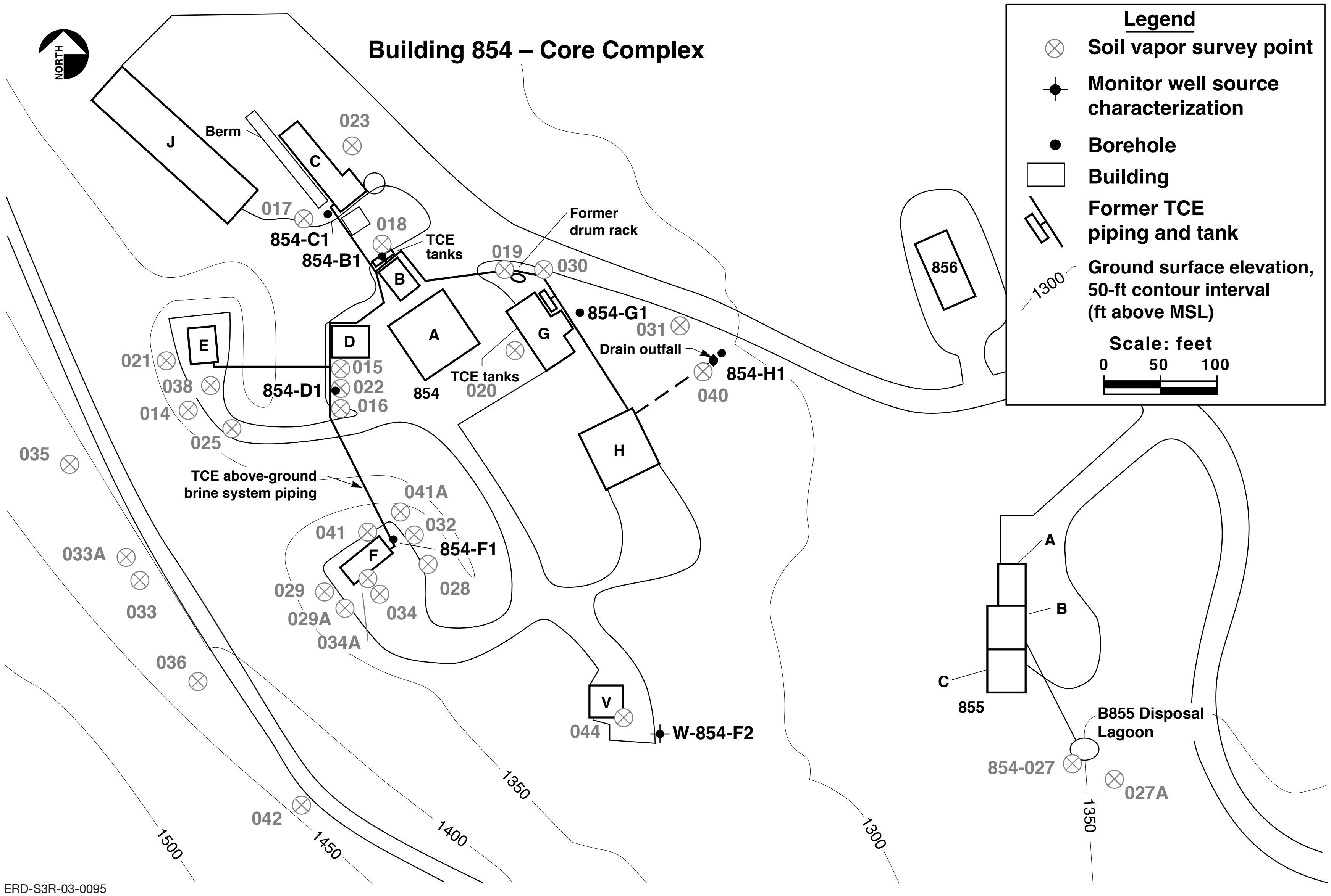

Figure 4. Map of the Building 854 – Core Complex showing source investigation boreholes, soil vapor points, buildings, TCE brine system piping, tanks, and the Building 854H drain outfall.

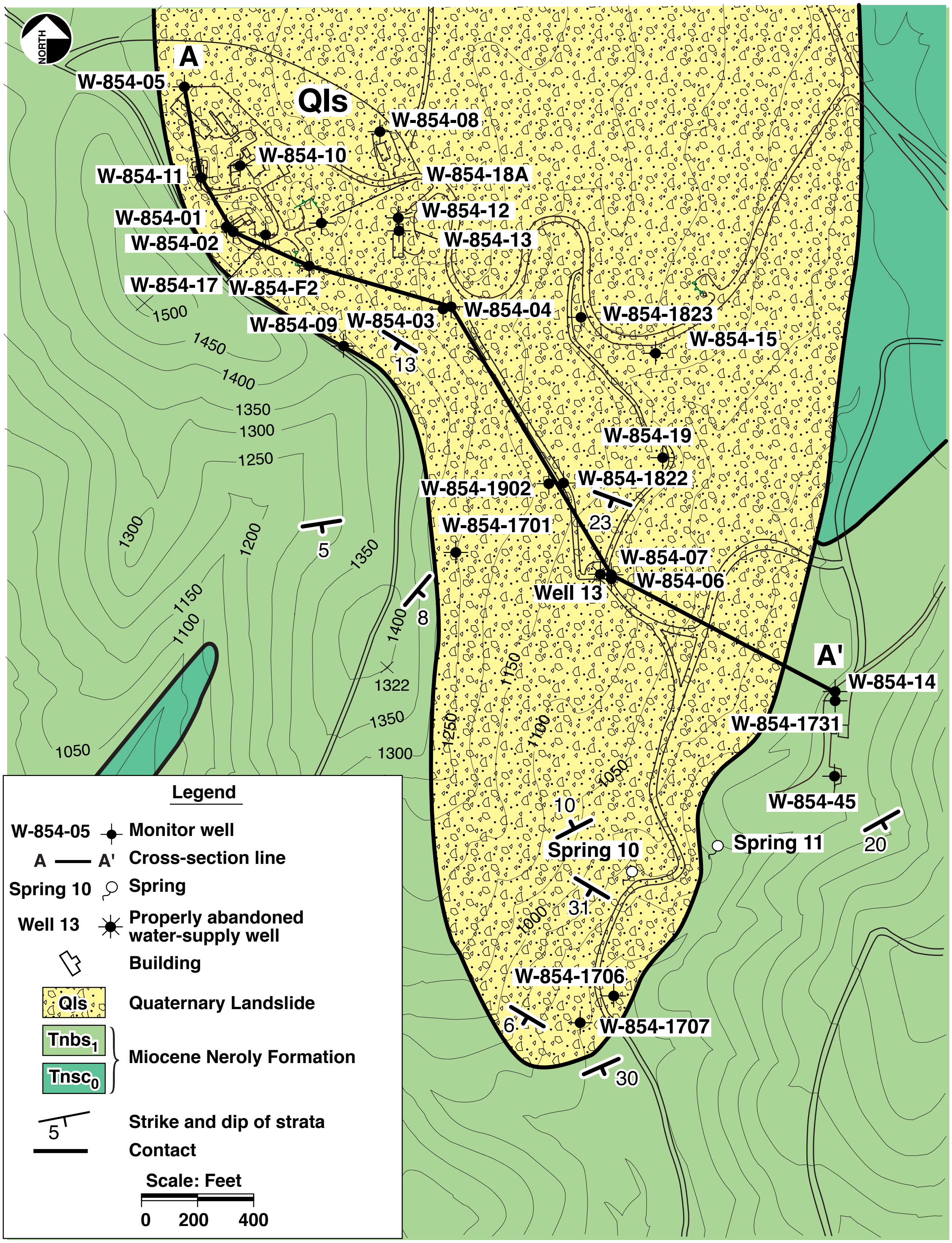

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Figure 5. Geologic map of the Building 854 OU showing location of cross-section A-A'.

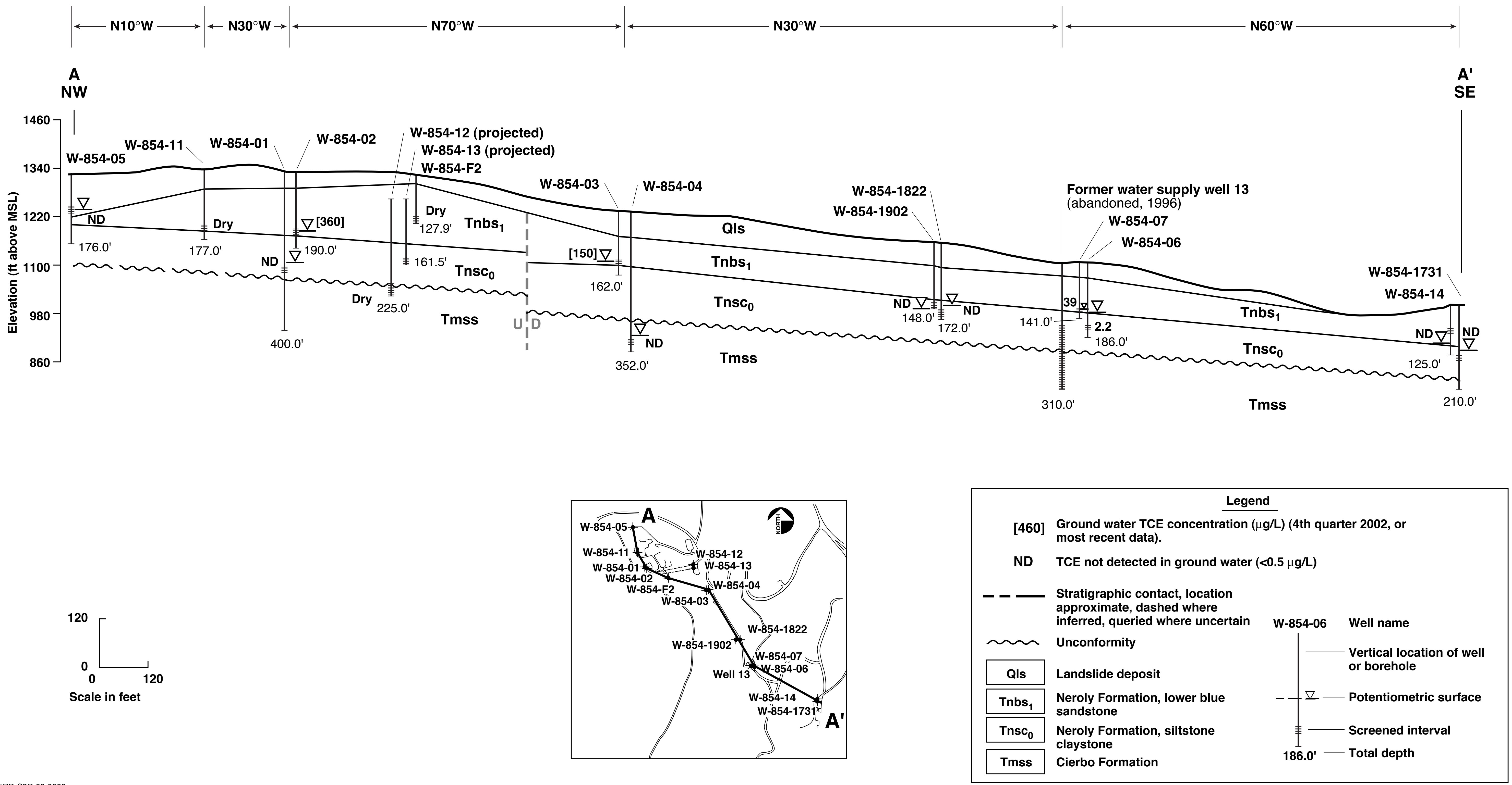

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Figure 6. Hydrogeologic cross-section A-A', Building 854 OU.

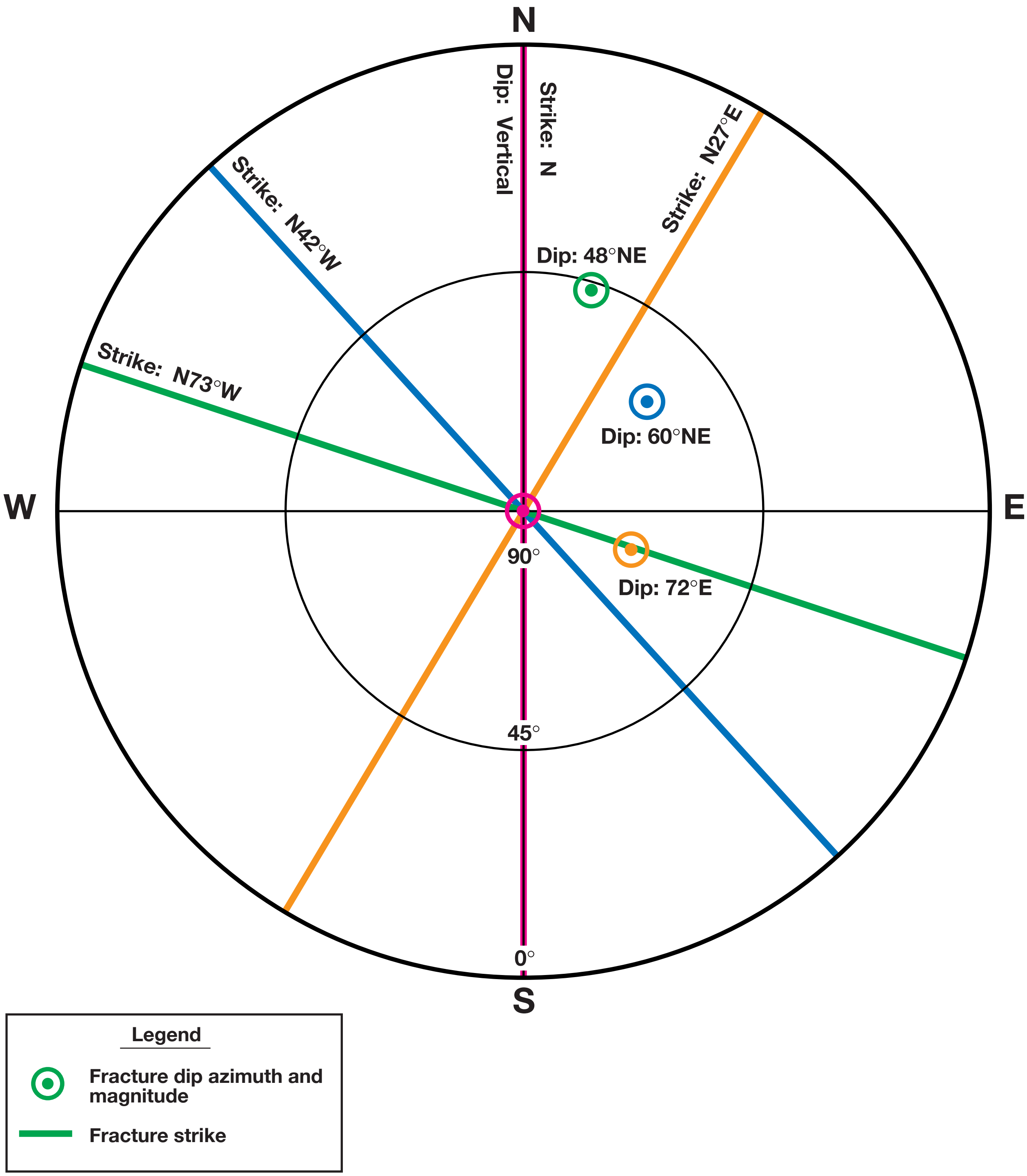

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Figure 7. Composite stereonet plot of fracture orientations based on OPTV data from boreholes W-854-1822, W-854-1823, W-854-1836 and W-854-1902.

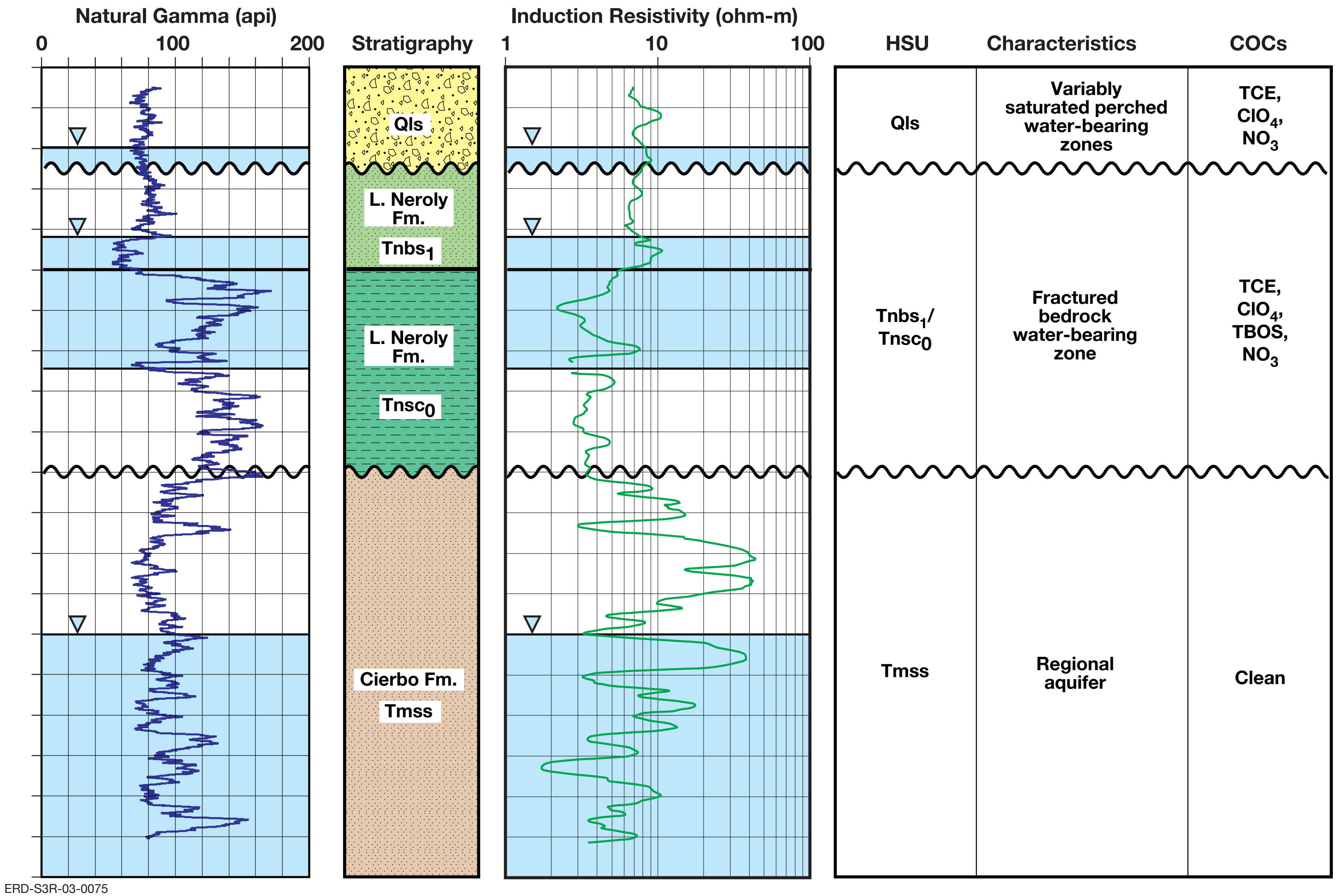

Figure 8. Summary of stratigraphy and hydrostratigraphy for the Building 854 OU.

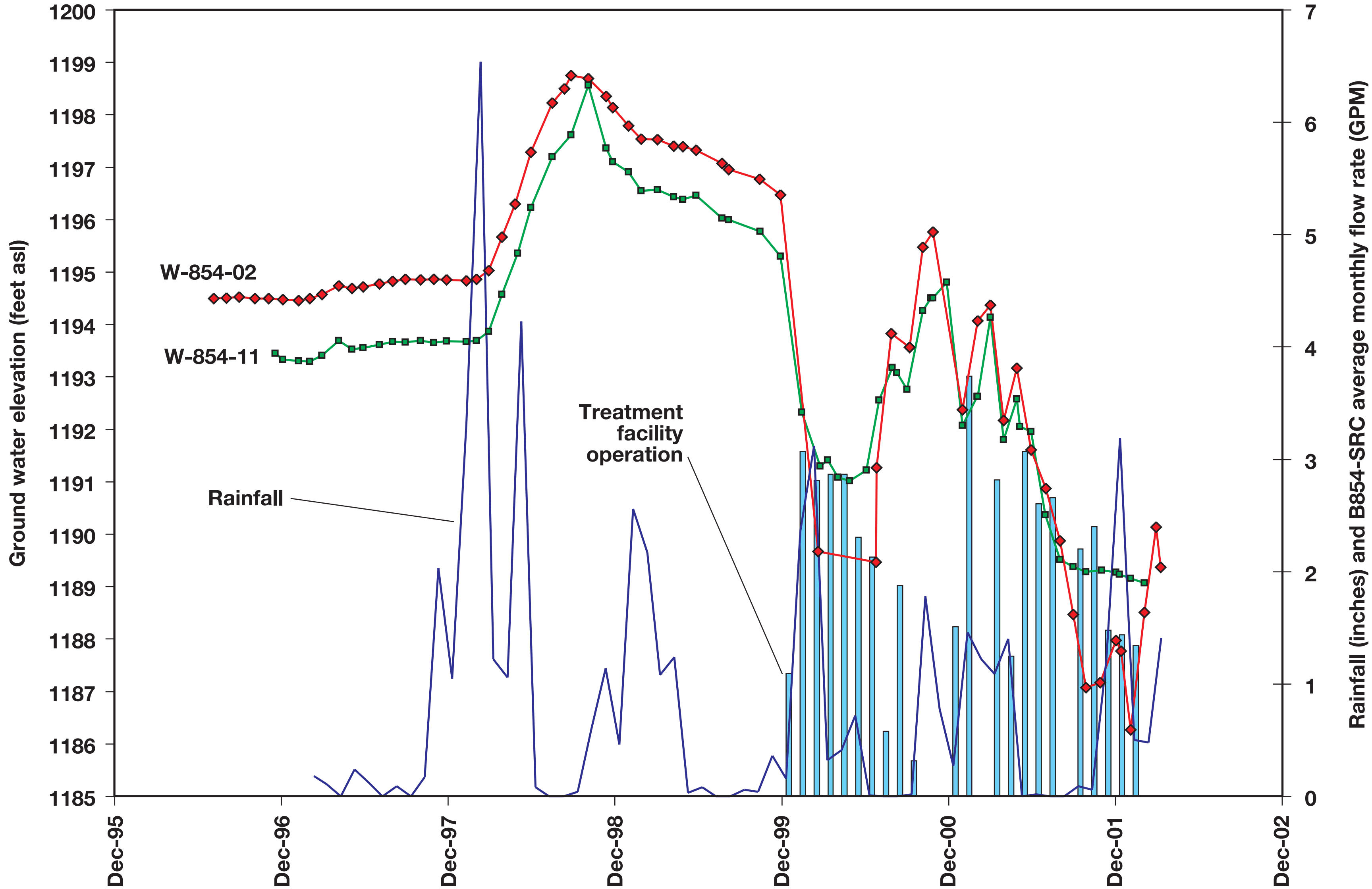

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Figure 9. Plot showing W-854-02 and W-854-11 hydrographs, monthly rainfall, and B854-SRC operation.

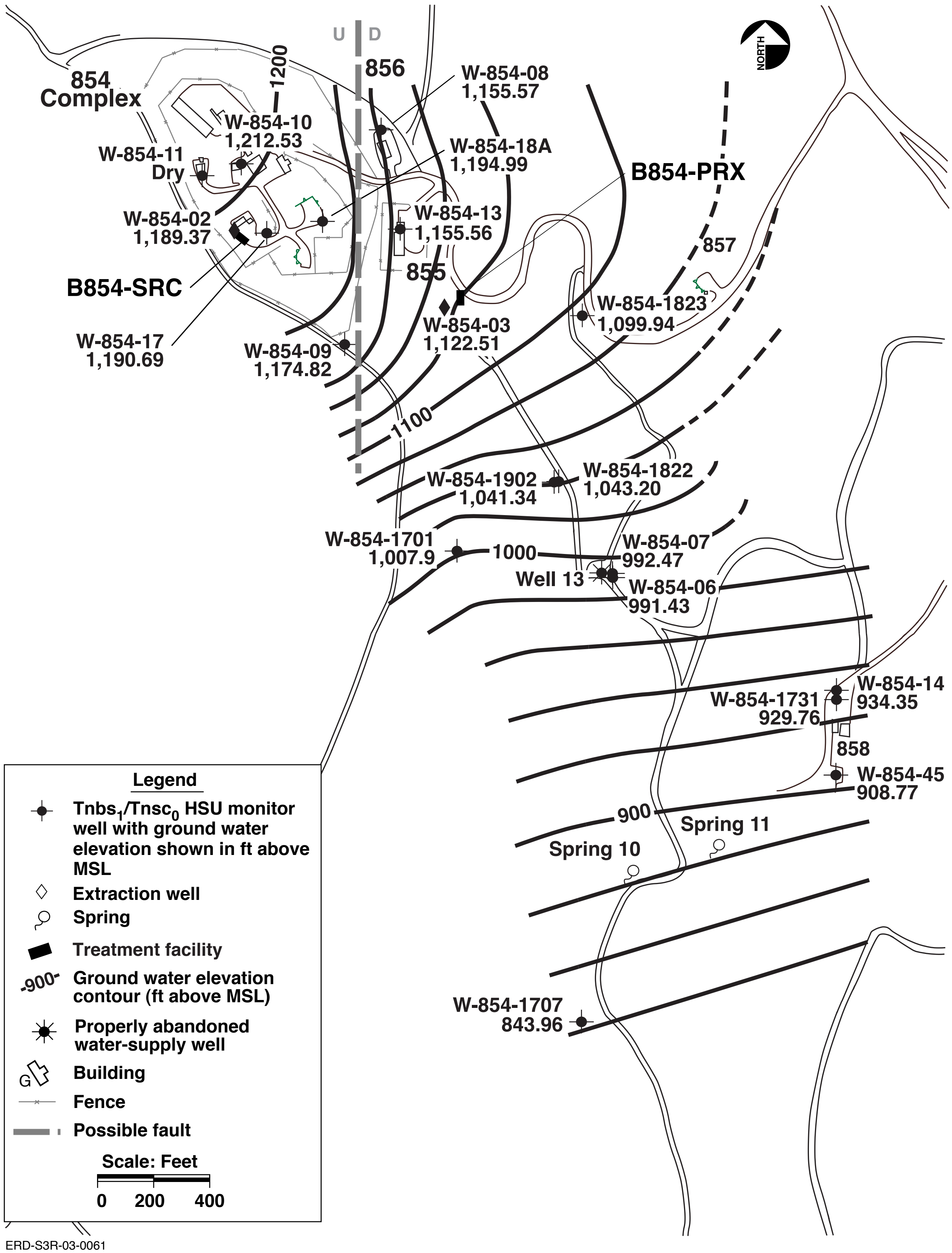


Figure 10. Map showing ground water elevation contours for the $Tnbs_1/Tnsc_0$ HSU (March 2003).

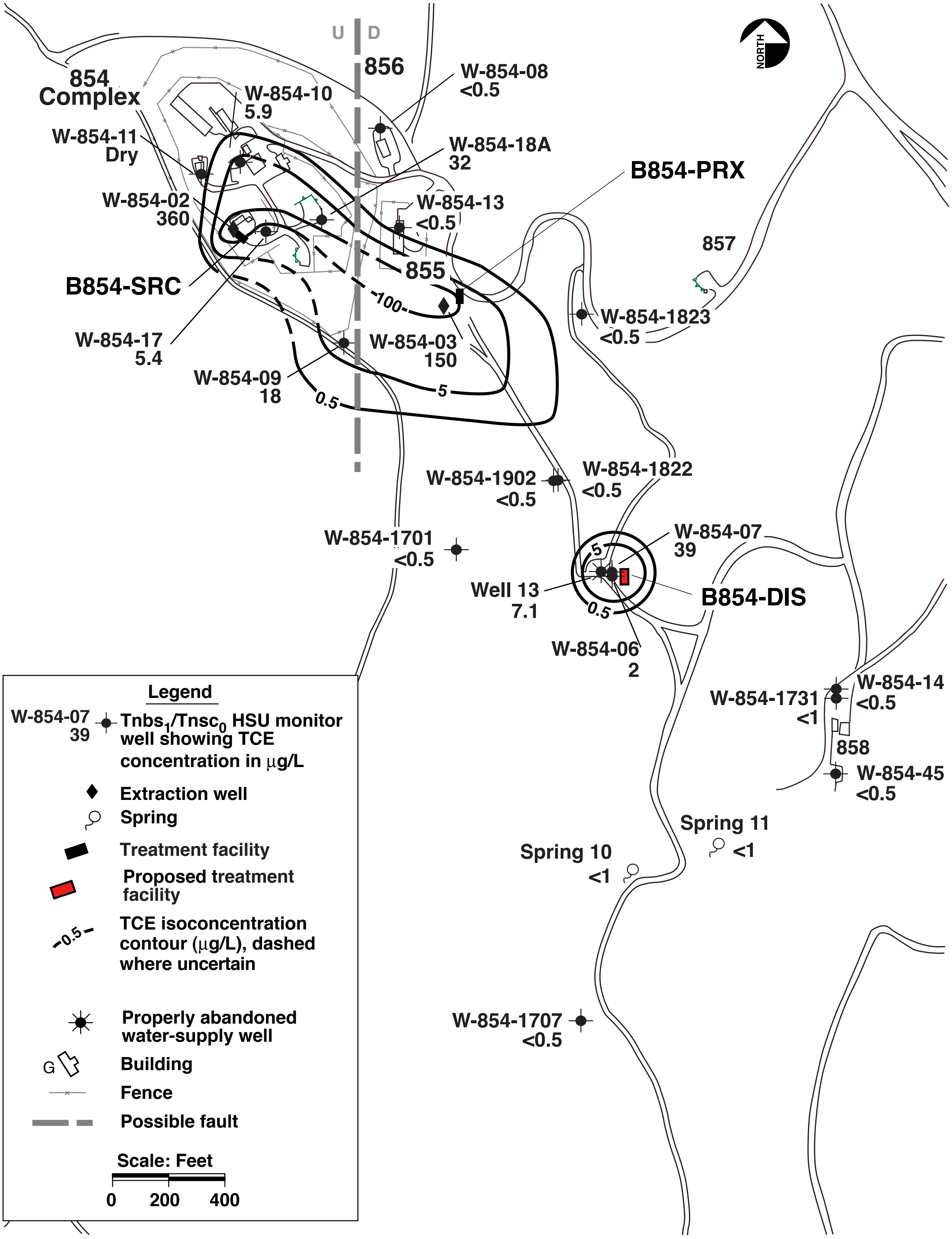


Figure 11. Ground water trichloroethylene (TCE) concentrations in the $Tnbs_1/Tnsc_0$ HSU (4th quarter 2002 or most recent data).

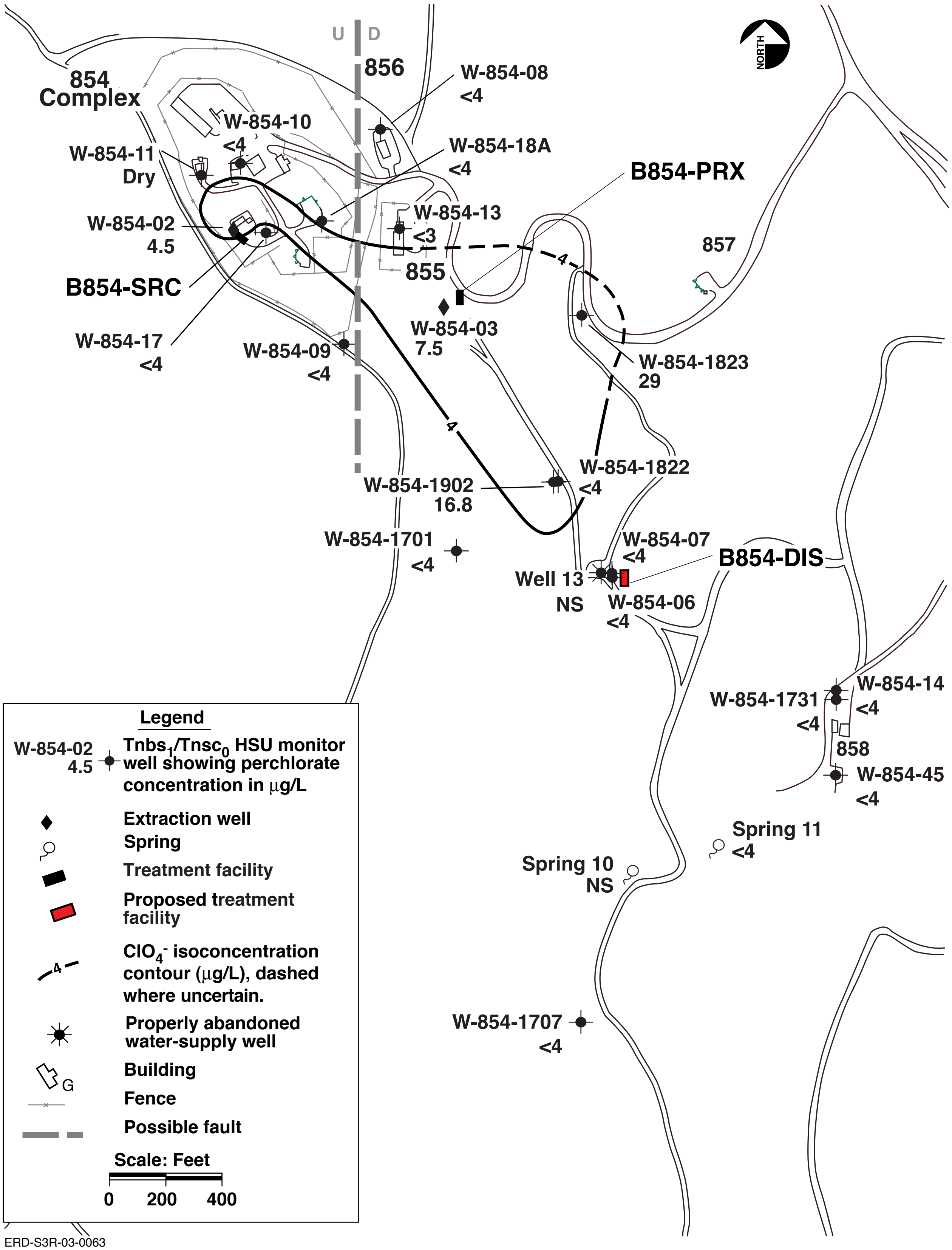


Figure 12. Ground water perchlorate (ClO_4^-) concentrations in the $Tnbs_1/Tnsc_0$ HSU (4th quarter 2002 or most recent data).

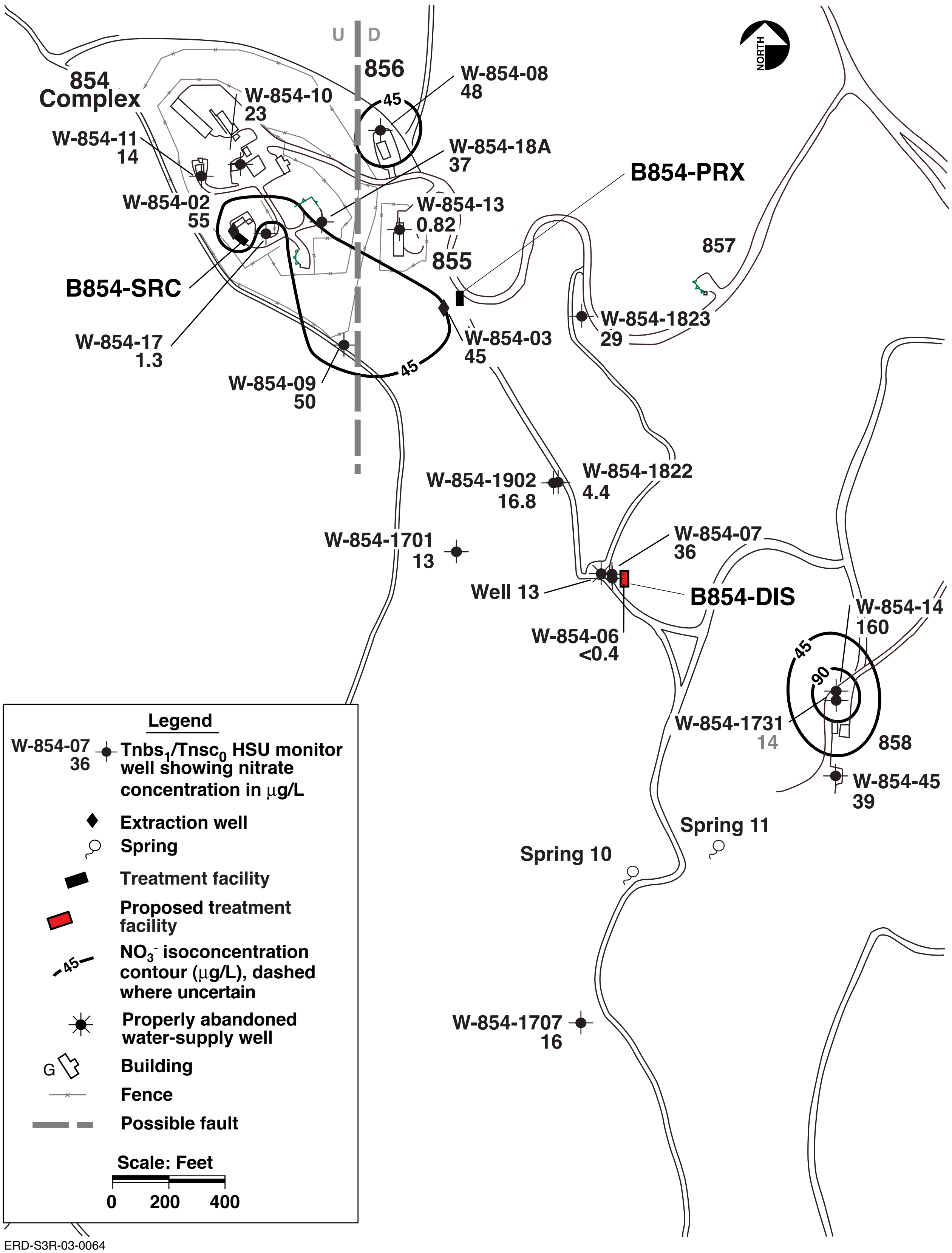
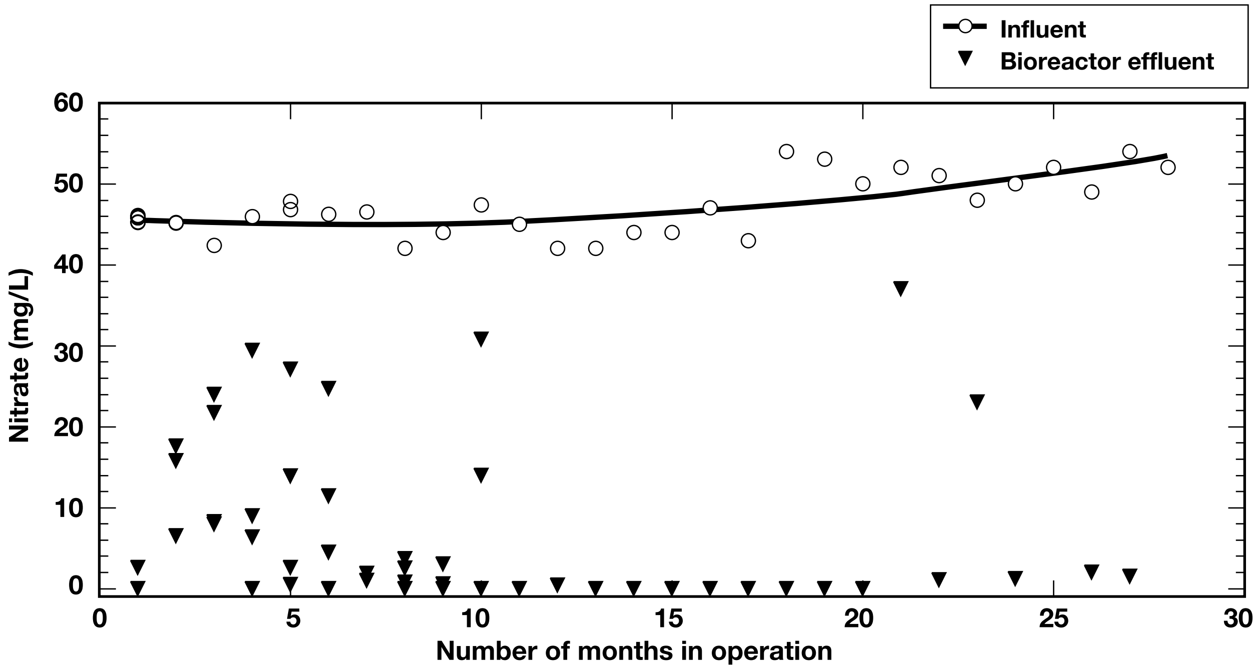


Figure 13. Ground water nitrate (NO_3^-) concentrations in the $Tnbs_1/Tnsc_0$ HSU (4th quarter 2002 or most recent data).



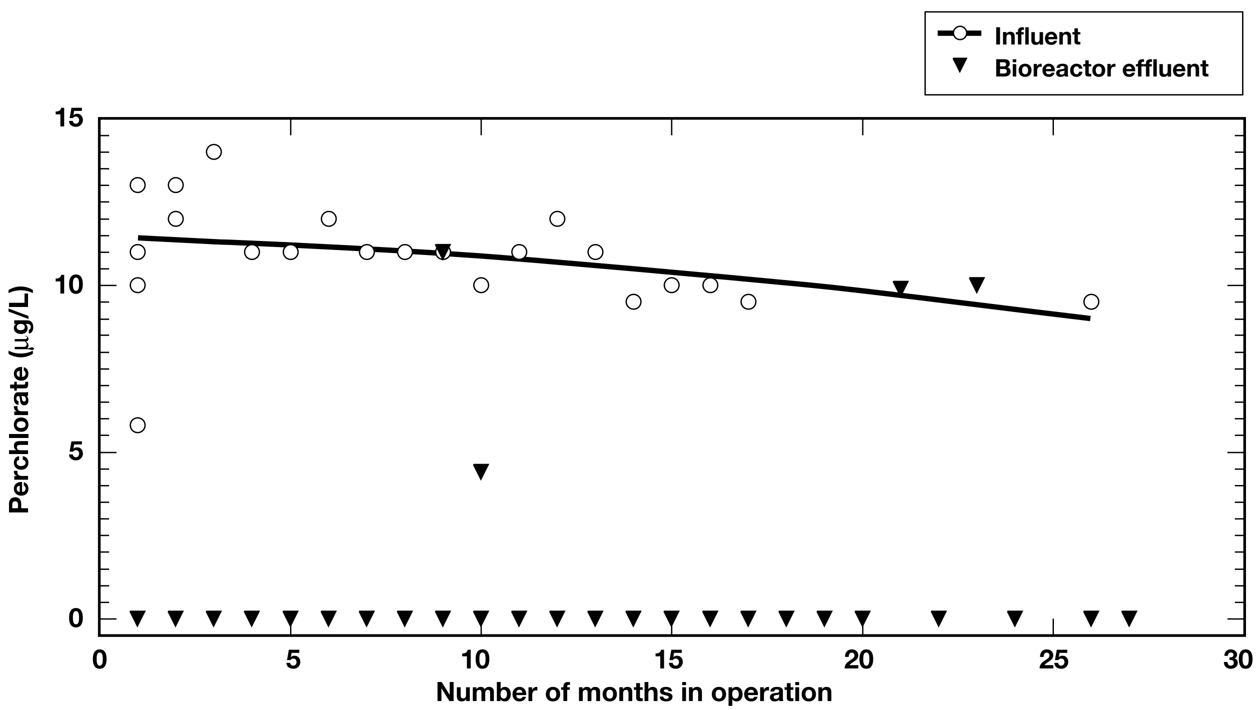


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Figure 14. Wetland bioreactor performance graphs for nitrate and perchlorate at B854-PRX (Nov. 2000 – Feb. 2002).

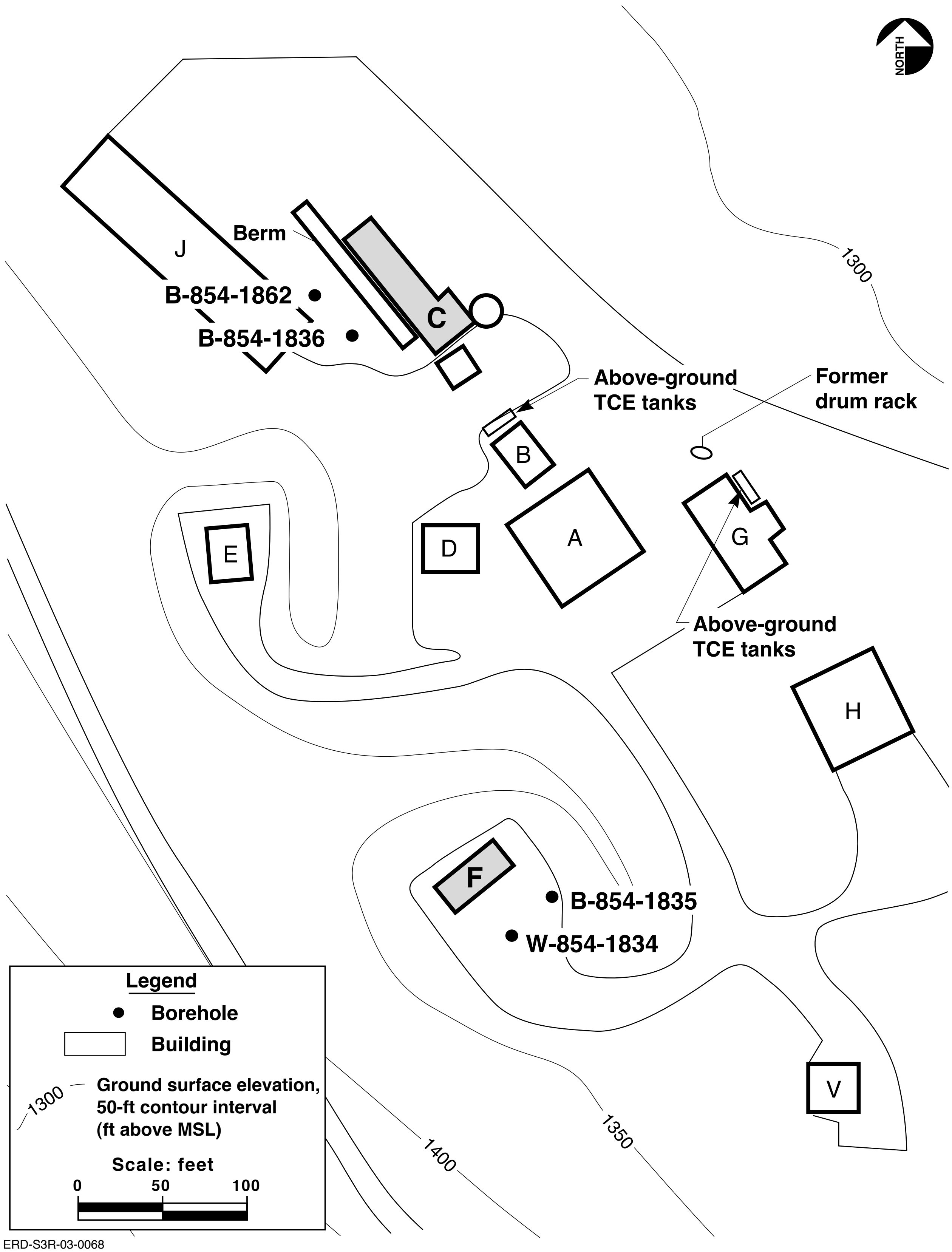
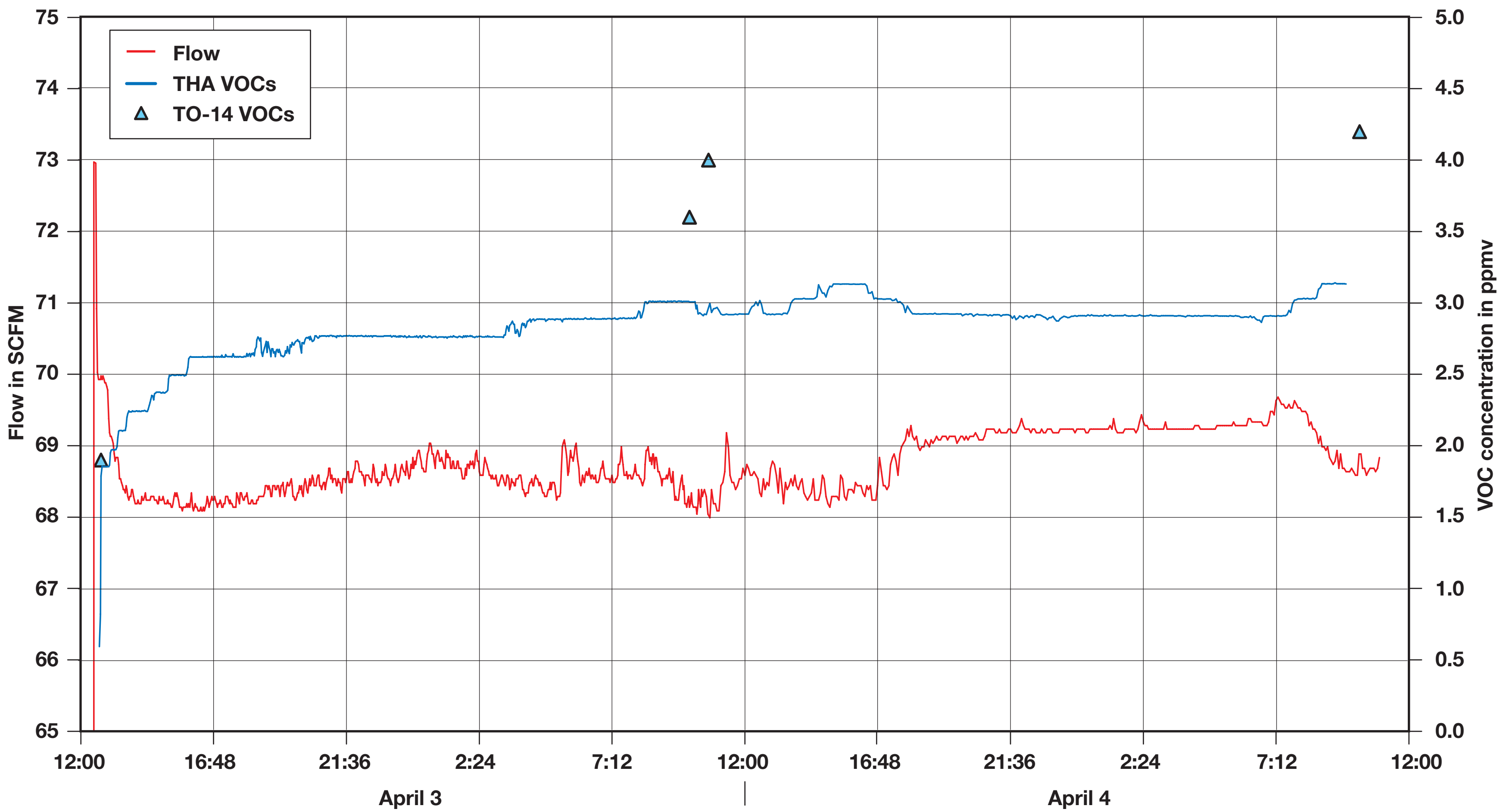


Figure 15. Locations of SVE test boreholes at B854-SRC.



ERD-S3R-03-0074

Figure 16. Soil gas flow and VOC vapor concentrations during the B854 F-Cell SVE Test, April 3 and 4, 2003.

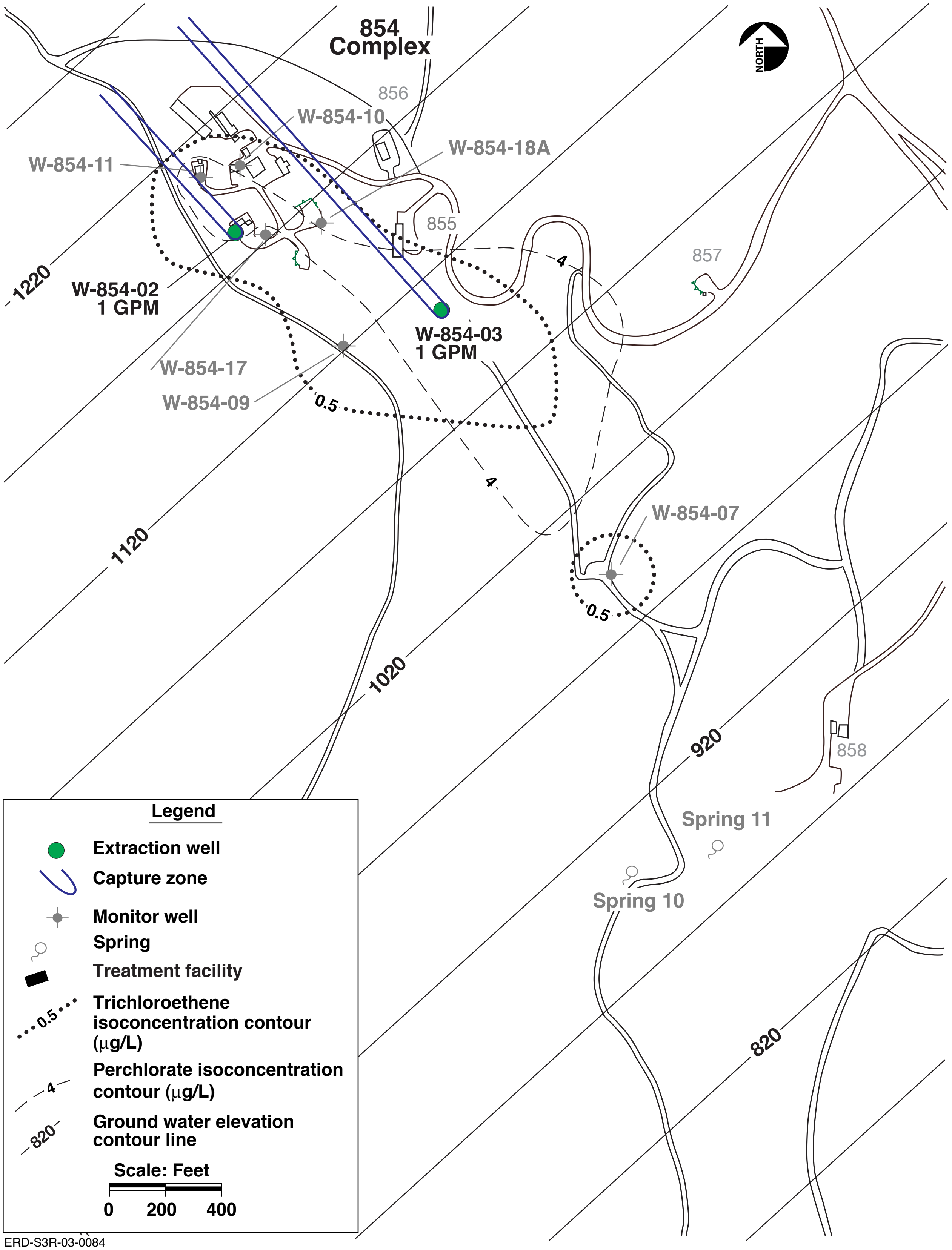


Figure 17. Five-year capture zone diagram for existing extraction wells.

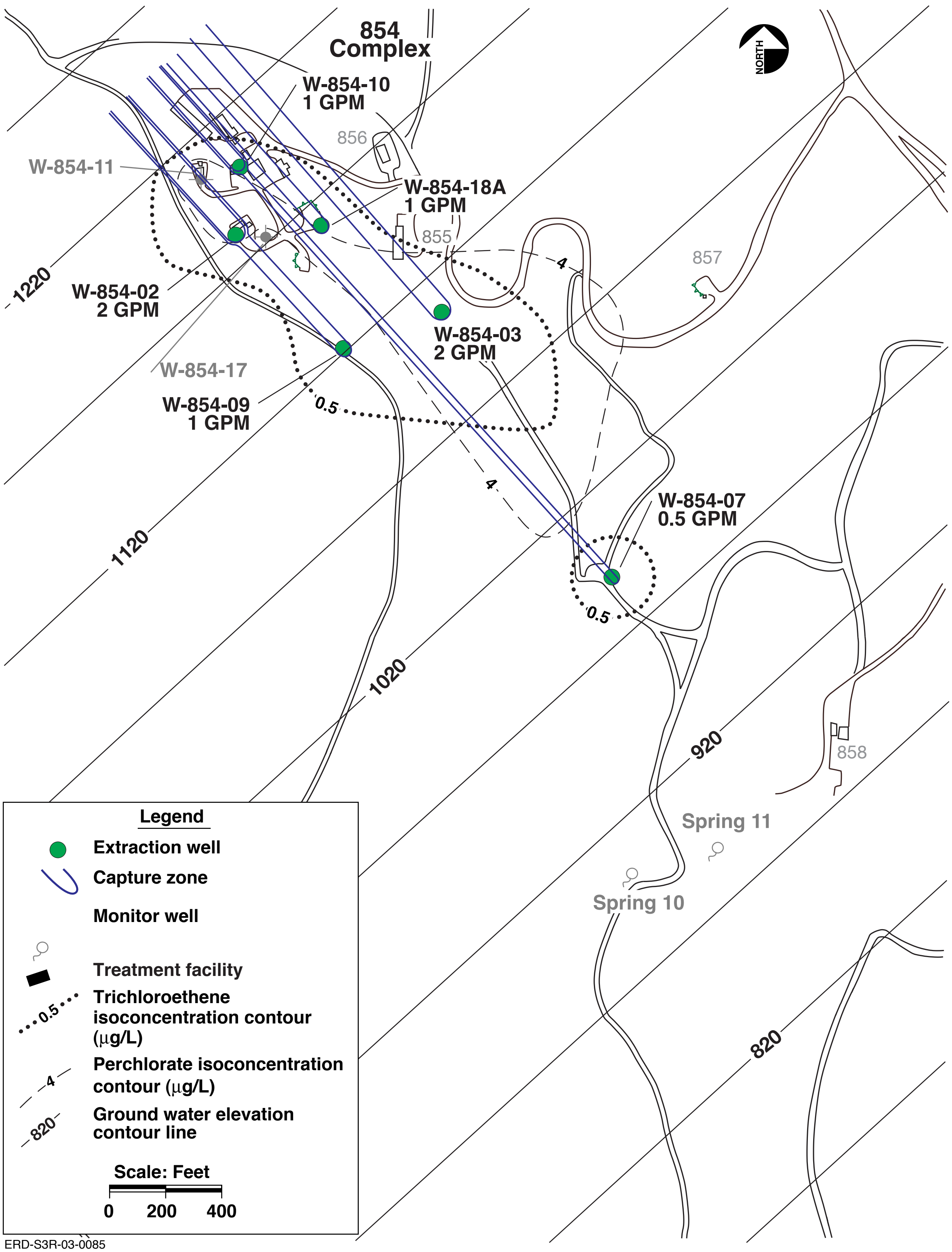
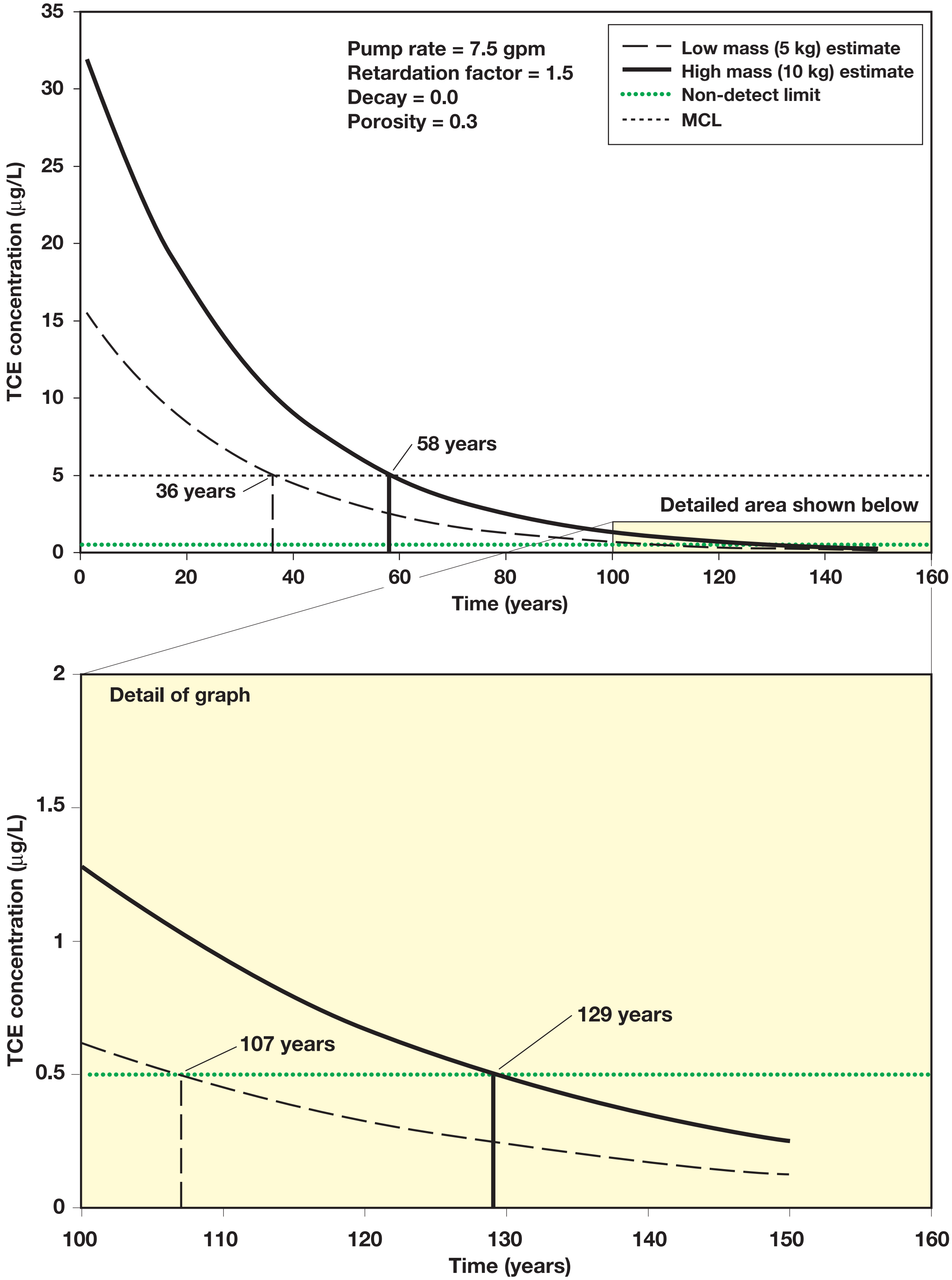
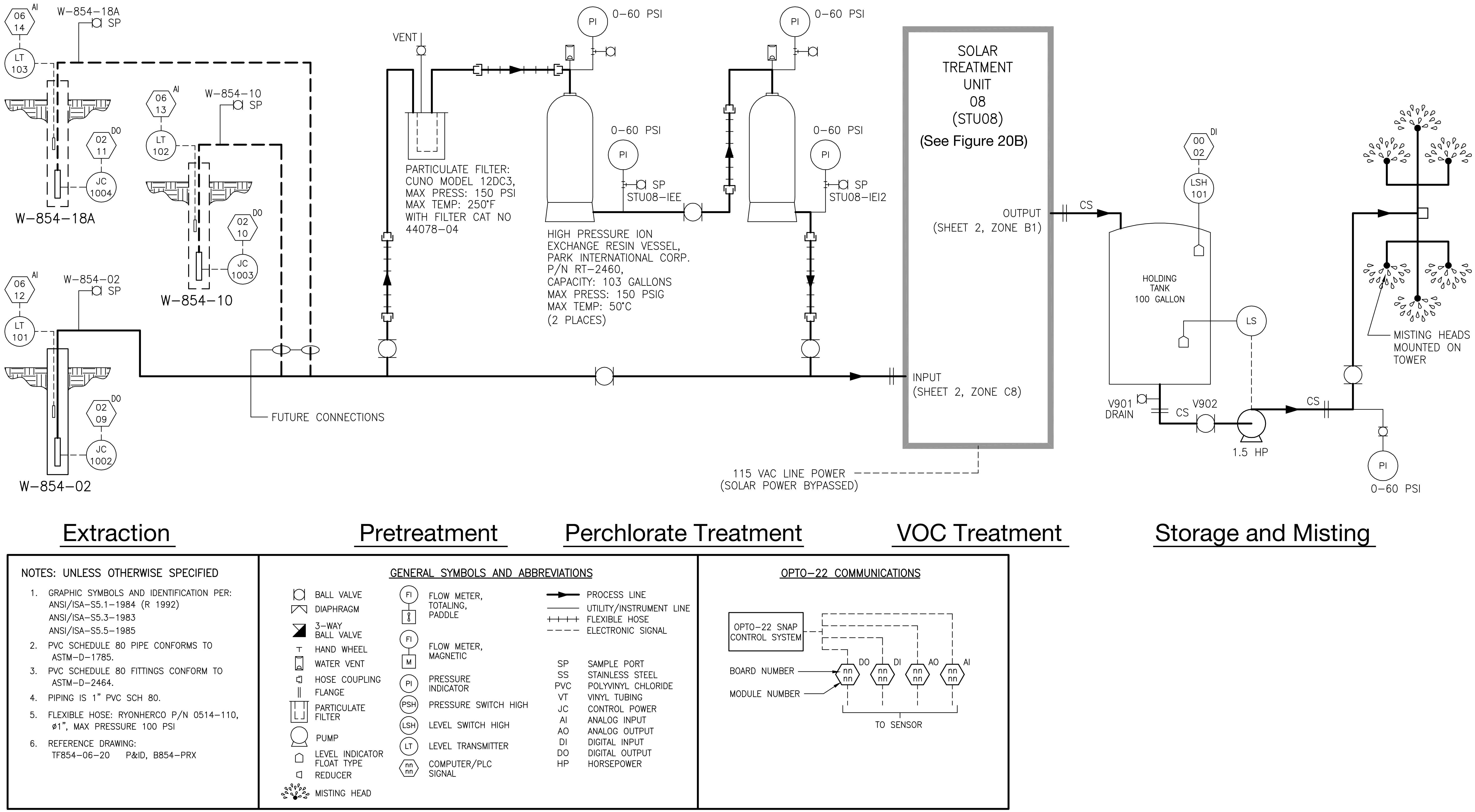


Figure 18. Five-year capture zone diagram for existing and proposed extraction wells.



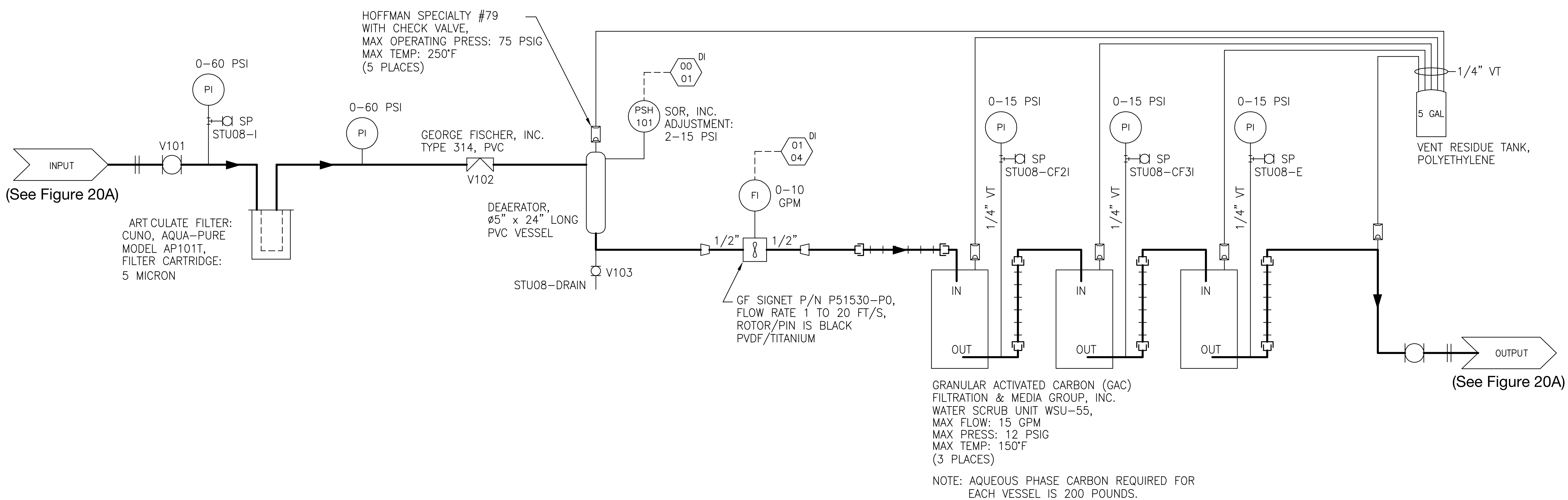
ERD-S3R-03-0119

Figure 19. Time-series plot of average TCE plume concentration predicted by a mixed tank model. Time to cleanup to MCL (5 µg/L) and to background levels (0.5 µg/L) noted for low and high dissolved TCE mass estimates.



ERD-S3R-03-0065

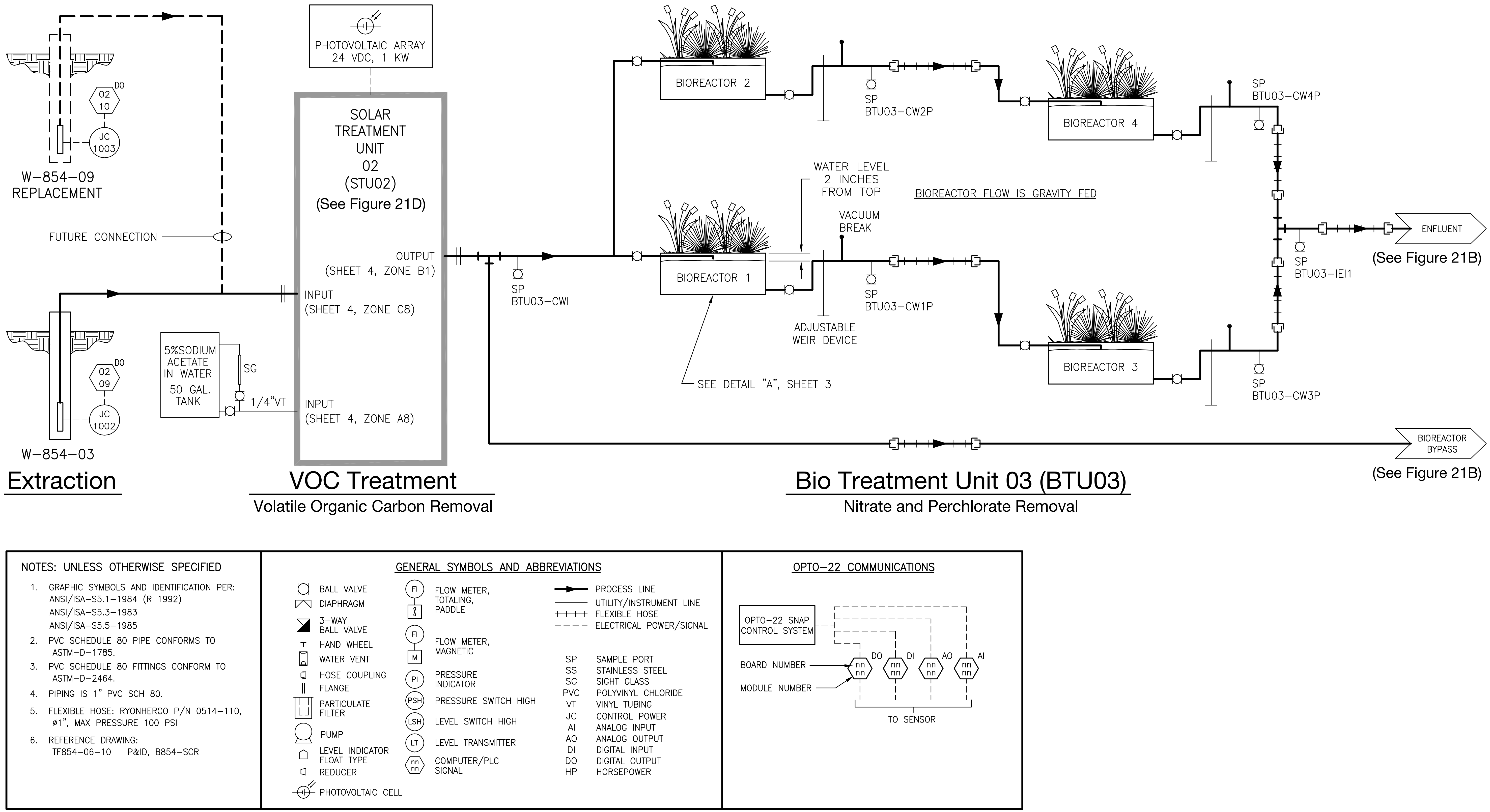
Figure 20A. Piping and instrument diagram for B854-SRC expansion.



STU08

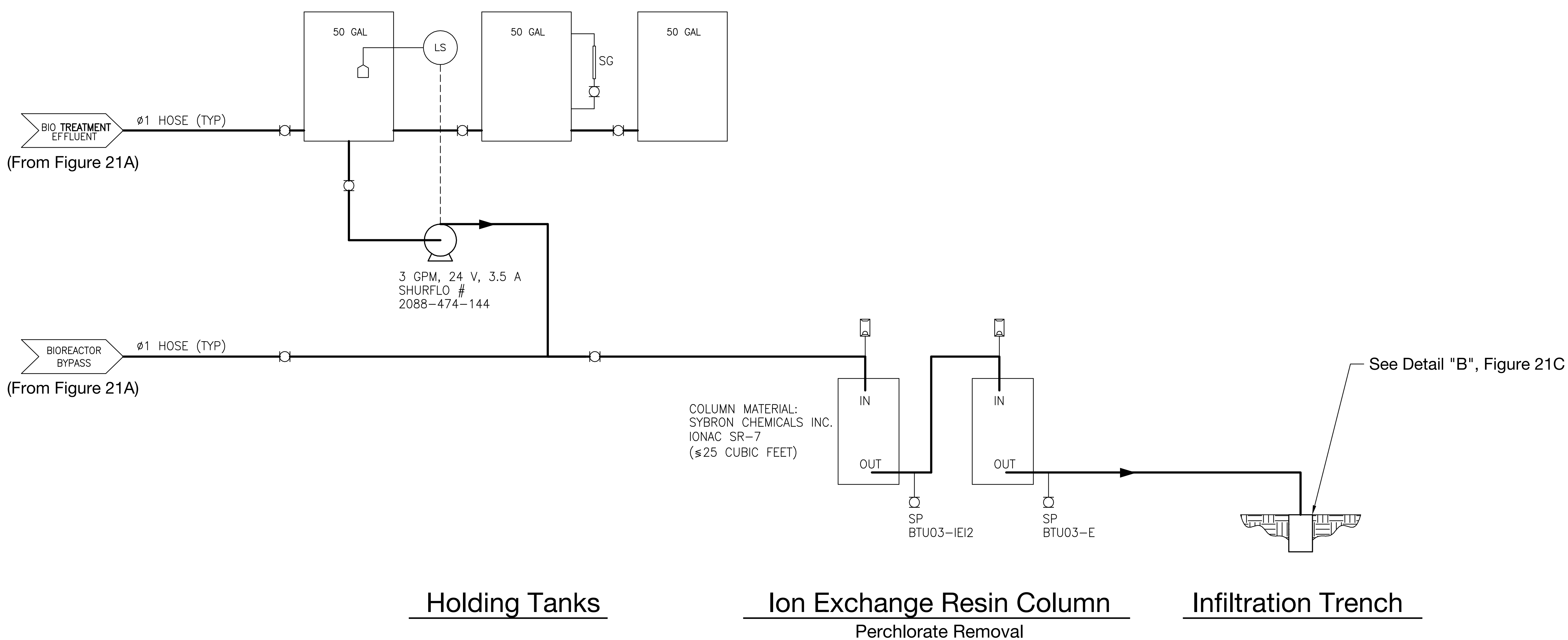
ERD-S3R-03-0088

Figure 20B. Solar Treatment Unit (STU08) piping and instrument diagram for B854-SRC.



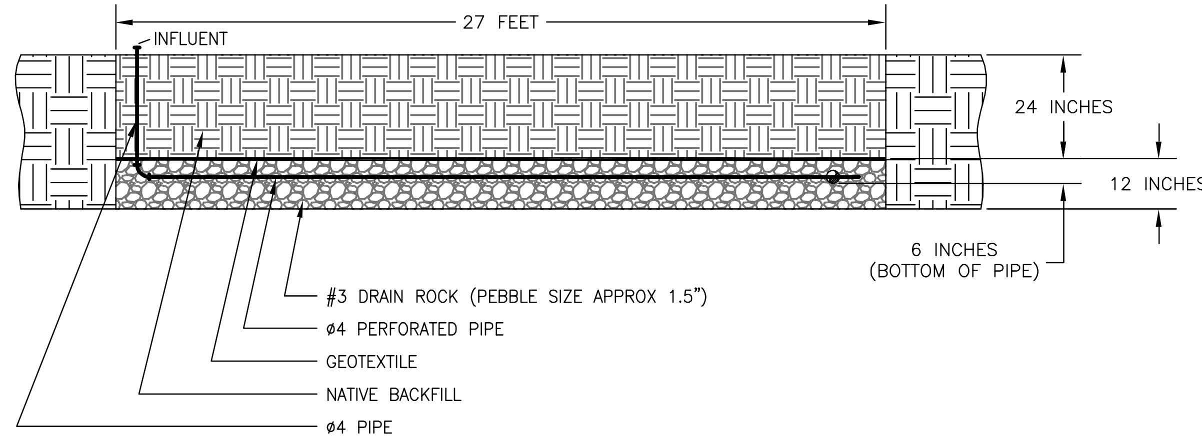
ERD-S3R-03-0066

Figure 21A. Piping and instrument diagram for B854-PRX expansion.



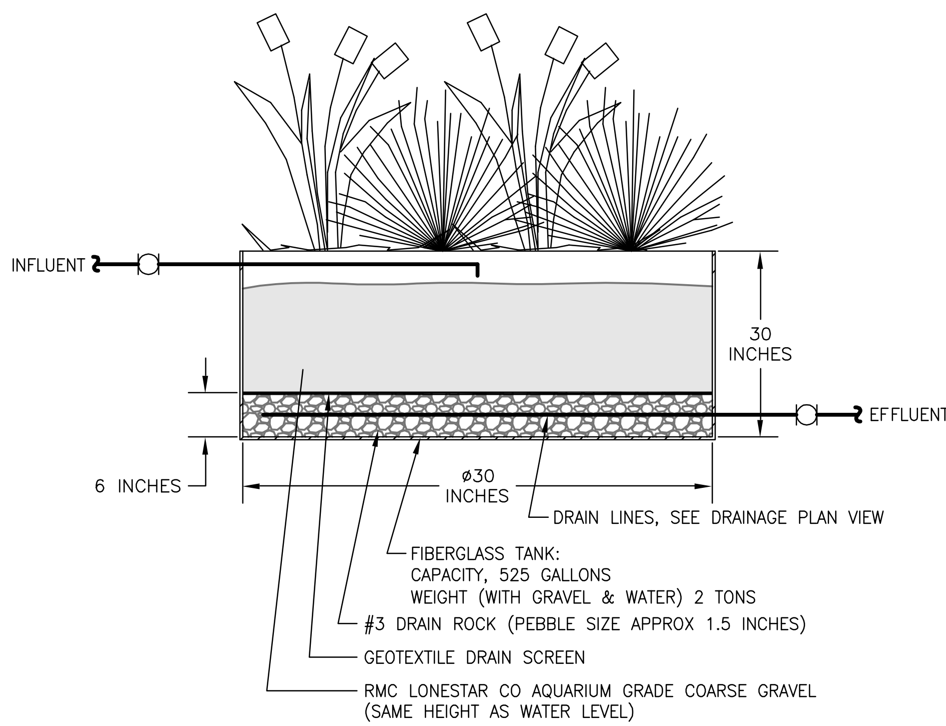
ERD-S3R-03-0089

Figure 21B. Piping and instrument diagram for B854-PRX.

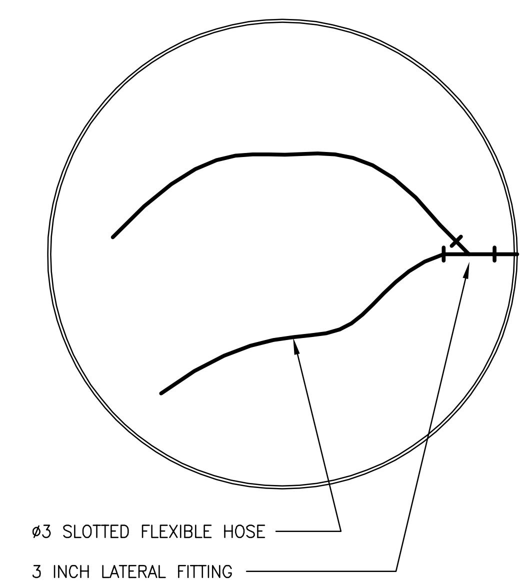


DETAIL "B" – INFILTRATION TRENCH

NOTE: WIDTH OF TRENCH IS 24 INCHES



TANK ELEVATION DETAIL



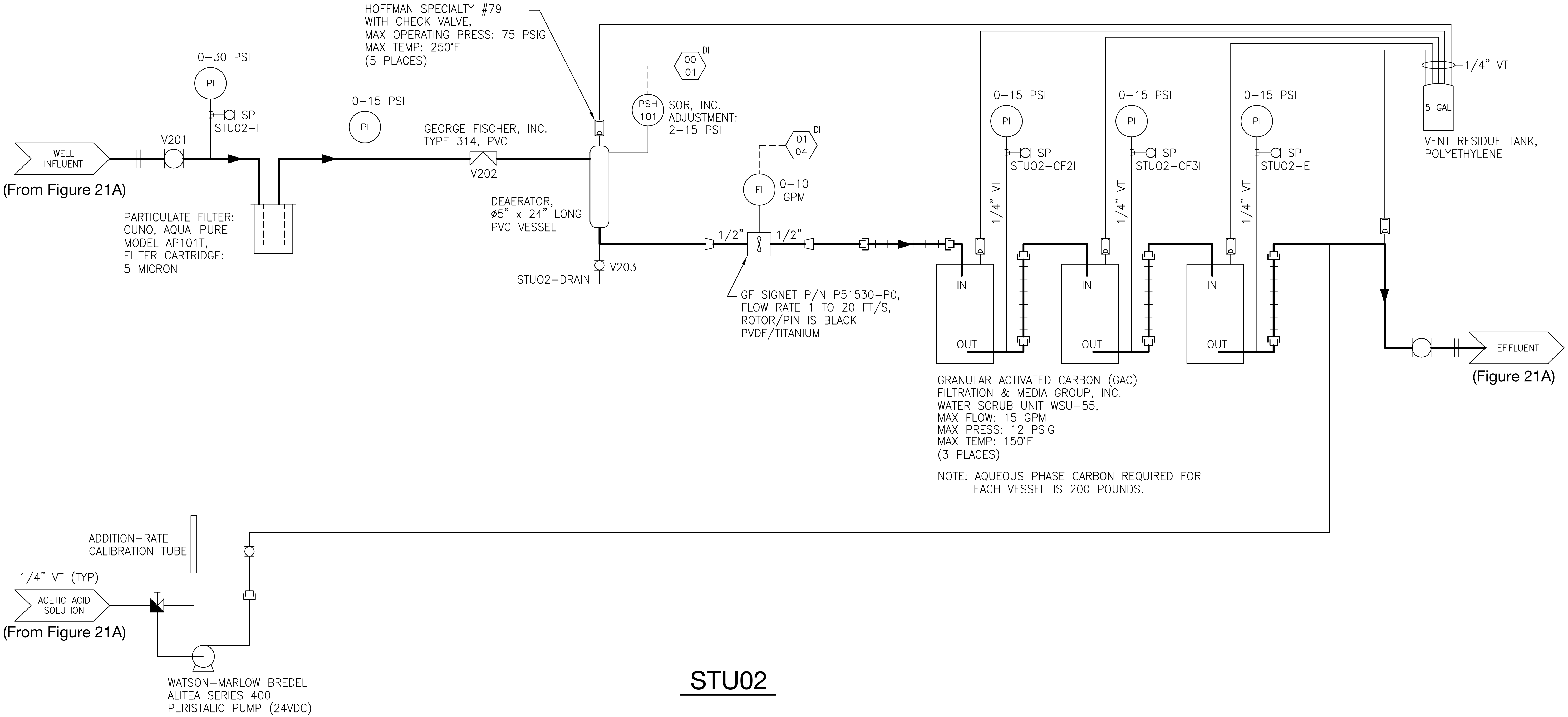
DRAINAGE PLAN VIEW

Detail "A" – Bioreactor Tank Assembly

Typical for each Reactorl

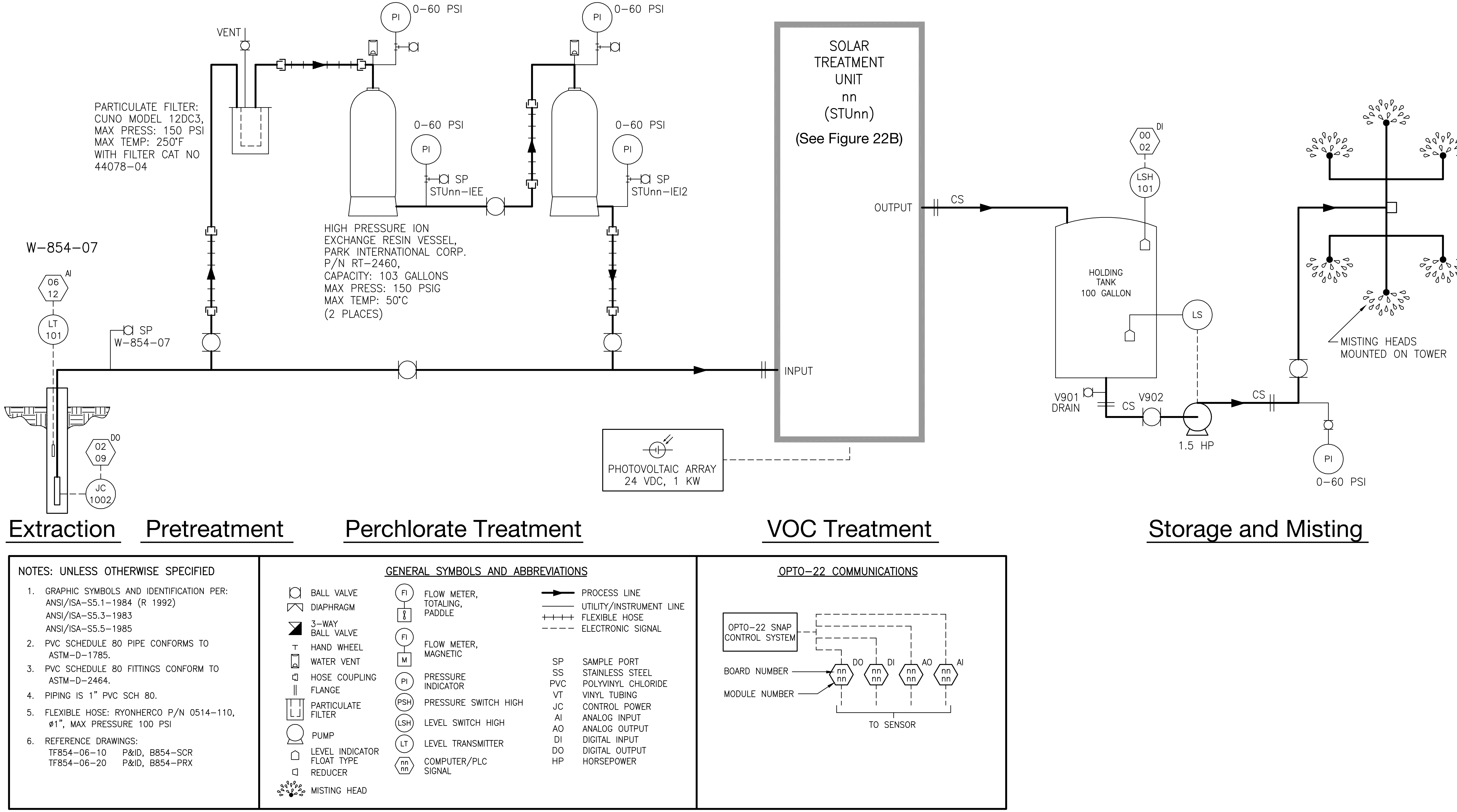
ERD-S3R-03-0090

Figure 21C. Detailed drawing for B854-PRX.



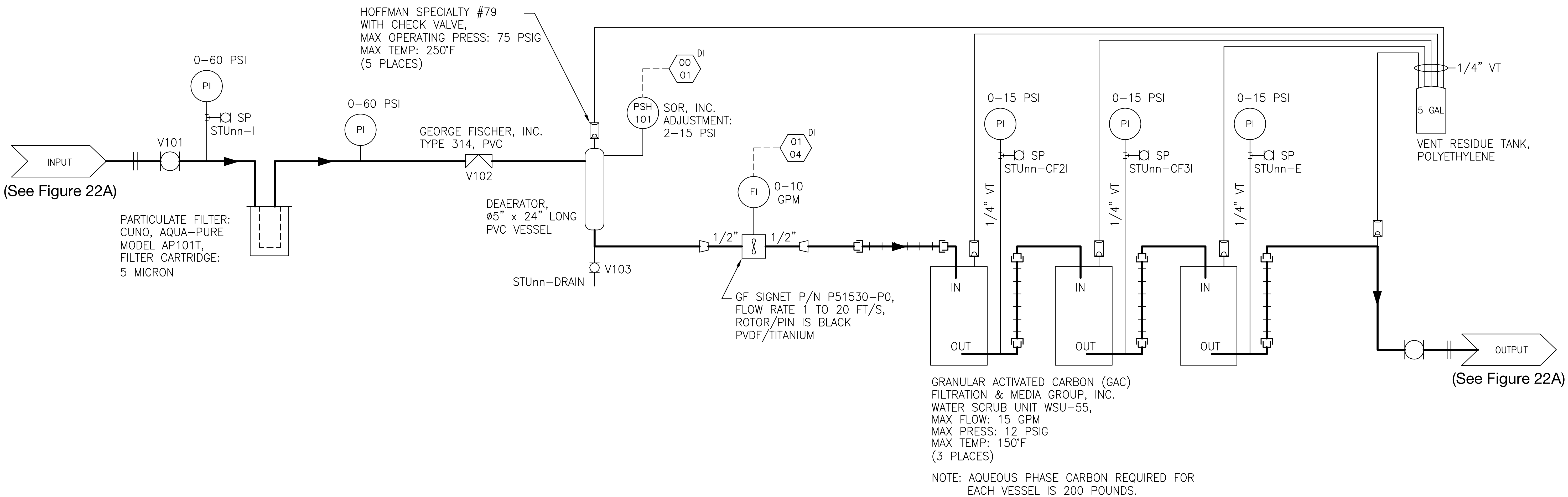
ERD-S3R-03-0091

Figure 21D. Solar Treatment Unit (STU02) piping and instrument diagram for B854-PRX.



ERD-S3R-03-0067

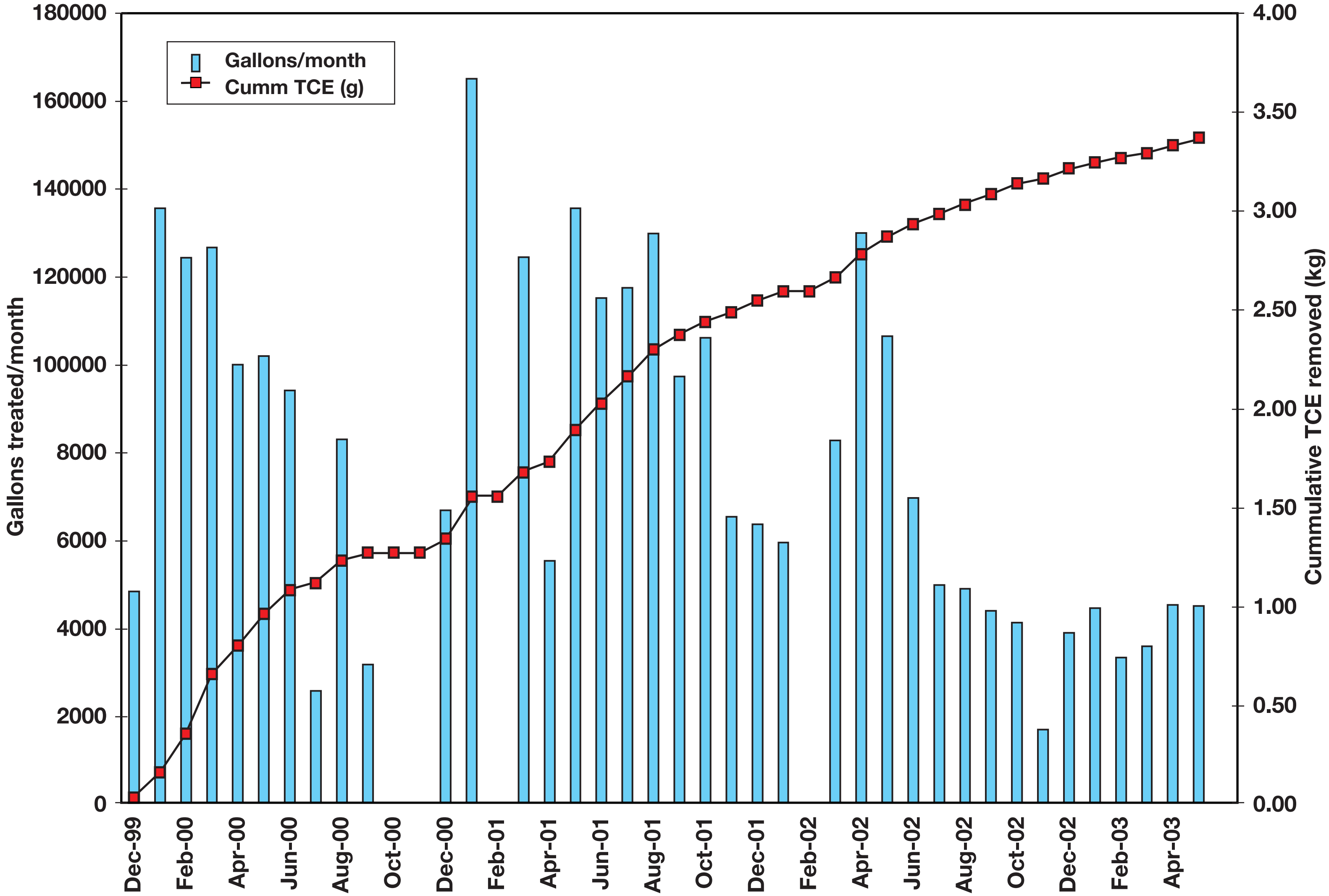
Figure 22A. Piping and instrument diagram for B854-DIS.



STUnn

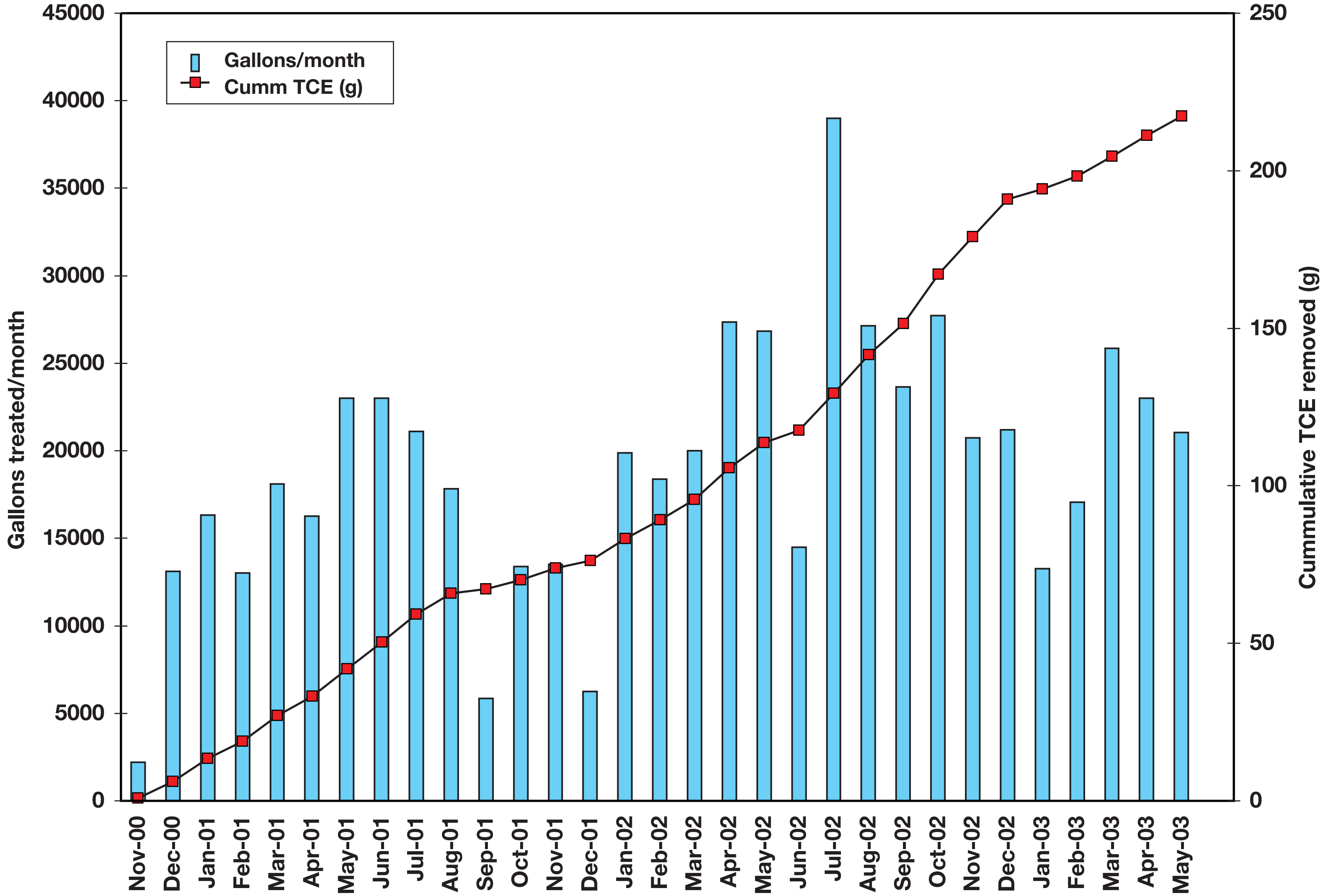
ERD-S3R-03-0087

Figure 22B. Solar Treatment Unit (STUnn) piping and instrument diagram for B854-DIS.



ERD-S3R-03-0115

Figure 23. Plot of TCE mass removal vs. time from B854-SRC facility.



ERD-S3R-03-0114

Figure 24. Plot of TCE mass removal vs. time from B854-PRX facility.

Tables

Table 1. Summary of ground water analytical results for contaminants of concern from recently installed wells at Building 854.

Well	Date sampled	TCE (μg/L)	Perchlorate (μg/L)	Nitrate (mg/L)
W-854-1822	03/11/03	<1	<4	4.4
W-854-1823	03/07/03	<0.5	27	28.7
	03/20/03	<1	NA	29
W-854-1902	03/07/03	<0.5	7.8	16.8
	03/20/03	<1	NA	12

Notes:

μg/L = Micrograms per liter.

mg/L = Milligrams per liter.

NA = Not analyzed for this constituent.

TCE = Trichloroethylene.

Table 2. Soil vapor extraction test summary.

Test	Borehole	Instrument type	Instrumentation details	Test duration (hours)	Influent flow rate (SCFM)	Vacuum (inches of H_2O)	VOC vapor concentrations
C-Cell	B-854-1862	Extraction Membrane	Screen 66 to 86 ft	24	17 to 24.5	70 to 80	
	B-854-1836	Instrumented Membrane	Sample ports every 10 ft from 36 to 86 ft				
F-Cell	B-854-1835	Vapor Extraction Well	Screen 100 to 120 ft	48	68 to 69	41.5 to 43.5	3 to 4 ppm_v
	W-854-1834	Instrumented Membrane	Sample ports every 15 ft from 45 to 120 ft				

Notes:

ft = Feet.

H_2O = Water.

ppm_v = Parts per million by volume.

SCFM = Standard cubic feet per minute.

Table 3. Analytic results for SVE treatability tests.

		TO-14 laboratory analyses			
Date	Sample	1,1-DCE ppm$_v$	TCE ppm$_v$	PCE ppm$_v$	$CHCl_3$ ppm$_v$
C-Cell					
3/20/03	B854-1836-086	<0.4	<0.4	<0.4	<0.4
3/24/03	B854-1836-086	<0.4	<0.4	<0.4	<0.4
	B854-1862-VES5-I	<0.4	<0.4	<0.4	<0.4
3/25/03	B854-1862-VES5-I	<0.4	<0.4	<0.4	<0.4
	B854-1836-036	<0.4	<0.4	<0.4	<0.4
	B854-1836-046	<0.4	<0.4	<0.4	<0.4
	B854-1836-066	<0.4	<0.4	<0.4	<0.4
	B854-1836-086	<0.4	<0.4	<0.4	<0.4
3/27/03	B854-1862-VES5-I	<0.4	<0.4	<0.4	<0.4
F-Cell					
3/20/03	B854-1834-105	<0.4	<0.4	<0.4	<0.4
	B854-1834-120	<0.4	0.4	<0.4	<0.4
4/01/03	B854-1834-VES5-I	<0.4	1.9	<0.4	<0.4
4/02/03	B854-1834-VES5-I	<0.4	3.6	<0.4	<0.4
	B854-1834-VES5-I	<0.4	4.0	<0.4	<0.4
4/03/03	B854-1834-VES5-I	<0.4	4.2	<0.4	<0.4
	B854-1836-045	<0.4	<0.4	<0.4	<0.4
	B854-1836-060	<0.4	<0.4	<0.4	<0.4
	B854-1836-075	<0.4	<0.4	<0.4	<0.4
	B854-1836-090	<0.4	<0.4	<0.4	<0.4
	B854-1836-0105	<0.4	0.2	<0.4	<0.4
	B854-1836-120	<0.4	0.7	<0.4	<0.4

Notes:

$CHCl_3$ = Chloroform.
1,1-DCE = 1,1-Dichloroethylene.
PCE = Tetrachloroethylene.
ppm$_v$ = Parts per million by volume.
SVE = Soil vapor extraction.
TCE = Trichloroethylene.

Table 4. Design specifications for the Building 854 OU treatment facilities.

Treatment facility	Type	Extraction wells	Proposed flow rate (gpm)	TCE (μg/L)	$CI0_4^-$ (μg/L)	NO_3 (mg/L)	Discharge method
B854-SRC	Aq GAC/IX	W-854-02	2	130–630	4.5–9.9	31–60	Misting[a]
B854-SRC Expansion		W-854-10[b]	1	5.9	<4	23	□
□		W-854-18A[b]	1	32	<4	37	□
Total influent			4	56–200	4–6	30–40	□
B854-PRX	Aq GAC/BIO/IX	W-854-03[c]	2	55–150	5.8–14	41–50	Infiltration Trench
B854-PRX Expansion		W-854-09 [d]	1	18	<4	50	□
Total influent			3	37–84	5–9	45–50	□
B854-DIS (Proposed)	(STU) Aq GAC/IX	W-854-07[b]	0.25–0.5	39	4	36	Misting
Discharge Criteria			□	<0.5	<4	45 (Inf Tr)	□
Regulatory Standard	□	□	□	5 (MCL)	4 (proposed MCL)	45 (MCL)	□

Notes:

μg/L = Micrograms per liter.
Aq GAC = Aqueous-phase granular activated carbon.
BIO = Bioreactor.
CIO_4^- Perchlorate.
DIS = Distal.
gpm = Gallons per minute.
HSU = Hydrostratigraphic unit.
Inf Tr = Infiltration trench.
IX = Ion exchange.
MCL = Maximum Contaminant Level. A drinking-water standard.
mg/L = Milligrams per liter.
NO_3 = Nitrate.
OU = Operable Unit.
PRG = Preliminary remediation goal.
PRX = Proximal.
SRC = Source.
STU = Solar-powered Treatment Unit.
TCE = Trichloroethylene.

[a] Plan to install injection trench or injection well to handle incrased flow rate.
[b] Existing monitor wells that will be converted to extraction wells.
[c] Plan to increase flow rate from W-854-03 to 2 gpm & phyto treatment capacity to handle increase flow.
[d] An additional extraction well will be installed near well W-854-09.

Table 5. Summary of hydraulic testing conducted in Building 854 OU wells.[a]

Well ID	HSU	Test type	Flow rate (gpm)	Hydraulic conductivity (gpd/ft^2)	Estimated sustainable yield (gpm)
W-854-07	$Tnbs_1/Tnsc_0$	Slug/Bail	NA	25	<0.5
W-854-10[b]	$Tnbs_1/Tnsc_0$	Slug/Bail	NA	40	<0.5
W-854-02	$Tnbs_1/Tnsc_0$	Step Drawdown	7	100 to 1,000	4

Notes:

ft_2 = Square feet.
gpd = Gallons per day.
gpm = Gallons per minute.
HSU = Hydrostratigraphic unit.
ID = Identification.
NA = Not applicable.
OU = Operable Unit.
$Tnbs_1$ = Tertiary Neroly Formation – Lower Blue Sandstone Member.
$Tnsc_0$ = Tertiary Neroly Formation – Lower Siltstone/Claystone Member.

[a] Values form Site 300 hydraulic test database.

[b] Well W-854-10 is completed in a perched water-bearing zone in the $Tnbs_1$ unit.

Table 6. Extraction well specifications at the Building 854 OU.

Treatment facility	Extraction well name	Date completed	Well type and status	Total depth (ft bgs)	Perforated interval (ft bgs)	Sand pack interval (ft bgs)	Flow rate (gpm)	Average TVOC concentration (μg/L)	Pump type	Pump intake depth (ft bgs)
B854-SRC	W-854-02	02/07/96	Active GWE	154	144-154	138-154	1	400	Grundfos	152
	W-854-10	08/06/96	Active MW; Proposed GWE	130	120-130	112-130	1.4	8	Poly Bailer	NA
	W-854-18A	07/13/99	Active MW; Proposed GWE	144.8	134-144	131-146.2	0.19	30	Poly Bailer	NA
B854-PRX	W-854-03	02/26/96	Active GWE	135	125-135	119-135	0.4	100	Shurflo	118
	W-854-09 (replacement)	07/24/96	Active MW; Proposed GWE	190	180-190	175-190	NA	20	Poly Bailer	NA
B854-DIS	W-854-07	06/12/96	Active MW; Proposed GWE	124	114-124	108-124	0.25–0.5	40	Poly Bailer	NA

Notes:

DIS = Distal.
ft bgs = Feet below ground surface.
gpm = Gallons per minute.
GWE = Ground water extraction.
μg/L = Micrograms per liter.
MW = Monitor well.
NA = Data not available.
OU = Operable Unit.
PRX = Proximal.
SRC = Source.
TVOC = Total volatile organic compound.

Table 7. Treatment facility engineering data.

Equipment	Specifications[a]
B854-SRC and B854-PRX Ground Water Extraction and Treatment Systems	
B854-SRC well pump	Grundfos 5503-9 electrical submersible pump, 1/3 HP, 230 VAC, 1 Ph.
B854-SRC misting transfer pump	1 hp, 208 VAC, 3 Ph. Gould, model 25G3010, 7 stage.
B854-PRX well pump	Shurflo Model 9325-043-101 electrical submersible pump, 24 VDC, 4 A max, 1 gpm @ 100 psi max (230 ft).
B854-PRX holding tank pump	Shurflo Model 2088-474-144 electrical pump, 24 VDC, 3.5 A max, 3 gpm.
B854-SRC pretreatment particulate filter canister	Cuno Model 12DC3, stainless steel, 150 psi max pressure, 250°F max.
B854-SRC pretreatment particulate filter	Cuno catalog number 44078-04.
STU particulate filter canister	Cuno, Aqua-Pure AP101T.
STU particulate filter cartridge	Cuno, Aqua-Pure, 5 micron.
B854-SRC pretreatment vessels	Two each, Park International Corp. high pressure vessels, P/N RT-2460, capacity is 103.20 gal, max flow is 10 gpm, resin required per vessel is 5.2 cu ft.
STU treatment vessels	Three each, Filtration & Media Group Inc., water scrub unit WSU-55, max flow is 15 gpm, 12 psi max operating pressure @ 150°F, carbon required per vessel is 200 lbs.
B854-PRX bioreactor	Four, see P&ID detail "A".
B854-PRX post treatment vessels	Two each, ion-exchange resin vessel, SR7 anion ion-exchange resin required per vessel is 2.9 cu ft.
B854-SRC effluent storage tank	Polyethylene, 100 gal.
B854-PRX acid storage tank	Steel, 50 gal.
Acid pump	Watson-Marlow Bredel Alitea series 400 peristalic pump, 24 VDC.
B854-PRX effluent storage tank	Three each, steel, 50 gal.
STU pressure switch	SOR, Inc., pressure adjustment is 2–15 psi.
Pressure gauges	Ashcroft, 0–15, 0–30, or 0–60 psi, ANSI Grade B.
Misting heads	Six each, 3 gpm heads.
STU deaerator	5-in. diam by 24-in. long PVC vessel.
Vent residue tank	Polyethylene, 5 gal.
STU paddle-wheel water flow transmitter	GF Signet P/N P51530-P0, nominal flow rate from 1 to 20 ft/s, Output 1 V p-p @ 6 hz per ft/s, rotor/pin is black PVDF/Titanium.
STU diaphragm valve	George Fischer Type 314, PVC, true union design.

Table 7. Treatment facility engineering data. (Cont. Page 2 of 2)

Equipment	Specifications[a]
Ball valves	George Fischer Type 346, PVC, true union design.
Water vent valve	Hoffman Specialty #79, with check valve, 75 psi @ 250°F max.
Pipe	PVC Schedule 80, conforms to ASTM-D-1785.
Pipe fittings	PVC Schedule 80, conforms to ASTM-D-2464.
Flexible hose	RyanHerco P/N 0514-110 chemical black PVC hose, 1-in. diam. Nylon reinforcement, max pressure 100 psi.
B854-SRC well water level transducer	Instrumentation Northwest Model PS9000 submersible pressure transmitter, 0-50 psi, 4–20 mA output.
Programmable logic controller	OPTO-22 Snap I/O equipment manager system.
B854-SRC real time data transmission	Via modem and remote desktop computer running SCADA manager software.

Notes:

ANSI = American National Standards Institute.
ASTM = American Society for Testing and Materials.
Corp. = Corporation.
Cu ft = Cubic feet.
diam. = Diameter
ft/s = Feet per second.
GAC = Granular activated carbon.
gal = Gallon(s).
gpm = Gallons per minute.
hp = Horsepower.
hz = Hertz.
in. = Inch.
Inc. = Incorporated.
I/O = Input/output.
lb = Pound(s).
mA = Milliamp.
max = Maximum.
P/N = Part number.
Ph = Phase.
P&ID = Piping and instrument diagram.
PRX = Proximal.
psi = Pounds per square inch.
PVC = Polyvinyl chloride.
PVDF = Polyvinylidene fluoride.
SCADA = Supervisory Control and Data Acquisition.
SRC = Source.
STU = Solar-powered Treatment Unit.
V p-p = Volts peak to peak.
VAC = Volts alternating current.
VDC = Volts direct current.

[a] If a specific model is not available, an equivalent device that satisfies the intended function will be procured.

Table 8. Summary of treatment facility performance at the Building 854 OU.

Facility/CY	Extracted/treated ground water	VOCs removed (grams)	Nitrate removed (kilograms)	Perchlorate removed (grams)
Building 854 Source				
1999	48,066	35	16	1
2000	885,910	1,307	169	24
2001	1,170,792	1,202	246	28
2002	684,393	668	138	10
2003	202,341	154	36	4
Total:	2,991,502	3,366	605	67
Building 854 Proximal				
2000	15,310	6	3	1
2001	187,618	70	25	8
2002	286,359	115	46	10
2003	100,249	26	17	4
Total:	589,536	217	91	23

Notes:

CY = Calendar year.

VOCs = Volatile organic compounds.

OU = Operable Unit.

Table 9. Building 854 remedial action and document schedule.

Activity	Completion date
Building 854-Source Startup	December 13, 1999
Building 854-Source Expansion	September 30, 2007
Building 854-Proximal Startup	November 13, 2000
Building 854-Proximal Expansion	September 30, 2007
Building 854-Distal Startup	September 30, 2006
Building 855-Disposal Lagoon Excavation	September 30, 2004
Draft Building 854 Five-Year Review	July 5, 2008
Draft Final Building 854 Five-Year Review	November 16, 2008
Final Building 854 Five-Year Review	December 15, 2008

Table 10. Cost estimate for wellfield expansion and facility O&M at Building 854 Source treatment facility.

Activity		Capital/one-time costs ($)	Annual O&M ($)
Wellfield modification			
Modify STU		$2,000	
Site Preparation Design/Construction		$2,000	
Influent Pipeline Construction			
	630 linear feet @ $150	$94,500	
Extraction Well Hookup			
	2 wells @ $5,000	$10,000	
Subtotal cost		**$108,500**	
Re-start of Treatment System			
Labor	1 man-week @ $70	$2,800	
Analytical Chemistry Lab		$10,140	
Subtotal cost		**$12,940**	
Operate Treatment Systems			
Annual O&M of STU			$41,700
Annual O&M of Ion-exhange Units			$2,240
Annual O&M of Misting System			$5,040
Subtotal cost			**$48,980**
Total costs (Rounded)		**$121,000**	**$49,000**

Notes:

O&M = Operations and Maintenance.

STU = Solar-powered Treatment Unit.

Table 11. Cost estimate for wellfield expansion and faciliy O&M at Building 854 Proximal treatment facility.

Activity		Capital/one-time costs ($)	Annual O&M ($)
Wellfield modification			
Modify STU		$4,000	
Site Preparation Design/Construction		$2,000	
Influent Pipeline Construction			
	400 linear feet @ $150	$60,000	
Extraction Well Hookup			
	1 well @ $5,000	$5,000	
Subtotal cost		**$71,000**	
Treatment facility expansion			
Add 4 new CWS tanks and 2 wetland empacements with associated piping, parts, and automatic monitoring:			
Parts		**$22,000**	
Design/Labor		**$65,000**	
Subtotal cost		**$87,000**	
Re-start Treatment System			
Labor	1 man-week @ $70	$2,800	
Analytical Chemistry Lab		$10,140	
Subtotal cost		**$12,940**	
Operate Treatment Systems			
Annual O&M of STU			$41,700
Annual O&M of Ion-exchange Units			$2,240
Annual O&M of Misting System			$5,040
Subtotal cost			**$48,980**
Total costs (Rounded)		**$171,000**	**$49,000**

Notes:

CWS = Containerized wetland system.

O&M = Operations and Maintenance.

PRX = Proximal.

STU = Solar-powered Treatment Unit.

Table 12. Cost estimate for design/construction, startup, and operation and maintenance of Building 854 Distal treatment facility.

Activity		Capital/one-time costs ($)	Annual O&M ($)
Design and Construct GTU			
Fabricate GTU		$77,000	
Site Preparation Design/Construction		$20,000	
Electric Power Hookup		$30,000	
Influent Pipeline Construction			
	100 linear feet @ $150	$15,000	
Extraction Well Hookup			
	1 well @ $5,000	$5,000	
Subtotal cost		**$147,000**	
Design and Construct Ion-exchange Unit			
Fabricate 2 Ion-exchange Units			
Parts	2 @ $250	$500	
Assembly	2 @ 8 hrs @ $70	$1,120	
Subtotal cost		**$1,620**	
Design and Construct Misting System			
Fabricate Mist Water Holding Tank			
Parts		$2,800	
Assembly	3 man-weeks @ 70/hr	$8,400	
Fabricate Mister			
Parts		$2,000	
Assembly	5 man-days @ 70/hr	$2,800	
Efflluent Pipeline	50 linear feet @ $75	$3,750	
Subtotal cost		**$19,750**	
Startup Treatment Systems			
Labor	1 man-week @ $70	$2,800	
Analytical Chemistry Lab		$10,140	
Subtotal cost		**$12,940**	
Operate Treatment Systems			
Annual O&M of GTU			$58,800
Annual O&M of Ion-exchange Units			$2,240
Annual O&M of Misting System			$5,040
Subtotal cost			**$66,080**
Total costs (Rounded)		**$181,000**	**$66,000**

Notes:

GTU = Granular Activated Carbon (GAC) Treatment Unit.

O&M = Operations and Maintenance.

hr = Hours.

Appendix A

Polychlorinated Biphenyls (PCBs) Surface Soil Sampling and Analysis

Appendix A

Polychlorinated Biphenyl Compound Surface Soil Sampling and Analysis

As reported in the 1998 Building 854 Operable Unit (OU) Characterization summary, polychlorinated biphenyl compounds (PCBs) were detected in surface soil in 1995. Based on these results, additional sampling and analysis was performed in 2003 to fully characterize the extent of PCB contamination in surface soil.

In 1995, two surface soil samples were collected from the Building 854 OU and analyzed for PCBs. The locations of these samples are shown on Figure A-1. The 1995 sample and duplicate collected from location 3SS-854-21 contained 34 milligrams per kilogram (mg/kg) of Aroclor-1242 and 52 mg/kg of Aroclor-1248, respectively. Surface soil sample 3SS-854-22 contained 0.16 mg/kg of Aroclor-1254. The presence of PCBs in these samples, which were collected from the Building 855 lagoon and adjacent to Building 855, respectively, are presumably the result of past activities where oils and other liquid wastes were discharged to the lagoon. These liquids were used to clean parts and test assemblies.

In the baseline risk assessment, risk and hazard were calculated for inhalation of resuspended particulates, incidental ingestion of surface soil, and direct dermal contact with PCB-contaminated surface soil. These estimates assumed an onsite worker would spend 8 hours a day, 5 days a week, for 30 years working near the contamination. An unacceptable risk (7×10^{-5}) was identified at Building 854. Building 854 is not currently occupied on a full-time basis, and local site use restrictions are in effect.

During January 2003, DOE collected 38 additional surface soil samples using the ERD Standard Operating Procedure (SOP) 1.12, "Surface Soil Sampling" (Dibley and Depue, 2003). The samples were analyzed by the immunoassay on-site technique, Environmental Protection Agency (EPA) Method 4020. Eight duplicate samples were submitted to an off-site analytical laboratory and analyzed by EPA method 8082. The locations of the samples collected in January 2003 are shown on Figure A-2. Figure A-3 shows the locations of samples collected within the Building 855 former disposal lagoon.

One sample (3SS-854-112) located within the Building 855 lagoon gave an absorbance reading that was extrapolated to equal 26 mg/kg PCBs using EPA method 4020. The absorbance for all other samples indicated PCB concentrations lower then 1 mg/kg.

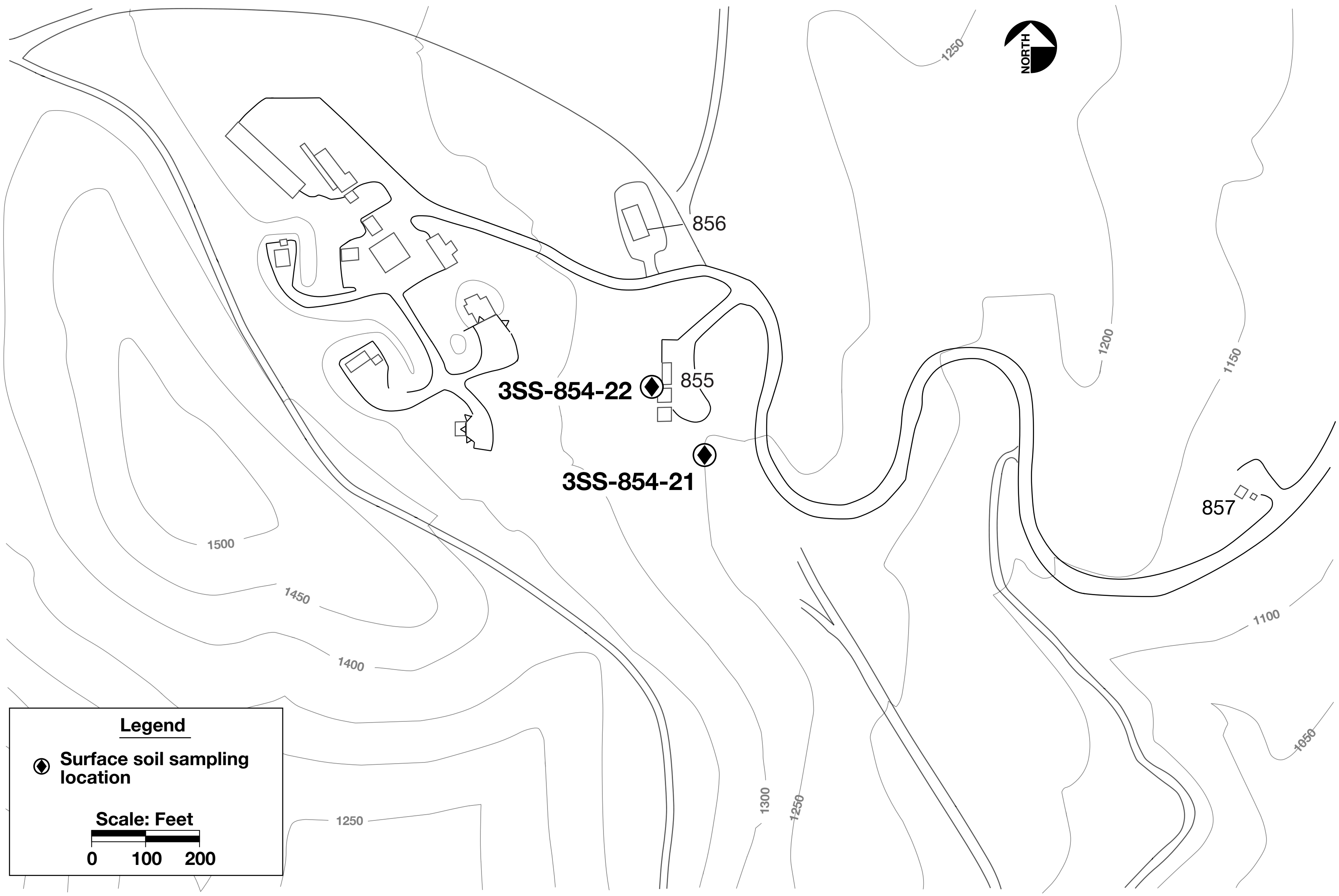
Of the eight samples analyzed by EPA method 8082, two samples had PCB detections above the reporting limit of 0.007 mg/kg. The sample collected from location 3SS-854-112 contained 3.6 mg/kg of Aroclor-1248 and 4.7 mg/kg of Aroclor-1254 and a sample collected from the edge of the lagoon, 3SS-854-113, contained 0.023 mg/kg of Aroclor-1254. Only one sample (3SS-854-112) contained PCBs at concentrations above the Industrial Soil Preliminary Remediation Goal (PRG) of 0.74 mg/kg for PCBs. Table A-1 contains the PCB field immunoassay and analytical laboratory results.

A sample from location 3SS-854-112 was collected and analyzed for dioxins and furans using EPA Method 8290. A total toxicity equivalent concentration for the dioxin/furan compounds was calculated to be 2.6×10^{-5} mg/kg. This concentration was calculated by multiplying the measured dioxin/furan compound concentration by the Toxicity Equivalence Factor (TEF). The TEF is defined as an order of magnitude estimate of the toxicity of the various dioxin and furan compounds relative to the toxicity of 2, 3, 7, 8-Tetrachlorodibenzo-p-dioxin (TCDD). The total toxicity equivalent concentration is above the industrial soil PRG of 1.6×10^{-5} mg/kg. Table A-2 contains the dioxin/furan analytical results and calculated TEF.

In April 2003, LLNL collected several additional samples in the location of the highest surface soil result detected in the lagoon (3SS-854-112). The samples were collected at 0.5 ft intervals starting at 0 ft and ending at 2.5 ft to profile the vertical extent of PCB contamination within the former disposal lagoon. The PCB 1248 was detected at all depths (see Table A-3). LLNL will be collecting additional depth profile samples and will pursue a removal action/excavation if appropriate.

A-1. References

Dibley, V., and R. Depue (Eds.) (2003), *LLNL Livermore Site and Site 300 Environmental Restoration Project Standard Operating Procedures (SOPs),* Lawrence Livermore National Laboratory Livermore, Calif. (UCRL-MA-109115 Rev. 10).



ERD-S3R-03-0096

Figure A-1. Surface soil sample locations collected during November 1995 in the Building 854 OU.

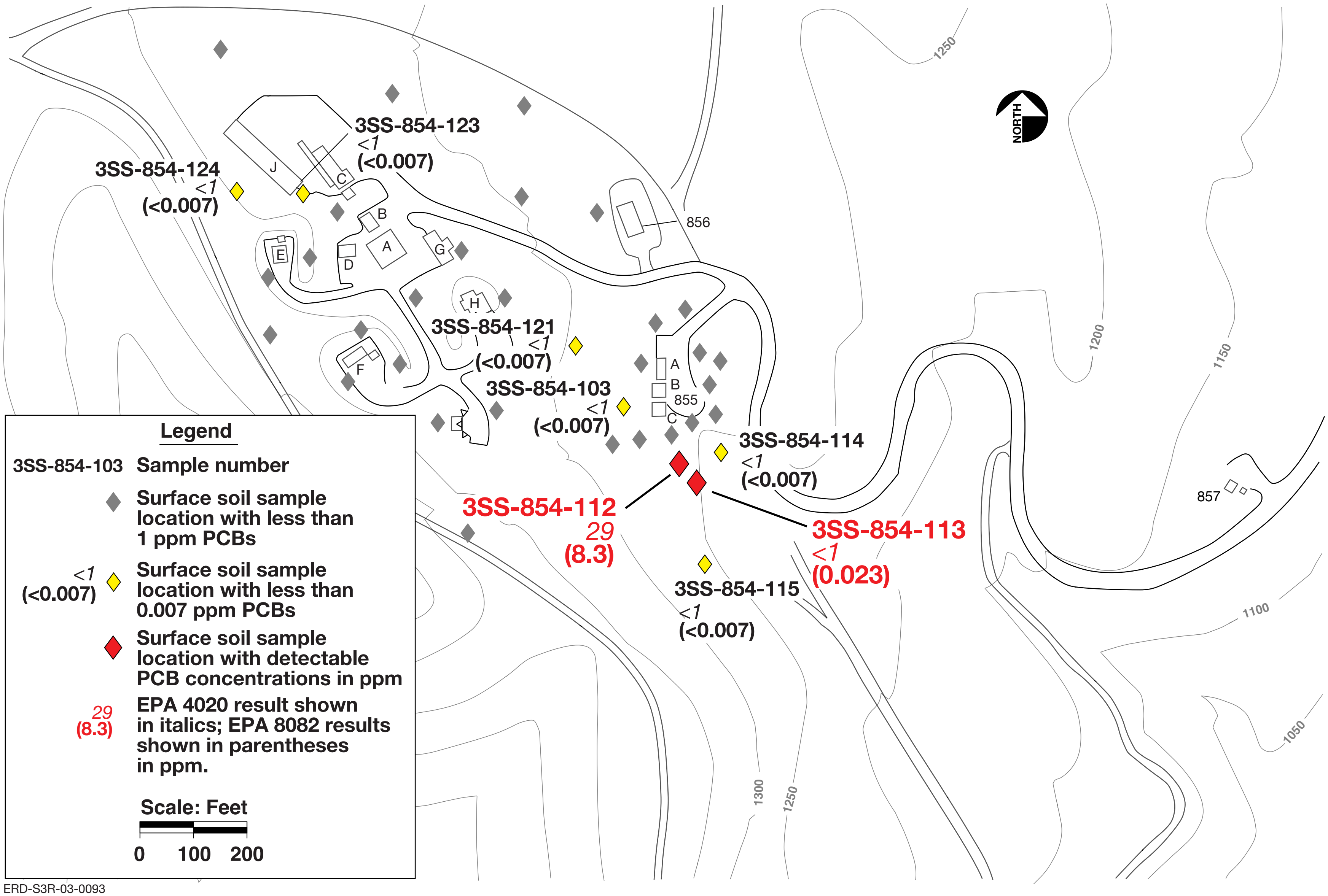
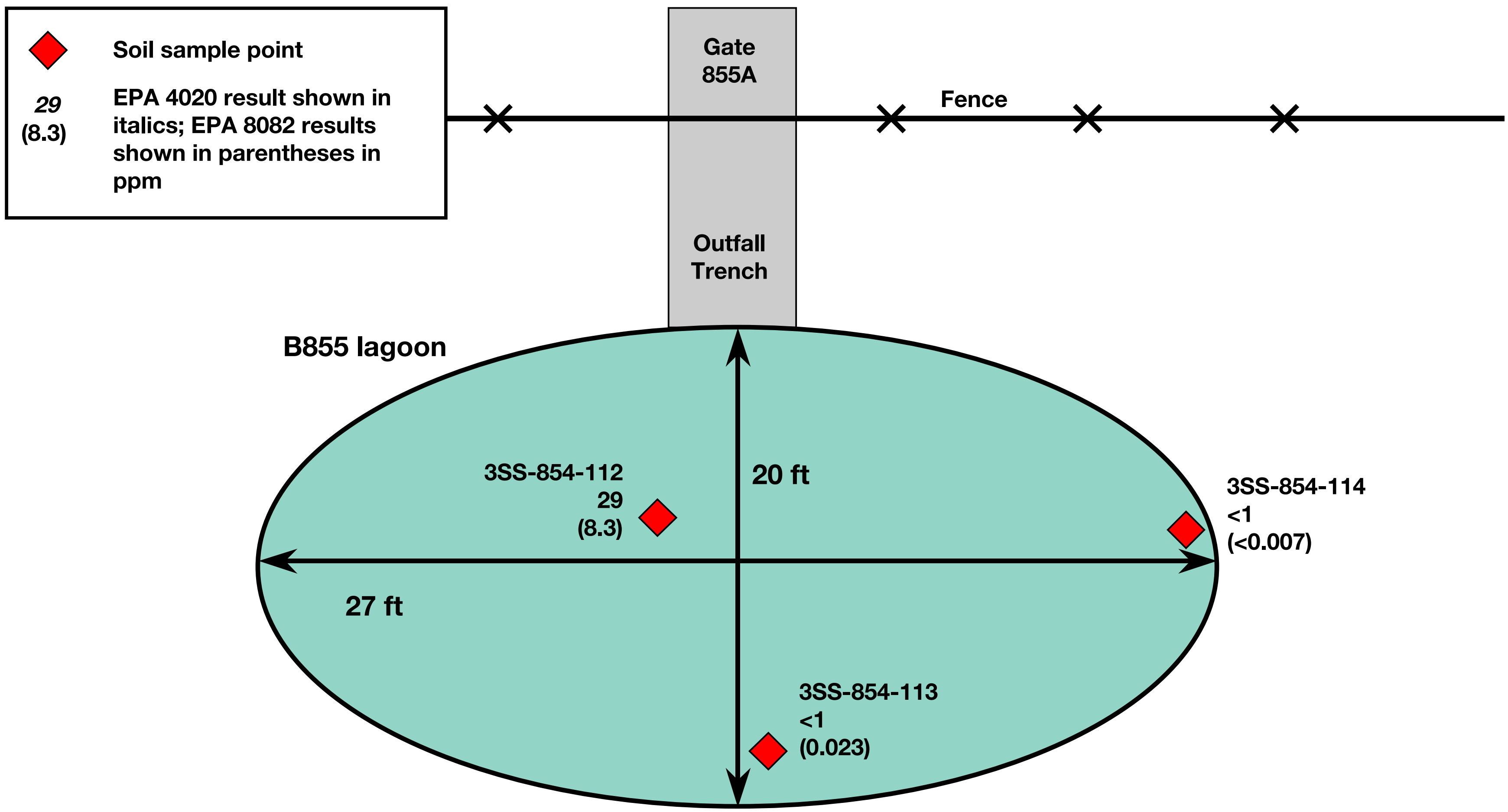


Figure A-2. Surface soil sample locations collected during January 2003 in the Building 854 OU.



ERD-S3R-03-0082

Figure A-3. Surface soil sample locations collected in the Building 855 former disposal lagoon during January 2003 in the Building 854 OU.

Table A-1. PCB concentrations in Building 854 OU surface soil.

Location	Sample date	EPA Method 4020 total PCB result (mg/kg)	EPA method 8082 total PCB result (mg/kg)
3SS-854-100	1/29/03	<1	NA
3SS-854-101	1/29/03	<1	NA
3SS-854-102	1/29/03	<1	NA
3SS-854-103	1/29/03	<1	<0.007
3SS-854-104	1/29/03	<1	NA
3SS-854-105	1/29/03	<1	NA
3SS-854-106	1/29/03	<1	NA
3SS-854-107	1/29/03	<1	NA
3SS-854-108	1/29/03	<1	NA
3SS-854-109	1/29/03	<1	NA
3SS-854-110	1/29/03	<1	NA
3SS-854-111	1/29/03	<1	NA
3SS-854-112	1/29/03	29	8.3
3SS-854-113	1/29/03	<1	0.023
3SS-854-114	1/29/03	<1	<0.007
3SS-854-115	1/29/03	<1	<0.007
3SS-854-116	1/29/03	<1	NA
3SS-854-117	1/29/03	<1	NA
3SS-854-118	1/29/03	<1	NA
3SS-854-119	1/29/03	<1	NA
3SS-854-120	1/29/03	<1	NA
3SS-854-121	1/29/03	<1	<0.007
3SS-854-122	1/29/03	<1	NA
3SS-854-123	1/29/03	<1	<0.007
3SS-854-124	1/29/03	<1	<0.007
3SS-854-125	1/29/03	<1	NA
3SS-854-126	1/29/03	<1	NA
3SS-854-127	1/29/03	<1	NA
3SS-854-128	1/29/03	<1	NA
3SS-854-129	1/29/03	<1	NA
3SS-854-130	1/29/03	<1	NA
3SS-854-131	1/29/03	<1	NA
3SS-854-132	1/29/03	<1	NA
3SS-854-133	1/29/03	<1	NA

Table A-1. PCB concentrations in Building 854 OU surface soil (Cont. Page 2 of 2).

Location	Sample date	EPA Method 4020 total PCB result (mg/kg)	EPA method 8082 total PCB result (mg/kg)
3SS-854-134	1/29/03	<1	NA
3SS-854-135	1/29/03	<1	NA
3SS-854-136	1/29/03	<1	NA
3SS-854-137	1/29/03	<1	NA

Notes:

EPA = Environmental Protection Agency.
mg/kg = Milligrams per kilogram.
NA = Not applicable.
OU = Operable Unit.
PCB = Polychlorinated biphenyl compounds.
TEF = Toxicity Equivalency Factor.

Table A-2. Dioxin and furan concentrations in surface soil sample 3SS-854-112 collected in the Building 854 OU.

Compound	Measured concentration (pg/g)	Measured concentration (mg/kg)	TEF[a]	Toxic equivalent concentration	PRG[b] mg/kg
2,3,7,8-TCDD	<0.149	0.00E+00	1.00E+00	0.00E+00	1.60E-05
1,2,3,7,8-PeCDD	1.29E+00	1.29E-06	5.00E-01	6.45E-07	1.60E-05
1,2,3,4,7,8-HxCDD	9.59E-01	9.59E-07	4.00E-02	3.84E-08	1.60E-05
1,2,3,6,7,8-HxCDD	3.35E+00	3.35E-06	4.00E-02	1.34E-07	1.60E-05
1,2,3,7,8,9-HxCDD	2.40E+00	2.40E-06	1.00E-03	2.40E-09	1.60E-05
1,2,3,4,6,7,8-HpCDD	4.41E+01	4.41E-05	1.00E-03	4.41E-08	1.60E-05
OCDD	3.07E+02	3.07E-04	0.00E+00	0.00E+00	1.60E-05
Total Tetra-dioxins	1.28E+00	1.28E-06	0.00E+00	0.00E+00	1.60E-05
Total Penta-dioxins	6.39E+00	6.39E-06	0.00E+00	0.00E+00	1.60E-05
Total-Hexa-dioxins	2.69E+01	2.69E-05	0.00E+00	0.00E+00	1.60E-05
Total Hepta-dioxins	9.27E+01	9.27E-05	0.00E+00	0.00E+00	1.60E-05
2,3,7,8-TCDF	1.56E+02	1.56E-04	1.00E-01	1.56E-05	1.60E-05
1,2,3,7,8-PeCDF	1.35E+01	1.35E-05	1.00E-01	1.35E-06	1.60E-05
2,3,4,7,8-PeCDF	7.67E+01	7.67E-05	1.00E-01	7.67E-06	1.60E-05
1,2,3,4,7,8-HxCDF	2.50E+01	2.50E-05	1.00E-02	2.50E-07	1.60E-05
1,2,3,6,7,8-HxCDF	1.58E+01	1.58E-05	1.00E-02	1.58E-07	1.60E-05
2,3,4,6,7,8-HxCDF	7.39E+00	7.39E-06	1.00E-02	7.39E-08	1.60E-05
1,2,3,7,8,9-HxCDF	3.37E+00	3.37E-06	1.00E-02	3.37E-08	1.60E-05
1,2,3,4,6,7,8-HpCDF	2.68E+01	2.68E-05	1.00E-03	2.68E-08	1.60E-05
1,2,3,4,7,8,9-HpCDF	4.54E+00	4.54E-06	1.00E-03	4.54E-09	1.60E-05
OCDF	2.65E+01	2.65E-05	0.00E+00	0.00E+00	1.60E-05
Total Tetra-furans	1.05E+03	1.05E-03	0.00E+00	0.00E+00	1.60E-05
Total Penta-furans	4.74E+02	4.74E-04	0.00E+00	0.00E+00	1.60E-05
Total-Hexa-furans	1.09E+02	1.09E-04	0.00E+00	0.00E+00	1.60E-05
Total Hepta-furans	4.46E+01	4.46E-05	0.00E+00	0.00E+00	1.60E-05
Total:				2.60E-05	1.60E-05

Notes:

CDD = Chlorinated dibenzo-p-dioxin.
CDF = Chlorinated dibenzofuran.
HpCDD = Heptachlorinated dibenzo-p-dioxin.
HpCDF = Heptachlorinated dibenzofuran.
HxCDD = Hexachlorinated dibenzo-p-dioxin.
HxCDF = Hexachlorinated dibenzofuran.
mg/kg = Milligrams per kilogram.
OCDD = Octachlorodibenzo-p-dioxin.
OCDF = Octachlorodibenzofuran.
OU = Operable Unit.
PeCDD = Pentachlorinated dibenzo-p-dioxin.
PeCDF = Pentachlorinated dibenzofuran.
pg/g = picogram per gram.
PRG = Preliminary Remediation Goal.
TCDD = Tetrachlorodibenzo-p-dioxin.
TCDF = Tetrachlorodibenzofuran.
TEF = Toxicity Equivalency Factor.

[a] U.S. EPA, 1987.

[b] EPA 2002, Industrial Soil for 2,3,7,8-TCDD.

Table A-3. PCB results from the April 2003 depth profile sampling of the Building 855 Lagoon.

Location	Sample Date	Analyte	EPA Method 8082A result (mg/kg)
3SS-854-200 @ 0.0ft	4/23/03	PCB 1016	<0.1
3SS-854-200 @ 0.0ft	4/23/03	PCB 1221	<0.1
3SS-854-200 @ 0.0ft	4/23/03	PCB 1232	<0.1
3SS-854-200 @ 0.0ft	4/23/03	PCB 1242	<0.1
3SS-854-200 @ 0.0ft	4/23/03	PCB 1248	10
3SS-854-200 @ 0.0ft	4/23/03	PCB 1254	<0.1
3SS-854-200 @ 0.0ft	4/23/03	PCB 1260	<0.1
3SS-854-200 @ 0.5ft	4/23/03	PCB 1016	<0.1
3SS-854-200 @ 0.5ft	4/23/03	PCB 1221	<0.1
3SS-854-200 @ 0.5ft	4/23/03	PCB 1232	<0.1
3SS-854-200 @ 0.5ft	4/23/03	PCB 1242	<0.1
3SS-854-200 @ 0.5ft	4/23/03	PCB 1248	59
3SS-854-200 @ 0.5ft	4/23/03	PCB 1254	<0.1
3SS-854-200 @ 0.5ft	4/23/03	PCB 1260	<0.1
3SS-854-200 @ 1.0ft	4/23/03	PCB 1016	<0.1
3SS-854-200 @ 1.0ft	4/23/03	PCB 1221	<0.1
3SS-854-200 @ 1.0ft	4/23/03	PCB 1232	<0.1
3SS-854-200 @ 1.0ft	4/23/03	PCB 1242	<0.1
3SS-854-200 @ 1.0ft	4/23/03	PCB 1248	26
3SS-854-200 @ 1.0ft	4/23/03	PCB 1254	<0.1
3SS-854-200 @ 1.0ft	4/23/03	PCB 1260	<0.1
3SS-854-200 @ 1.5ft	4/23/03	PCB 1016	<0.1
3SS-854-200 @ 1.5ft	4/23/03	PCB 1221	<0.1
3SS-854-200 @ 1.5ft	4/23/03	PCB 1232	<0.1
3SS-854-200 @ 1.5ft	4/23/03	PCB 1242	<0.1
3SS-854-200 @ 1.5ft	4/23/03	PCB 1248	62
3SS-854-200 @ 1.5ft	4/23/03	PCB 1254	<0.1
3SS-854-200 @ 1.5ft	4/23/03	PCB 1260	<0.1
3SS-854-200 @ 2.0ft	4/23/03	PCB 1016	<0.1
3SS-854-200 @ 2.0ft	4/23/03	PCB 1221	<0.1
3SS-854-200 @ 2.0ft	4/23/03	PCB 1232	<0.1
3SS-854-200 @ 2.0ft	4/23/03	PCB 1242	<0.1
3SS-854-200 @ 2.0ft	4/23/03	PCB 1248	22
3SS-854-200 @ 2.0ft	4/23/03	PCB 1254	<0.1

Table A-3. PCB results from the April 2003 depth profile sampling of the Building 855 Lagoon. (Cont. Page 2 of 2)

Location	Sample Date	Analyte	EPA Method 8082A result (mg/kg)
3SS-854-200 @ 2.0ft	4/23/03	PCB 1260	<0.1
3SS-854-200 @ 2.5ft	4/23/03	PCB 1016	<0.1
3SS-854-200 @ 2.5ft	4/23/03	PCB 1221	<0.1
3SS-854-200 @ 2.5ft	4/23/03	PCB 1232	<0.1
3SS-854-200 @ 2.5ft	4/23/03	PCB 1242	<0.1
3SS-854-200 @ 2.5ft	4/23/03	PCB 1248	21
3SS-854-200 @ 2.5ft	4/23/03	PCB 1254	<0.1
3SS-854-200 @ 2.5ft	4/23/03	PCB 1260	<0.1

Appendix B

Substantive Requirements for Building 832 Canyon OU and Building 854 OU Treatability Studies, Lawrence Livermore National Laboratory Site 300, U.S. Department of Energy, San Joaquin

SUBSTANTIVE REQUIREMENTS
BUILDING 832 CANYON OU TREATABILITY STUDY
AND
BUILDING 854 OU
LAWRENCE LIVERMORE NATIONAL LABORATORY SITE 300
U.S. DEPARTMENT OF ENERGY
SAN JOAQUIN COUNTY

The California Regional Water Quality Control Board, Central Valley Region, (hereafter Board) finds that:

1. The U.S. Department of Energy and the Regents of the University of California, Lawrence Livermore National Laboratory Site 300, (hereafter jointly referred to as Discharger), propose to conduct treatability studies at the Building 832 Canyon Operable Unit (OU) and the Building 854 OU.

2. The Building 832 Canyon OU contains facilities that were used to test the stability of weapons and weapons components under various environmental conditions and mechanical stresses. Building 854 Complex was used for testing of electrical, mechanical and experimental devices containing inert or hazardous materials. At the Building 854 Complex, a TCE brine system with elevated outdoor piping carried TCE between buildings. Contaminants were released to the subsurface as a result of these activities.

3. Groundwater, soil and soil vapor beneath the Building 832 Canyon OU are contaminated with volatile organic compounds (VOCs), primarily trichloroethylene (TCE). Releases occurred mainly at Building 830 and at the Building 832 Complex where TCE was used as a heat exchange fluid. Plumes of nitrate have also been identified in the vicinity of Building 830 and Building 832. Perchlorate has been detected in several wells in both the Building 330 and Building 832 areas.

4. Groundwater contaminants at the Building 854 OU are TCE, nitrate and perchlorate. The maximum detection of TCE in groundwater was 2,900 ug/l in well W-854-02. Nitrate has been detected in concentrations in excess of its MCL (45 mg/l) in groundwater samples from wells W-854-05 and W-854-08 (maximum detection of 180 mg/l from well W-854-08). Perchlorate has been detected at a maximum concentration of 16 ug/l in well W-854-11.

5. Most recent concentrations of TCE in the proposed extraction wells were 270 ug/l in W-854-03 and 140 ug/l in W-854-02. The maximum nitrate concentration was 43 mg/l in W-854-03 and 53 mg/l in W-854-02. The maximum perchlorate concentration in W-854-03 was 9.7 ug/l. No perchlorate has been detected in W-854-02.

6. The site is located in San Joaquin County in the Altamont Hills of the North Diablo Range, approximately 20 kilometers southwest of the town of Tracy. The Building 832 area is located in the southeast part of Site 300. The Building 832 Canyon OU is underlain by Tertiary-age Neroly Formation sedimentary bedrock units that form the canyon walls and Quaternary alluvium in the entrenched stream channels on the canyon floor. Depth to groundwater below ground surface ranges from 20 to 40 feet.

7. The Building 854 Complex is located in the southwest part of Site 300. It is underlain by an unsaturated Quaternary landslide deposit locally in excess of 70 feet thick. Underlying the landslide deposit is the Tertiary Neroly lower blue sandstone and the Cierbo formation. The contaminated aquifer occurs in the Neroly blue sandstone and the underlying upper Cierbo Formation.

8. Depth to groundwater at the proposed extraction wells at Building 854 is 116 feet at well W-854-03 and 140 feet at well W-854-02.

9. Treatability studies are proposed for the Building 832 Canyon OU and the Building 854 OU to evaluate the effectiveness of groundwater techniques in achieving source control and to assess the effect of source control on downgradient contaminant concentrations. As part of the treatability tests, hydraulic testing will be performed to evaluate extraction wells, determine extraction rates and contaminant concentrations and estimate capture zones.

10. To perform the treatability studies, the Discharger may use several types of groundwater remediation technologies including: 1) air stripping, 2) vapor-phase granular activated carbon (GAC), 3) resin columns, 4) aqueous-phase GAC, 5) iron fillings and 6) phytoremediation. Extraction techniques may include active and passive groundwater extraction and soil vapor extraction powered by natural hydraulic gradients, solar panels or supplied electricity.

11. The treatment systems will be located on property owned by the U.S. Department of Energy and will be managed under the direction of the Regents of the University of California. The Building 832 treatment facility (B832-TF1) will be located south and across the street from Building 832 (Figure 1). The Building 830 portable treatment unit (PTU) will be located adjacent to well W-830-19 (Figure 1). Other portable/solar treatment units may be used to extract and treat wells at various locations within the Building 830 area as needed.

12. At the Building 832 treatment facility groundwater will be extracted from 9 wells (Figure 1) to lower the water table and enhance the soil vapor extraction efforts (W-832-12, W-832-13, W-832-14, W-832-15, W-832-16, W-832-17, W-832-18, W-832-20 and W-832-22). Groundwater from these wells will be treated using an aqueous-phase GAC treatment unit. Extracted soil vapor will be treated using a vapor-phase

GAC treatment unit.

13. Groundwater from three extraction wells in the Building 830 area (W-830-19, W-830-25, and W-830-49) will be extracted and treated with a PTU. Groundwater from other wells near Building 830, including W-830-30 and W-830-34, and from well W-832-05 near Building 832 may be treated by solar powered (SWAT) units (Figure 1).

14. Other wells in the Building 832 Canyon OU, including W-830-10, W-830-51, W-830-52, W-830-53, W-830-56 and W-830-14, may be used as extraction wells for additional treatment facilities. In this event, a complete description of wells and treatment system parameters will be submitted to the Board. Discharge from all treatment facilities will adhere to the limitations defined in these Substantive Requirements.

15. Table 1 presents the historic maximum and most recent concentrations for four constituents of concern from a selection of key wells in the Building 832 Canyon OU.

16. The extracted groundwater at the Building 854 Complex will be treated by SWAT units.

17. The groundwater treatments systems (GWTSs) work as follows:

Building 832 Treatment Facility (Water) (Figure 1):

1. Independent well pumps pump extracted groundwater to the treatment facility.
2. The groundwater passes through a twenty-micron filtration system to remove suspended particles from groundwater.
3. The water then passes through three aqueous-phase GAC canisters placed in series, which remove the VOCs.
4. Water is then pumped to the discharge location where it will be discharged by misting nozzles that distribute the water over a large ground surface area.
5. The discharge point for this system will be located on the hill adjacent to and approximately 500 feet south of the treatment facility. The area is vegetated primarily with native grasses.

Building 832 Treatment Facility (Vapor)(Figure 1):

1. Contaminated soil vapors are pulled under vacuum from the subsurface by the action of a positive displacement blower.
2. Extracted soil vapor passes through a knock out chamber that separates water from the air stream.
3. Soil vapors then enter four GAC canisters (in series) which remove the VOCs from the air stream.

4. Treated soil vapors then are discharged to the atmosphere through a 12-ft stack.

Building 830 Treatment Facility (PTU) (Figure 1):

1. Extracted groundwater is pumped to the PTU.
2. Prior to entering the air stripper in the PTU, the groundwater passes through a five-micron filtration system to remove suspended particles.
3. Following filtration, the influent is aerated through a series of air blower trays, stripping out the VOCs.
4. Following treatment for VOCs, if the perchlorate concentration in the effluent is greater than the detection limit, the water will be fed to resin columns to remove perchlorate. Then the treated groundwater will be discharged to the hillside via a perforated pipe or will be misted directly onto the hillside as an appropriate method of discharging nitrate-bearing water
5. The VOC-laden vapors generated in the air stripper are treated in two vapor-phase GAC canisters connected in series.
6. If discharge is through a perforated pipe, the discharge area will be about 100 feet below well W-830-25 in the Canyon bottom. (Figure 1).
7. Monthly monitoring of the discharge area will be conducted to ensure that no runoff is occurring into a surface drainage system.

GTU/SWAT:

1. Extracted groundwater is pumped to the groundwater treatment unit.
2. Prior to entering the aqueous-phase GAC units, the groundwater passes through a five-micron filtration system to remove suspended particles from groundwater.
3. The influent passes from the filtration system to three aqueous-phase GAC units connected in series to allow the VOCs to adsorb to the GAC.
4. Following treatment for VOCs, the water will then be fed to resin columns if the perchlorate concentration in the effluent is above the detection limit.
5. Treated groundwater is then pumped to the discharge location where it will be discharged to a misting system where it will be misted to the hillside or it will be discharged to a percolation trench.
6. The discharge point for the unit extracting from W-830-30 and W-830-34 is located along the north slope of the drainageway/arroyo leading up to Building 830 (Figure 1).
7. The discharge point for the unit extracting from W-832-05 is located approximately 225 ft. south of well W-832-05 east of the road leading up the Building 832 complex (Figure. 1).
8. Treated groundwater from extraction well W-854-03 will be discharged to a percolation trench and from extraction well W-854-02 will be discharged by misting into the atmosphere on a nearby hillside similar to the method to be used

at the 832-TF-1 (Figure 2). An additional trench may be constructed to test in situ biological treatment of nitrate.

9. Monthly monitoring of the discharge area will be conducted to ensure that no runoff is occurring into a surface drainage system.

<u>Iron Fillings Treatment System (Figure 1):</u>

1. Extracted groundwater flows to the unit under passive hydraulic pressure.
2. The groundwater passes through a twenty-micron filtration system to remove suspended particles from groundwater.
3. The influent passes from the filtration system through four iron filling drums in parallel.
4. The water then passes through two aqueous-phase GAC units connected in parallel. (The iron filings should remove all VOCs. The GAC units will act as backup during this testing period.)
5. The iron filings treatment will raise the pH and cause iron dissolution into the treated water. In order to adjust the pH and remove the dissolved iron from the treated groundwater, following treatment for VOCs, the water will be fed through an aeration and sand filtration unit. If nitrate concentrations are at or above the MCL, the treated groundwater will then be fed through a phytoremediation system.
6. Treated groundwater will be discharged into the adjacent streambed.

14. If the Discharger needs to use groundwater discharge locations other than those listed above as a result of the testing of additional wells, discharge locations will be submitted to the Board for review prior to discharge.

15. For the nine wells connected to the B-832 TF1, the Discharger anticipates that the area will dewater relatively quickly based on dry boreholes in the area in the early 1990s and the perched nature of the existing water in thin, clayey sand units totaling about 10 feet in thickness. Dewatering should occur after removal of about 580,000 gallons of water.

16. At an extraction rate of 10,000 gallons/day, the dewatering will take place in about two months. Since groundwater recharge into the wells occurs only during the rainy season, the pumps are designed to automatically extract water from these zones as water accumulates so that dewatering occurs when necessary. After removal of the TCE and other VOCs by the GAC units, the treated groundwater will be misted on the hillside above the TF so the hillside vegetation will use that nitrate in the groundwater. If enough rainfall results in perched water accumulating over the wet season, this misting process will be repeated next year.

18. The Discharger anticipates that approximately 10,500 gallons/day can be extracted from wells W-830-19, W-830-25, and W-830-49 in the Building 830 area. The extracted groundwater will be treated in a PTU. The SWAT unit will treat approximately 3,000 gallons/day extracted from wells W-830-30, and W-830-34.

19. The extraction rate from wells W-854-02 and W-854-03 is estimated at one to three gallons per minute.

The Discharger, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, shall comply with the following:

A. Discharge Prohibitions

1. Bypass or overflow of untreated or partially treated waste is prohibited.

2. Discharge of waste classified as 'hazardous' or 'designated', as defined in Sections 2521(a) and 2522(a) of Chapter 15, is prohibited.

3. Discharge in violation of State Board Resolution 68-16 is prohibited.

B. Effluent Limitations

1. The discharge of groundwater effluent, in excess of the following limits is prohibited:

Compound	Maximum Daily Concentration (μg/L)[1]	Monthly Median Concentration (μg/L)
Tetrachloroethylene	5.0	0.5
Trichloroethylene	5.0	0.5
1,1-Dichloroethylene	5.0	0.5
1,2-Dichloroethylene	5.0	0.5
1,1,1-Trichloroethane	5.0	0.5
1,2-Dichloroethane	5.0	0.5
Chloroform	5.0	0.5
Freon 11	5.0	0.5
Total Volatile Organic Compounds [2]	5.0	0.5
Nitrate (as NO_3)	***	
Perchlorate[3]	18.0	ND<4

[1] Using EPA Method 601 with a detection limit of 0.5 μg/L or less for halogenated VOCs and EPA Method 353.2 with a detection limit of 500 μg/L for nitrate.
[2] Total VOCs will be the sum of all VOCs detected above the 0.5 μg/L concentration.

[3] Using EPA Method 300.0 with a detection limit of 4 µg/L.

***Nitrate will be removed from the system effluent by resin columns or phytoremediation or nitrate-bearing treated groundwater will be misted on the hillsides and nitrate will be used by vegetation. Nitrate levels for B-832 TF1 should average about 70 mg/L (ppm). Discharge from this facility should last for no more than two months based on the estimated volume of water available for pumping at the facility (see Sec. 13 above). Monthly monitoring of the discharge area will be conducted to ensure that no runoff is occurring in the hillside discharge area.

2. The discharge of individual VOCs other than those listed in B.1 above in excess of the 5.0 µg/L maximum daily concentration and the 0.5 µg/L monthly median concentration using EPA Method 601 is prohibited.

3. All chromatograph peaks for EPA Method 601 shall be identified.

4. The treated groundwater will not have a pH less than 6.5 or greater than 8.5.

5. The Discharger shall use the best practicable cost-effective control technique currently available to limit mineralization to no more than a reasonable increment.

6. No runoff from the discharge locations will occur, and to safeguard this, monthly monitoring of the discharge areas will be conducted to ensure that no runoff is occurring.

C. Discharge Specifications

1. SYSTEM CHECK

Prior to operating the groundwater treatment system with contaminated groundwater, a system check shall be conducted to confirm the proper construction and operation of the treatment system. The following minimum requirements apply to this system check phase:

a. A conformance inspection shall be conducted to confirm that all equipment, piping, instrumentation, and control systems of the groundwater treatment system have been installed according to the approved design. Any deficiencies in the groundwater treatment system shall be corrected.

b. To confirm piping integrity, piping of the collection system and treatment system shall be pressure tested at 150 percent of the design pressure with potable water. Any leaks shall be repaired.

c. All instrumentation, control systems, and equipment shall be inspected for malfunctions. All automatic controls, such as shutdown or alarm switches necessary for the operation of each treatment system phase, shall be certified operational prior to startup of that phase. Mechanical equipment, such as pumps, air blowers, and valves, required for the operation of the treatment phases, will be cycled or operated. Any functional deficiencies shall be corrected.

2. FULL SCALE OPERATION

   a. All extracted groundwater will be treated by the treatment systems and discharged directly to the ground surface or indirectly to the ground surface via misting.
   b. The Discharger shall operate the treatment systems to maximize the removal of VOCs from the extracted groundwater.
   c. The system operations shall be monitored in accordance with the full scale operational phase monitoring plan in the MRP.

   d. All treatment, transport, and disposal components (including pumping valves, liquid level controllers, pipelines, blowers, flow meters, pressure gauges, etc.) will be inspected for leaks and/or malfunctions each business day that the system is operational during manual operations and weekly during automated operation.

3. DURING ALL PHASES OF OPERATIONS

   a. Neither the treatment nor the discharge shall cause a nuisance or condition of pollution as defined by the California Water Code, Section 13050.

   b. The discharge shall not cause degradation of any water supply.

   c. Any collected screenings, sludge, and other solids removed from liquid wastes shall be disposed of in a manner consistent with Chapter 15, Division 3, Title 23, CCR.

D. Provisions

1. The Discharger shall not allow pollutant-free wastewater to be discharged into the collection, treatment, and disposal system in amounts that significantly diminish the system's capability to comply with these Substantive Requirements. Pollutant-free wastewater means rainfall, groundwater, cooling waters, and condensates that are essentially free of pollutants.

2. The Discharger may be required to submit technical reports as directed by the Board.

3. The Discharger shall comply with the attached MRP, which is part of these Substantive Requirements and any revision thereto, i.e., monitoring frequency, locations, constituent changes, etc. as ordered by the Board.

4. The Discharger shall notify the Board immediately, during normal working hours via telephone, and at least within 24 hours of any spill of untreated groundwater. This notification shall include the size and cause of the spill, any immediate damage to the environment, any corrective/cleanup actions taken and/or additional monitoring proposed.

5. The Discharger shall report to the Board, DTSC, and the U.S. EPA quarterly operation and status reports for the treatability study during Remedial Project Manager (RPM) meetings. These operational reports shall contain a summary of operating parameters, operation and maintenance activities, and any shut down or spill events that occurred during the quarter.

6. The Discharger shall comply with the "Standard Provisions and Reporting Requirements for Waste Discharge Requirements", date 1 March 1991, which are attached hereto and by reference a part of these Substantive Requirements except for those Provisions and Requirements which are superceded by CERCLA requirements. This attachment and its individual paragraphs are commonly referenced as "Standard Provisions".

7. The Discharger shall report promptly to the Board any material change or proposed change in the character, location, or volume of the discharge.

8. In the event of any change in ownership of land or waste discharge facilities presently owned or controlled by the Discharger, and associated with the groundwater cleanup of the Building 832 Canyon area and Building 854 area groundwater, the Discharger shall notify at that time the succeeding owner or operator of the existence of these Substantive Requirements by letter. A copy of the notification shall be forwarded to this office.

9. A copy of the Substantive Requirements shall be kept at the discharge facility for reference by operating personnel. Key operating personnel shall be familiar with its contents.

10. The Board will review these Substantive Requirements periodically and may revise them. The Discharger shall be notified prior to the review of these Substantive Requirements by the Board, and have the opportunity to review and comment on the proposed changes.

Appendix C

Construction Quality Assurance/ Quality Control Plan

Appendix C

Construction Quality Assurance/ Quality Control Plan

C-1. Introduction

This Quality Assurance/Quality Control (QA/QC) Plan has been developed in support of the construction and buildout of the Building 854 Operable Unit (OU) ground water and soil vapor extraction (SVE) and treatment systems and extraction wellfield. Some of these facilities have already been constructed as part of the Building 854 Treatability Studies. As such, this plan will apply only to wellfield expansion and future construction of ground water and soil vapor treatment facilities.

The purpose of this plan is to define quality objectives and areas of responsibility in accordance with the requirements for the construction and buildout of LLNL extraction and treatment facilities. This plan has been developed to comply with Lawrence Livermore National Laboratory (LLNL) QA policy and to address the applicable elements of U.S. Department of Energy (DOE) Order 414.1A.

The QA/QC objectives are to:

- Assure excellence in construction design and implementation.
- Provide the QA/QC requirements to meet all programmatic and institutional needs.

The QA/QC Plan provides confidence that these objectives will be achieved and that achievement will include due consideration for health, safety, property, and the environment.

C-2. QA/QC Processes and Procedures

Detailed QA/QC processes and procedures for construction activities are addressed in one or more of the following documents, which are incorporated by reference into this plan:

- U.S. Department of Energy (DOE) Order 414.1A, Quality Assurance Program (DOE, 1999).
- Lawrence Livermore National Laboratory (LLNL) Environmental Protection Department (EPD) Quality Assurance Management Plan (QAMP) (LLNL, 2001).
- LLNL Environmental Restoration Project Quality Assurance Project Plan (QAPP) (Dibley, 1999).
- LLNL Livermore Site and Site 300 Environmental Restoration Project Standard Operating Procedures (SOPs) (Dibley and Depue, 2003).

- LLNL Construction Manager Manual - Subcontracted Construction Projects, Plant Engineering Department (LLNL, 1989).
- LLNL Construction Inspectors Policy and Procedure Manual, Plant Engineering Department (LLNL, 1990).

Table C-1 shows the 10 elements of the EPD QAMP, which implements DOE Order 414.1A, and their applicability to any future construction related activities for the Building 854 OU ground water extraction and treatment systems. The Construction QA/QC Plan follows the Environmental Restoration Project QAPP approved by the U.S. Environmental Protection Agency (EPA).

C-3. Organization

This section documents the organizational structure, functional responsibilities, and lines of communication for those aspects of construction related activities for the Building 854 OU ground water and SVE and treatment systems that affect quality.

Figure C-1 shows the organizational structure for construction QA/QC activities. The descriptions below generally describe the QA/QC responsibilities of those involved in carrying out the QA/QC program for the construction of the Building 854 OU ground water and soil vapor treatment systems. Project personnel as shown in Figure C-1 have the following responsibilities:

- The U.S. DOE is the Principal Responsible Party for Comprehensive, Environmental Response, Compensation and Liability Act (CERCLA) related activities at the LLNL Site 300. Environmental restoration activities at Site 300 are conducted by University of California staff in the LLNL Environmental Restoration Division (ERD), hereafter referred to as LLNL, under the direction of the DOE Site 300 Remedial Project Manager (RPM). The DOE RPM coordinates these activities through the U.S. Environmental Protection Agency, and California Department of Toxic Substances Control and the Regional Water Quality Control Board RPMs.
- The LLNL Environmental Protection Department (EPD) Quality Assurance Manager provides oversight and monitors QA related activities of divisions within the EPD, including ERD. The Quality Assurance Manager reports the results of quality verification to the EPD Department Head who, in turn, relays this information to DOE.
- The LLNL ERD Division Leader is responsible for implementing the EPD and ERD QA programs as it relates to activities in the division and ensuring that nonconforming conditions are promptly addressed and documented. The ERD Division Leader reports to both the EPD Department Head and to DOE.
- The LLNL ERD Site 300 Project Leader is responsible for ensuring that approved procedures related to QA are used during activities in the project and division and ensuring that nonconforming conditions are promptly addressed and documented. The Site 300 Project Leader issues the QA/QC plan and periodically reviews its implementation. The Site 300 Project Leader reports to the ERD Division Leader on QA conformance and other QA-related issues.

- The LLNL ERD Quality Assurance Implementation Coordinator is responsible for the development and implementation for the QA/QC plan, establishment and control of the applicable QA/QC requirements, coordination with appropriate project personnel to assure compliance within groups over which the quality organization has no administrative control, and development of tracking and reporting systems to provide management visibility of implementation activities and results. The Quality Assurance Implementation Coordinator maintains direct communication and liaison with the EPD Quality Assurance Manager and has line authority through the ERD Division Leader for the implementation of the QA Program within the division.
- The LLNL Quality Assurance Engineer is responsible for providing direction to the Subproject Leader, Remediation Engineer, and Technician Supervisor in the selection and installation of the equipment and remediation systems to meet QA objectives and ensuring that construction meets design criteria specified in the design documents. The Quality Assurance Engineer reports directly to the Quality Assurance Implementation Coordinator on construction QA/QC related activities.

  The Quality Assurance Implementation Coordinator and Quality Assurance Engineer constitute the independent quality assurance reviewers as defined in the EPD Quality Assurance Management Plan. The Quality Assurance Management Plan requires that design/technical reviews are conducted by competent, independent reviewers other than those involved in the original design activity although they may be from the same organization. Additional QA audits of ERD activities are regularly conducted by DOE. The ERD Division Leader may assign an outside (non-LLNL), independent QA team as appropriate (i.e., when the necessary technical expertise to conduct design review is not available within the LLNL organization).
- The LLNL Subproject Leader is responsible for coordinating facility construction. The Subproject Leader reports directly to the Site 300 Project Leader.
- The LLNL Remediation Engineer is responsible for writing design criteria for equipment and flow rates to treat water, as well as providing oversight for construction activities. The Remediation Engineer is the equivalent to the Remedial Design Engineer. The Remediation Engineer reports to the Subproject Leader regarding facility design and construction.
- The LLNL Plant Engineering Project Manager (PEPM) is responsible for coordinating Plant Engineering activities, if any. The PEPM reports functionally during any assigned construction activities to the ERD Site 300 Project Leader and the Subproject Leader. The PEPM is Plant Engineering's primary contact with ERD for the assigned project. He/she is responsible for coordinating and executing the project assigned to him/her.
- The LLNL ERD Technician Supervisor is responsible for the supervision and oversight of day-to-day construction activities. The Technician Supervisor is the equivalent to the Remedial Action Constructor. The Technician Supervisor reports to the Subproject Leader regarding construction-related activities.

C-4. Training and Qualifications

Personnel supporting Environmental Restoration Projects are trained to ensure that they have the skills and knowledge necessary to perform their work assignments in a safe, competent, uniform, and environmentally sound manner. Technicians performing construction activities comply with the EPD's Training Management Plan, the Safety and Security Directorate Training Implementation Plan, and the LLNL Training Program Manual. In addition to the regulatory driven training such as hazardous waste operations and emergency response certification, Superfund Amendments and Reauthorization Act/Occupational Safety and Health Administration (SARA/OSHA), and the Environment, Safety, and Health courses provided by LLNL, technicians also receive on-the-job training for their specific work tasks. All training is tracked and recorded by the EPD Training Section.

C-5. Quality Improvement

ERD technicians integrate quality improvement into all construction activities by communicating to management, per the requirements of SOP 4.12, Quality Improvement Forms, any unsafe practice or nonconforming item or process (e.g., faulty material, malfunctioning equipment, process defects, data irregularities, and deviations from standard operating procedures) that could potentially compromise worker safety or the activity's deliverable. The technicians also identify and communicate methods to improve quality or achieve greater efficiency of the treatment facilities or associated extraction system under construction.

C-6. Construction

C-6.1. Identification and Control of Items

Material delivered to the job site is inspected to verify compliance with the approved submittal to assure that only correct and accepted items are used or installed.

The Technician Supervisor will request identification and inspection of items arriving at the construction site, when required. Acceptance of items or materials not in conformance with the design requirements shall be approved by the Project Manager and QA Engineer.

C-6.2. Inspection, Test, and Operating Status

The Technician Supervisor and Remediation Engineer shall maintain cognizance of incoming and stored materials and items and inspect or test them for conformance to requirements, as necessary. They shall tag rejected items to ensure that they are not inadvertently used.

Lockout tags shall be tied on electrical equipment, lifts and hoists, valves, etc. where such items (1) are unsafe to use, (2) are uncertified, or (3) may pose a risk to personnel working on the system per the requirements of SOP 4.16, ERD Lockout/Tag Program.

C-6.3. Design Changes

If during the course of construction, design changes are necessary, these changes must be controlled in accordance with the following requirements:

- Changes to final designs, field changes, and nonconforming items dispositioned "use as is" or "repair" must be justified and must be subject to design control measures commensurate with those applied to the original design.
- Design control measures for changes must include provisions to ensure that the design analyses for the item are still valid.
- Changes must be approved by the same groups or organizations that reviewed and approved the original design documents.
- If a significant design change becomes necessary because of an incorrect original design, the design process and design verification methods and implementing procedures must be reviewed and modified, as appropriate. These design deficiencies must be documented according to the requirements provided using the organization's nonconformance reporting process.
- Field changes must be incorporated into the applicable design documents.
- Design changes that affect related implementing procedures or training programs must be communicated to the appropriate organizations.

C-6.4. Inspection

All construction work is subjected to inspection. The QA Engineer shall notify the Subproject Leader and Remediation Engineer if the work does not meet design criteria or quality requirements. After construction, the QA Engineer shall verify the accuracy of the as-built drawings to the final constructed facility.

C-7. Activation

C-7.1. System Check

Prior to operating a new or modified ground water or soil vapor treatment facility with contaminated ground water or soil vapor, a system check will be conducted to confirm the proper construction and operation of the treatment system. The following minimum requirements apply to this system check phase:

- A conformance inspection will be conducted to confirm that all equipment, piping, instrumentation, and control systems of the treatment system have been installed according to the approved design. Any deficiencies in the treatment system will be corrected.
- To confirm piping integrity, piping of the collection system and treatment system will be tested. Any leaks will be repaired.
- All instrumentation, control systems, and equipment will be inspected for malfunctions. All automatic controls, such as shutdown or alarm switches necessary for the operation of each treatment system phase, will be inspected for operational readiness prior to startup of that phase. Mechanical equipment, such as pumps and valves, required for the operation of the treatment phases, will be cycled or operated. Any functional deficiencies will be corrected.

C-7.2. Proof-of-System Check

After the system check has been conducted and any deficiencies corrected, a proof-of-system check will be conducted to ensure that the extraction wellfield and treatment system will remove and treat contaminated ground water or soil vapor to meet regulatory effluent discharge limits. The proof-of-system check will consist of the following elements:

- The proof-of-system check will last long enough to demonstrate that contaminated ground water or soil vapor has been extracted from each extraction well and has been treated by the treatment system to meet effluent discharge limitations.
- Each of the new extraction wells will be pumped long enough to confirm that the ground water pumps and water level shutoff devices operate properly.
- The treated ground water will be analyzed for volatile organic compounds (VOCs), nitrate, and perchlorate, as appropriate, after passing through the treatment system.
- The treated soil vapor will be analyzed for VOCs after passing through the treatment system.
- If analysis show that ground water or soil vapor contaminant concentrations are above the effluent discharge limitations, the treatment system will be modified until the concentrations reach regulatory standards.
- All treatment, transport, and disposal components (including pumps, valves, liquid level controllers, pipelines, flow meters, pressure gauges, etc.) will be inspected for leaks and/or malfunctions. In addition, the system's automatic controls will be inspected for operational readiness. All mechanical equipment will be operated under load to assure proper performance. Any deficiencies will be corrected.

C-7.3. Proof-of-System Monitoring

Proof-of-system monitoring will be conducted to characterize changes to the treatment system influent and effluent stream as a result of connecting new extraction wells, to determine the treatment efficiencies of new treatment facilities, and to monitor the performance of the new extraction wells.

During the proof-of-system monitoring, the following analyses or measurements will be conducted:

- Total volume of water or soil vapor extracted from each new extraction well.
- Water levels in the new extraction wells.
- Total volume of water or soil vapor treated.
- Analysis of ground water treatment system effluent samples for volatile organic compounds, nitrate, and perchlorate, as appropriate, as well as pH.
- Analysis of soil vapor treatment system effluent samples for VOCs

The quality of the data generated as part of the proof-of-system testing will be assessed following the data quality assessment procedures outlined in Section 3.1.3 and Section 4 (Data Validation and Usability) of the ERD QAPP (Dibley, 1999).

C-7.4. Measuring and Testing Equipment Calibration and Verification

All Measuring and Test Equipment used in acceptance testing of electronic, monitoring, and interlock systems and items will be calibrated in accordance with the applicable LLNL or manufacturer's calibration manual. The individual conducting the test will be responsible for assuring that all test equipment is calibrated and within its certification period.

C-8. References

Dibley, V. (March 1999), *Environmental Restoration Division, Quality Assurance Project Plan, Livermore Site and Site 300 Environmental Restoration Projects*, Lawrence Livermore National Laboratory, Livermore, Calif. (UCRL-AR-103160 Rev. 2).

Dibley V., and R. Depue (Eds.) (2003), *LLNL Livermore Site and Site 300 Environmental Restoration Project Standard Operating Procedures (SOPs),* Lawrence Livermore National Laboratory, Livermore Calif. (UCRL-MA-109115 Rev. 10).

LLNL (November 2001) *Environmental Protection Department Quality Assurance Management Plan*, *Rev. 4*, Lawrence Livermore National Laboratory, Livermore Calif. (UCRL-AR-146357).

LLNL (1989), Construction Manager Manual - Subcontracted Construction Projects, Plant Engineering Department.

LLNL (1990), Construction Inspector's Policy and Procedure Manual, Plant Engineering Department.

U.S. DOE (1999), DOE Order 414.1A, Quality Assurance Program, Office of Nuclear Safety Policy and Standards.

Table C-1. Applicability of the EPD QAMP elements to the construction of Building 854 OU treatment systems and wellfield buildout.

EPD QAMP requirement	Title	Applicable ?
Element 1	EPD Quality Assurance Program Description	Yes
Element 2	Training and Qualification	Yes
Element 3	Quality Improvement	Yes
Element 4	Document and Records	Yes
Element 5	Work Processes	Yes
Element 6	Design Control	Yes
Element 7	Procurement	Yes
Element 8	Inspection and Acceptance Testing	Yes
Element 9	Management Assessment	Yes
Element 10	Independent Assessment	Yes

Notes:

EPD = Environmental Protection Department.

OU = Operable Unit.

QAMP = Quality Assurance Management Plan.

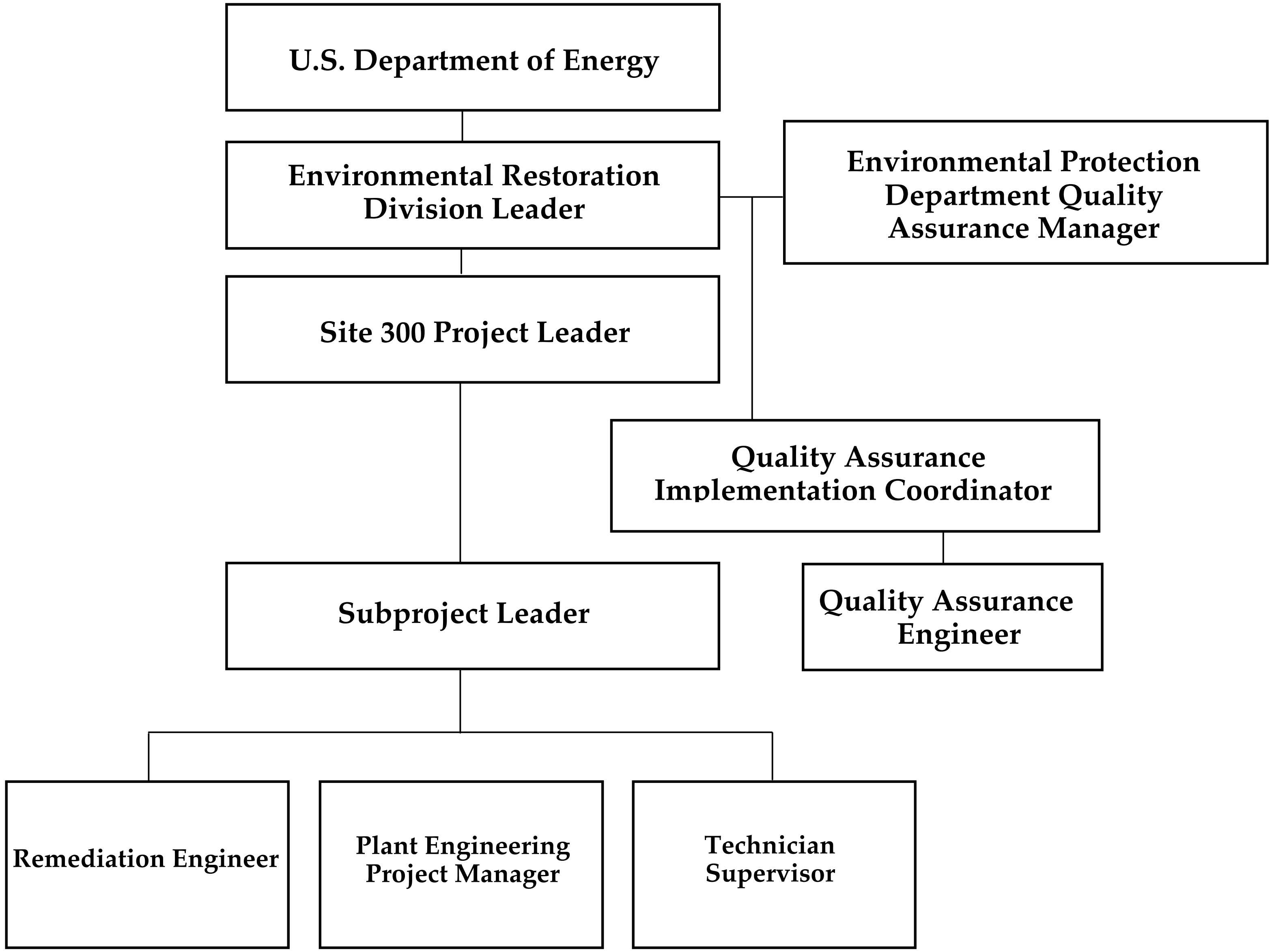


Figure C-1. Organizational structure for construction QA activities.

Appendix D

Construction Health and Safety Plan

Appendix D
Construction Health and Safety Plan

This Appendix contains the Construction Health and Safety Plan for the Building 854 Operable Unit (OU) Remedial Action.

D-1. Reason for Issue

Safety procedures are required to construct the Building 854 OU remedial action. This Health and Safety Plan serves as an administrative tool to summarize the requirements that are pertinent to the Building 854 OU treatment facility construction. Some treatment facilities have already been constructed as part of the Building 854 Treatability Studies. This plan will apply only to wellfield expansion and future construction of ground water extraction and treatment facilities. Any potential health and safety hazards and the control of such hazards during construction are addressed in one or more of the following documents:

- Lawrence Livermore National Laboratory (LLNL) Environment, Safety, and Health Manual (LLNL, 2003).
- LLNL Environment, Safety, and Health Manual, Document 2.5 - Procured Services Subcontractor Environment, Safety, and Health Program (LLNL, 2003).
- LLNL Environmental Restoration Division (ERD) Site Safety Plan for Lawrence Livermore National Laboratory Comprehensive, Environmental Response, Compensation and Liability Act (CERCLA) Investigations at Site 300 (LLNL, 2000).

The requirements of the LLNL Environmental Safety and Health (ES&H) Manual are based on DOE's Integrated Safety Management System Principles and Work Smart Standards.

D-2. Work to be Performed and Location of Activity

D-2.1. Location of Treatment Facilities

The Building 854 OU covers an area of approximately 1.5 square miles in the southwestern portion of Site 300 (Figure 2). Two ground water treatment facilities have already been constructed and are operating at present. One treatment facility (B854-SRC) is located in the Building 854 Source Area adjacent to Building 854 F. A second treatment facility (B854-PRX) is located southeast of the Building 854 complex. Construction of one additional treatment facility is planned as discussed in Section 4.3 of the Remedial Design report. Treatment facility, Building 854-Distal (B854-DIS), will be installed in the distal portion of the volatile organic compound (VOC) plume. Soil vapor extraction treatability testing will be conducted near B854-SRC. Locations of the treatment facilities are shown in Figure 3 of the Remedial Design report.

D-2.2. Existing Treatment Facilities

The B854-SRC ground water extraction and treatment facility began operating in 1999. At this facility, aqueous-phase granular activated carbon (GAC) is used to remove VOCs and ion-exchange resin for removing perchlorate from ground water extracted from one extraction well located adjacent to Building 854F. Treated ground water containing nitrate is misted onto native grasses. The grasses and plants readily use the nitrate, a component of plant fertilizers. The extraction wellfield for this facility will be expanded to include two additional extraction wells.

The B854-PRX ground water extraction and treatment facility began operating in 2000. At the B854-PRX facility, contaminated ground water is currently pumped from one extraction well. VOCs are treated using aqueous-phase GAC units. A containerized wetland system or biotreatment unit then removes nitrate and perchlorate from extracted ground water. An ion-exchange unit is then used as a "polishing" step to remove any perchlorate remaining in the water stream. The extraction wellfield for this facility will be expanded to include one additional extraction well.

Health and safety hazards and controls for the operation of these facilities are discussed in Appendix F (Operations and Maintenance Health and Safety Plan).

D-2.3. Future Treatment Facilities

The Remedial Design for the Building 854 OU includes plans to install one additional ground water extraction and treatment facility, B854-DIS.

Health and safety hazards and controls for the construction of these facilities are discussed in this Construction Health and Safety Plan.

D-3. Responsibilities

Ed Folsom, phone number (925) 422-0389, LLNL pager number 02892, and home phone number (925) 455-6750, is responsible for the safety of this operation and for assuring that all work is performed in conformance with this Health and Safety Plan. In the absence of the responsible individual, Greg Santucci, phone number (925) 422-3089, LLNL pager number 06502, shall assume these responsibilities.

The responsible individual(s) listed above, and the LLNL Environmental Safety & Health (ES&H) team leader may approve any changes in construction activities that improve or do not significantly affect safety and environmental controls. The responsible individual will ensure that this action is documented in a memorandum. Any changes in the operation that increase the hazard level, introduce additional hazards, or decrease safety shall not be made until a revision to this Health and Safety Plan has been reviewed and approved, consistent with the LLNL Environmental Restoration Division review and approval process.

Before starting construction activities, the responsible individual shall verify and document that the operating personnel have read and understand the Health and Safety Plan, relevant Integration Work Sheets (IWSs), and associated LLNL ES&H Manual sections referenced in Section D-8.2.

D-4. Hazard Analysis

D-4.1. Noise Hazard

Irreversible hearing loss can occur due to long-term exposure to noise from operating heavy equipment and other construction activities. Noise can also aggravate pre-existing hypertension. The American Conference of Industrial Hygienists has established a standard of 85 dBA over an 8-hour day. Exposure to noise louder than 85 dBA is permitted as long as the average exposure for the entire day is less than 85 dBA.

D-4.2. Electrical Hazard

B854-PRX is strictly solar and uses 24VDC only. The proposed facility ((B854-Distal) is expected to be solar as well. B854-SRC has 110VAC supplied to the treatment unit and 208VAC supplied to the pump controller.

D-4.3. Chemical Hazard

VOCs, consisting primarily of TCE, are expected to be in the extracted ground water treated in all the Building 854 OU remediation systems. Concentrations of TCE in the treatment system influent are expected to range from 30 μg/L to 630 μg/L. The only other VOC that has been periodically detected in ground water monitor wells in the Building 854 OU is 1, 2-dichloroethene. TCE has been detected in soil vapor up to 4 parts per million per volume (ppm_v). These VOCs are listed as potential carcinogens and kidney and liver toxins that may enter the body through inhalation, skin absorption, and/or ingestion. It is irritating to the eyes, nose, and throat and may affect the central nervous system.

Nitrate (as NO_3) is or is expected to be contained in extracted ground water treated by the Building 854 OU treatment facilities at concentrations ranging from 20 mg/L to 60 mg/L. Nitrate is non-carcinogenic but significant concentrations of nitrogen in drinking water has been linked to methemoglobinemia, or blue baby syndrome, a potentially fatal disease of infants.

Perchlorate is or is expected to be contained in extracted ground water treated by the Building 854 OU treatment facilities at concentrations ranging from <4 μg/L to 14 μg/L. The concerns surrounding perchlorate contamination involves its ability to inhibit iodide anion uptake by the thyroid. This results in decreased thyroid hormone production that can affect metabolism, growth, and development. Perchlorate is currently listed as non-carcinogenic however additional studies are being conducted to provide data to evaluate the potential for cancer risk.

D-4.4. Explosives Hazard

No explosives are treated by the treatment facilities located in the Building 854 OU. However, high explosives are mechanically pressed and machined into shaped detonation devices at Building 855, within the Building 854 OU. The major hazards from explosives are personal injury and property damage caused by heat, blast, noise, fumes, and flying debris or projectiles from unintentional or inadequately controlled ignition or explosion of such materials.

D-4.5. Confined Space Hazard

A confined space is defined as an enclosed area that is large enough for an employee to enter and perform assigned work, has limited or restricted means of entry or exit, and is not designed for continuous human occupancy. If an ignition source is present in or introduced into an enclosed space that contains flammable gases, solvents, or dust, the atmosphere may burn or explode. Serious injury or death may result when the atmosphere contains even low concentrations of toxic gases.

D-4.6. Hand and Portable Power Tool Hazard

The Laboratory provides hand and portable tools that meet accepted national safety standards. However, these tools can still cause injury and must be properly used and maintained.

D-4.7. Working Alone Hazard

Working alone means performing any activity out of sight or communication for more than a few minutes at a time. For work on exposed energized electrical equipment, an individual is considered to be working alone if not within sight of someone else. The major danger in working alone is sustaining an illness or injury that precludes self-rescue.

D-4.8. Physical and Biological Hazards

Physical hazards associated with working at Site 300 include extreme temperatures with temperatures often exceeding 100° F in the summer. High air temperatures coupled with use of semi-permeable or impermeable protective clothing and/or strenuous physical activities have a high potential for inducing heat stress in workers. In addition, hazardous conditions may exist during lightning storms at Site 300. Biological hazards include rattlesnakes and insects (i.e., tarantulas, black widow spiders, scorpions, etc.).

D-4.9. Slip/Trip/Fall Hazards

The surfaces that operators stand or work on can be hazardous if not properly designed or maintained. Injuries can result from slips, trips, or falls on work surfaces. Work at heights or at elevated locations can also pose a fall hazard.

D-4.10. Material Handling Hazards

The hazards associated with improper material handling include being struck by a load, losing control of a load, physical overexertion, and exceeding equipment capacities. Such accidents can lead to injuries.

D-4.11. Mechanical Motion Hazards

A wide variety of mechanical motions and actions may present hazards to personnel. These can include the movement of rotating members, reciprocating arms, moving belts, meshing gears, cutting teeth, and any part that may cause impact or shear. These different types of hazardous mechanical motions and actions are basic in varying combinations to nearly all machines.

D-4.12. Hazards to Eyes

During construction activities, flying particles or objects can present a hazard to worker's eyes. The use of soldering or welding equipment also poses an eye hazard.

D-4.13. Fire Hazards

Soldering or welding of pipe connections may be necessary to connect pipeline to extraction wells or to the treatment facility. These hot-work activities present a fire hazard, particularly when performed in the more remote, grassy areas of the OU during the summer months when the grass is dry and highly ignitable.

In addition, vehicle travel off-road into grassy areas may be necessary during pipeline construction or hook-up. Hot engine and vehicle exhaust components may present a fire hazard when contacting high, dry grass or vegetation.

D-5. Hazard Control

Controls for the hazards identified in Section D-4 are based on selected sections of LLNL ES&H Manual, the Site Safety Plan for LLNL CERCLA Investigations at Site 300 (2000), and IWSs #1084, #1390, and #1960.

D-5.1. Noise Hazard Control

Based on previous experience, it is not anticipated that the noise level will be of concern during construction activities. However, sound levels will be monitored during any operation that may generate hazardous noise levels. Construction personnel will be required to wear noise protection when working within the noise hazard area, if required by LLNL Industrial Hygiene personnel. Engineered and/or administrative controls should also be implemented, as necessary, to limit noise and protect worker's hearing. The work supervisor shall provide workers affected by noise with earplugs or earmuffs as needed.

The facility operator is required to follow noise safety precautions outlined in the LLNL ES&H Manual, Document 18.6 "Hearing Conservation."

D-5.2. Electrical Hazard Control

D-5.2.1. Access Control

Limiting access to the breaker switches prevents inadvertent contact with energized equipment. All breaker switches are contained in cabinets with keyed locks.

D-5.2.2. Electrical System Maintenance Safety Procedures

Only qualified electricians or electrical technicians perform activities on the electrical systems for the treatment facilities during construction work. These personnel will follow safety precautions as outlined in the LLNL ES&H Manual, Document 16.1, "Electrical Safety." These personnel will also follow the LLNL Lockout and Tag program as defined in Document 12.6, "LLNL Lockout/Tagout Program" of the LLNL ES&H Manual and IWS #1084 whenever any work is to be done that would expose them to energized equipment.

D-5.3. Chemical Hazard Control

Concentrations of contaminants in the treatment facility influent are generally several orders of magnitude lower than the recommended permissible exposure limits (PELs) or threshold limit values (TLVs) for these chemicals. Therefore, it is not anticipated that exposure levels in excess of PELs or TLVs will be encountered. However, precautions, such as use of personal protective equipment or clothing (i.e., gloves, safety glasses) should be taken to prevent exposure when potential contact with contaminated, untreated ground water is possible per the requirements of LLNL ES&H Manual, Document 11.1, "Personal Protective Equipment." In addition, to prevent the ingestion of hazardous materials, workers should wash their hands prior to eating, drinking, smoking, or using restroom facilities. The Material Safety Data Sheets for the chemical encountered at Building 854 OU are maintained at the technician's office at Site 300 and in the Site Safety Plan for LLNL CERCLA Investigations at Site 300 (2000). Additional information on the safe handling of chemicals can be found in the LLNL ES&H Manual, Document 14.1, "Chemicals."

D-5.4. Explosives Hazard Control

Explosives treatment or handling is not anticipated as part of the construction activities in the Building 854 OU at this time. When remote operations occur in the Building 854 OU, access to the area is restricted. Workers must complete and follow the safety procedures covered in Course HS0095W "Site 300 Safety Orientation Training." This course contains information regarding signs, procedures, and controls used to minimize exposure to hazards related to Site 300 activities. Although no explosives are used in environmental restoration activities, it is imperative that workers follow the special safety and access requirements for the Building 854 OU during construction activities in this area.

D-5.5. Confined Space Hazard Control

Confined space entries are not anticipated as part of construction activities in the Building 854 OU at this time. However, construction personnel and technicians should be familiar with and perform all work in confined spaces in accordance with the LLNL ES&H Manual, Document 18.7, "Working in Confined Spaces." Technicians and construction personnel should contact Hazards Control Team #1 prior to entry in any confined space. A Confined Space permit is required for hazardous confined space work. Only qualified personnel with recent confined space training are permitted to work in confined spaces and are required to comply with the two-man rule.

D-5.6. Hand and Portable Tool Hazard Control

Facility technicians and construction personnel are responsible for selecting and using the proper tools for the job assigned and for wearing the appropriate personal protective equipment (i.e., safety glasses, etc.) when working with hand and portable tools. All hand and portable tools should be inspected prior to use to make sure they are not damaged and are in good-working condition. Any tool that is damaged or unfit for use should be immediately removed from service. Personnel are responsible for following the work safety standards outlined in LLNL ES&H Manual, Document 11.2, "Hazards—General and Miscellaneous" Chapter 5.0, *Hand and Portable Power Tools* and IWS #1390.

D-5.7. Working Alone Hazard Control

When working alone on a non-hazardous activity, facility technicians and construction personnel will advise a co-worker or supervisor that they will be working alone and when they expect to return. For potentially hazardous activities, technicians will: (1) exercise prudent judgment whether or not to perform the activity alone, and (2) obtain prior authorization from work supervisor before beginning planned hazardous-work-alone operations to ensure that all hazards have been thoroughly evaluated from the perspective of working alone. Work supervisors are responsible for ensuring an IWS is prepared for activities classified as hazardous for working alone. Personnel are responsible for following the work safety standards outlined in LLNL ES&H Manual, Document 11.2, "Hazards—General and Miscellaneous" Chapter 12.0, *Working Alone* and the Environmental Restoration Division Working Alone Guidelines (in ERD O&M Manual, Appendix L) for all work-alone activities.

D-5.8. Physical and Biological Hazard Control

During late spring and summer months, technicians and construction personnel should ingest fluids and evaluate their physical conditions regularly and break when necessary to avoid overheating. Work should be conducted in accordance with the LLNL ES&H Manual, Document 11.2, "Hazards—General and Miscellaneous" Chapters 16.0, *Heat Stress and* 19.0 *Working Outdoors*. All personnel should follow procedures outlined in the Site 300 Lightning Procedures (S300 MGM-T-7) during a lightning alert at Site 300. A lightning alert means the weather conditions are potentially conducive to lightning. Lightning alerts are announced through the Site 300 communications systems. Employees and visitors must evacuate and remain outside explosives hazard zones until a lightning alert is cleared.

Technicians and construction personnel should inspect work areas for snakes and other biological hazards before commencing work. The use of high top work boots is recommended. Avoid biological hazards when possible; do not harass wildlife. Anyone who is bitten should be moved to a safe area and kept calm. Notify the Emergency Dispatch by calling 911 or 925-447-6880 from a cellular phone immediately.

D-5.9. Slip/Trip/Fall Hazard Control

Work surfaces around the treatment facilities should be properly maintained at all times to prevent slips, trips, and falls. Maintenance includes assuring all spills and foreign materials (i.e., tools, excess equipment, etc.) are promptly removed, installing rubber or slip resistant mats at locations that may accumulate water, and ensuring that floor openings are equipped with adequate covers when worker exposure is possible. Any access to elevated locations or work at heights requires guardrails, an administrative control system, or fall protection devices. Personnel are responsible for following the work safety standards outlined in LLNL ES&H Manual, Document 11.1, "Personal Protective Equipment" and Document 11.2, Chapters 2.0, *Housekeeping* and 17.0, *Walking and Working Surfaces*.

D-5.10. Material Handling Hazard Control

Operators should use methods that ensure personal safety and safety of the material being handled when lifting or handling materials manually. Objects that are too heavy or bulky to handle safely should be moved using more than one person or mechanical lifting device. All material lifting or handling should be performed in accordance with the safety standards and procedures for lifting contained in the LLNL ES&H Manual, Document 15.2, "Manual and Mechanical Material Handling."

D-5.11. Mechanical Motion Hazard Control

Any machine part, function, or process, which may cause injury shall either be guarded (physical barriers which prevent access to danger areas) or safeguarded (provided with devices which inhibit machine operation, to mitigate or eliminate danger areas).

Machine operators shall be trained in the proper use of equipment and associated guards/safeguards to protect themselves and others from machine-related hazards. Machine operators shall wear protective clothing or personal protective equipment as necessary whenever engineering controls are not available or are not fully capable of protecting personnel. At a minimum, all personnel operating or working within close proximity of heavy machinery or equipment shall wear safety shoes and safety glasses. When there is a potential for head injury, hard hats shall be worn. Additional details for personal protective equipment are contained in the LLNL ES&H Manual, Document 11.1.

D-5.12. Eye Hazard Control

Eye protection shall be provided and worn by technicians where flying particles or objects present a hazard. The minimum type of eye protection is a pair of safety glasses. Increased protection against flying particles is provided when safety glasses have side shields; side shields should be used in most cases. Special eye protection is required when operations such as welding or metal cutting with a torch or arc are performed.

Generally, the technician supervisor will select the eye protection that is appropriate for the type of work being conducted by the technician. Additional details for eye protection are contained in the LLNL ES&H Manual, Document 11.1.

D-5.13. Fire Hazard Control

As part of the LLNL program to control fire hazards, permits are required for welding, soldering, and other hot-work operations with a high fire potential. The permits are obtained from the LLNL Fire Department at Site 300. Construction areas shall be maintained in a fire-safe condition, including ensuring that the construction site is accessible to the Fire Department. Technicians will obtain fire permits for all soldering or welding work with a high fire potential. This work will be also be conducted in accordance with the requirements of the LLNL ES&H Manual, Document 22.5, "Fire", LLNL Fire Protection Program Manual, and National Fire Protection Association (NFPA) 51 (Standard for Fire Prevention During Welding, Cutting, or Other Hot Work).

In addition, technicians must obtain approval to access any construction work site that requires off-pavement travel as defined by the LLNL "Restricted Off-Pavement Travel at Site 300" policy manual. Technicians planning to travel off-pavement must receive prior permission from the Site 300 Manager, the Functional Area Supervisor, and the CAS Operator and carry a trunked radio for communications. In addition, appropriate training is required for all personnel engaging in off-road travel at Site 300. Personnel should not park or drive through dry, tall grass. Technicians performing off-road travel during construction activities shall be familiar with the "Restricted Off-Pavement Travel at Site 300" manual (LLNL, 2001) and must be listed as 'qualified personnel' on IWS #1960 "Site 300 Restricted Travel to Perform ERD Activities."

In case of fire, contact the LLNL Fire Department by dialing 911 or 925-447-6880 from a cellular phone.

D-6. Stop Work Procedures

LLNL's stop-work procedure applies to all work done at the Laboratory. Activities that are imminently dangerous to workers, the public, or the environment shall be stopped immediately by any Laboratory employee, supplemental labor employee, or contractor. Each worker is empowered to stop work if there is a perceived unsafe or unapproved condition. "Stopping work" includes stabilizing an imminent danger situation to the extent that it can be left unattended for a prolonged period of time until the issue is resolved. The person requesting the work stoppage shall notify manager responsible for the work. The manager shall notify the area ES&H Team and the Directorate ES&H Assurance Manager as soon as possible of this action. Informal stop work interventions to correct minor conditions (e.g., to remind workers to put on their hard hats, safety glasses etc.) do not require formal notification. Details of the Stop Work Process are included in the LLNL ES&H Manual, Document 2.1, "Laboratory and ES&H Policies, General Worker Responsibilities, and Integrated Safety Management."

D-7. Emergency Response Procedures

In the event of an emergency, facility operations personnel will first dial 911 or 925-447-6880 from a cellular phone to report to the Emergency Dispatcher, then administer first aid, if necessary and if trained appropriately, to injured personnel. The Emergency Dispatcher uses reserved telephone lines to promptly relay the emergency call to the following members of the LLNL Emergency Response Team:

- Fire Department.
- Security Department.
- Hazards Control Safety Teams.
- Plant Engineering.
- Health Services.

The Emergency Response Team will go to the scene of the emergency immediately. The phone numbers of individuals to be notified in the event of an emergency during off-shift hours are posted at the Building 854 OU treatment facilities. The LLNL ES&H Manual describes the emergency response procedures in Document 22.1, "Emergency Management" and Document 22.2, "Environmental Emergency Response."

The Site 300 Environmental Restoration Division Emergency Self-Help Plan's for Buildings 843 and 835 and trailer 8726 outline the self-help procedures personnel follow in the event of a disaster.

D-8. Applicable Documents

The following documents and/or sections thereof apply to safely performing construction activities at the Building 854 OU and are incorporated into this Health and Safety Plan by reference.

D-8.1. Integration Work Sheet Safety Procedures

#1084	ERD Electronic Routine Electronic Operations
#1390	B843 Machine Shop Operations
#1960	Site 300 Restricted Travel to Perform ERD Activities

D-8.2. LLNL Environment, Safety, and Health Manual Sections

Document 2.1	Laboratory and ES&H Policies, General Worker Responsibilities, and Integrated Safety Management	
Document 2.5	Procured Services Subcontractor Environment, Safety, and Health Program	
Document 11.1	Personal Protective Equipment	
Document 11.2	Hazards—General and Miscellaneous	
	Chapters 2.0	Housekeeping
	Chapter 5.0	Hand and Portable Power Tools
	Chapter 12.0	Working Alone
	Chapter 16.0	Heat Stress
	Chapter 17.0	Walking and Working Surfaces
	Chapter 19.0	Working Outdoors
Document 12.6	LLNL Lockout/Tagout Program	
Document 14.1	Chemicals	
Document 15.2	Manual and Mechanical Material Handling	
Document 16.1	Electrical Safety	
Document 18.6	Hearing Conservation	
Document 18.7	Working in Confined Spaces	
Document 22.1	Emergency Management	

Document 22.2 Environmental Emergency Response

Document 22.5 Fire

D-8.3. Site Safety Plan for LLNL CERCLA Investigations at Site 300, November 2000

D-8.4. Site 300 Environmental Restoration Emergency Self-Help Plans

Site 300 Trailer 8726

Site 300 Building 835

Site 300 Building 843

D-9. References

LLNL (2000), *Site Safety Plan for Lawrence Livermore National Laboratory CERCLA Investigations at Site 300*, Lawrence Livermore National Laboratory, Livermore, Calif. (UCRL-21172 Rev. 3).

LLNL (latest edition), *Fire Protection Program Manual*, Lawrence Livermore National Laboratory, Livermore, Calif. (UCRL-MA-116646).

LLNL (2000), LLNL Site 300 Environment Restoration Division Emergency Self-Help Plan, Trailer 8726.

LLNL (2000), LLNL Site 300 Environment Restoration Division Emergency Self-Help Plan, Building 835.

LLNL (2000), LLNL Site 300 Environment Restoration Division Emergency Self-Help Plan, Building 843.

LLNL (2001), *Restricted Off-Pavement Travel at Site 300*, Lawrence Livermore National Laboratory, Livermore, Calif. (UCRL-MI-144038).

LLNL (2003), LLNL Environment, Safety, and Health Manual.

LLNL (2003), Operations and Maintenance Manual Volume 1: Treatment Facility Quality Assurance and Documentation, Appendix L.

Appendix E

Operations and Maintenance Quality Assurance/Quality Control Plan

Appendix E

Operations and Maintenance Quality Assurance/Quality Control Plan

E-1. Introduction

This Quality Assurance/Quality Control (QA/QC) Plan has been developed in support of the Operations and Maintenance (O&M) for the Building 854 OU ground water and soil vapor extraction and treatment systems. The purpose of the plan is to define the quality objectives and areas of responsibility to operate and maintain these facilities. This plan meets the QA requirements of the U.S. Department of Energy (DOE) Order 414.1A, the Environmental Protection Department (EPD) Quality Assurance Management Plan (QAMP), (2001), and the Quality Assurance Project Plan (QAPP) for the Livermore Site and Site 300 Environmental Restoration Projects (1999).

E-2. Organization

This section documents the organizational structure, functional responsibilities, levels of authority, and lines of communications for those aspects of the O&M of the Building 854 OU ground water treatment systems that affect quality.

Figure E-1 shows the organizational structure for QA/QC activities. The descriptions below generally describe the QA/QC responsibilities of those mainly involved in carrying out the QA/QC program for the O&M of the Building 854 OU ground water treatment systems. The Lawrence Livermore National Laboratory (LLNL) Environmental Restoration Division (ERD) Site 300 Project Leader, the Quality Assurance Engineer, the Subproject Leader, and other individuals shown in Figure E-1 have the following responsibilities:

- The Site 300 Project Leader issues this QA/QC plan and periodically reviews its implementation. The Site 300 Project Leader may request an independent review or formal audit of the QA/QC program.
- The Quality Assurance Implementation Coordinator is responsible for the development and implementation of the QA/QC plan, establishment and control of the QA document files, coordination with appropriate project personnel to assure compliance within groups over which the quality organization has no administrative control, and development of tracking and reporting systems to provide management visibility of implementation activities and results.
- The Quality Assurance Engineer is responsible for providing direction in the O&M of remediation systems to meet QA/QC objectives.

- The Subproject Leader is responsible for overseeing facility startup and monitoring its performance and operations.
- The Remediation Engineer is responsible for providing technical direction in the O&M of treatment systems, reviewing and tracking failure of equipment and systems and determining the root cause of failures. The Remediation Engineer is also responsible for implementing the changes to the preventative maintenance schedule to reduce facility maintenance cost and downtime.
- The LLNL Plant Engineering Project Manager reports functionally during any assigned maintenance activities to the ERD Site 300 Project Leader and the Subproject Leader. The Plant Engineering Project Manager is Plant Engineering's primary contact with ERD for the assigned project. He/she coordinates and executes the project assigned to him/her. He/she is responsible for approving minor technical field design changes related to treatment facility modifications and/or O&M activities.
- The Technician Supervisor is responsible for the day-to-day supervision of the facility technicians who operate and maintain the treatment facilities. This includes scheduling required maintenance and ensuring completion in a timely fashion.
- The Treatment Facility Operator/Technician is responsible for the day-to-day operation and maintenance of the treatment facilities. This includes operating equipment, sampling, and performing maintenance to approved procedures, ensuring the measuring and testing equipment is properly calibrated and is of the proper type, range, and accuracy, reporting nonconformances or improvements, and reviewing facility data.
- State Certified Analytical Laboratories using EPA methods are responsible for providing independent chemical analytical results on water samples. For the Building 854 OU ground water treatment systems, these samples are submitted as part of the monitoring program required by LLNL's discharge permits, in addition to operational testing samples collected prior to the official operation of a facility and routine samples taken to evaluate facility performance.

E-3. Quality Assurance Program

This section covers the objectives, quality goals, and the QA/QC elements. The procedures for implementation of QA/QC requirements are included in this plan, in the ERD Standard Operating Procedures (SOPs) (Dibley and Depue, 2003), the ERD O&M Manual for Site 300 Treatment Facilities, Volume I (2002), and the LLNL Environmental Restoration Project Quality Assurance Project Plan (QAPP) (Dibley, 1999).

The objectives of the project supported by this QA/QC plan are to:

- Assure excellence in maintenance services and operations to achieve quality, and
- Provide the QA/QC requirements to meet all programmatic and institutional needs.

This QA/QC plan defines the process for providing confidence that these QA/QC objectives will be achieved and that achievement will include due consideration for health, safety, property, and the environment.

Table E-1 shows the 10 elements of the EPD QAMP, which implements DOE Order 414.1A, and their applicability to the operation and maintenance of Building 854 OU treatment systems.

The SOPs, the ERD O&M Manual for Site 300 Treatment Facilities, Volume I (2003), and QAPP provide the procedures to implement the applicable elements of the EPD QAMP. In addition, they include lists of the QA auditable records, including the responsible personnel that are required to document compliance with the requirements of the EPD QAMP.

E-4. Training and Qualifications

ERD facility technicians may only perform work for which they are trained and qualified including the operation and maintenance of the Building 854 OU treatment facilities. Untrained personnel may temporarily work under the supervision of a trained person until the required training is completed. The EPD Training Management Plan, the Safety and Security Directorate Training Implementation Plan, the LLNL Training Program Manual, and training questionnaires completed by supervisors dictate the training requirements for treatment facility personnel including course work and on-the-job training.

E-5. Quality Improvement

ERD facility technicians integrate quality improvement into all treatment facility O&M activities by communicating to management per the requirements of SOP 4.12, "Quality Improvement Forms," any unsafe practice or nonconforming item or process (e.g., faulty material, malfunctioning equipment, process defects, data irregularities, and deviations from standard operating procedures) that could potentially compromise worker safety, the activity's deliverable, or the compliance status of the facility. The technicians also identify and communicate methods to improve quality or achieve greater efficiency of the treatment facilities. These personnel also participate in facility assessments and operations meetings to address quality improvement issues.

E-6. Operations and Maintenance

E-6.1. Scope

The Building 854 OU ground water treatment systems will be operated to treat ground water containing volatile organic compounds (VOCs), nitrate, and perchlorate. The water will be treated to meet the requirements specified by the Regional Water Quality Control Board (RWQCB). Building 854 OU soil vapor treatment systems will be operated to treat soil vapor containing VOCs to San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) standards. Therefore, O&M activities at this facility shall be controlled by quality procedures designed to meet these requirements.

E-6.2. Operations

E-6.2.1. General Operating Procedures

The Site 300 Project Leader is responsible for ensuring the quality of operations at these facilities. The Technician Supervisor is responsible for ensuring that all field operations, including maintenance and operations, are performed with the appropriate quality procedures and are completed in a timely fashion.

The treatment facilities have a required monitoring program as described in the Compliance Monitoring Plan (CMP)/Contingency Plan for Interim Remedies (2002). Water and vapor samples are collected and analyzed to monitor the performance of the treatment systems in meeting Substantive Requirements for waste water discharge issued by the RWQCB and requirements of the SJVUAPCD. The Technician Supervisor is responsible for ensuring that the facility technicians are properly trained to collect these samples according to documented standard operating procedures. Samples generated as part of the treatment facility monitoring are assigned unique identifiers and documented traceability of these identifiers is maintained throughout the handling of the samples (the Chain-of-Custody process) and the data generated from measurements of the samples.

The Building 854 OU treatment systems have their own set of operating procedures including startup, shutdown, normal operation, safety considerations, and maintenance procedures. These facility specific procedures will be developed and included in the facility O&M manual to cover the different modes of operation.

Waste products (i.e., spent granular activated carbon) that are generated as part of the treatment facility operation process will be handled by LLNL's Radioactive and Hazardous Waste Management Division for shipment to an offsite Resource Conservation and Recovery Act (RCRA)-permitted regeneration or disposal facility.

E-6.2.2. Equipment Calibration and Verification

All measuring and test equipment used at the treatment facilities should be calibrated, maintained, and controlled per ERD Standard Operating Procedure 4.8 “Calibration/Verification and Maintenance of Measuring and Test Equipment” and the EPD QAMP, Section 5.5.5, to assure conformance with standards of known accuracy and traceability. Facility technicians are responsible for ensuring the calibration status of all data collection and monitoring equipment is current prior to use. The calibration status of this equipment will be identified and tracked in a Calibration/Maintenance Log.

E-6.2.3. Record Keeping

An operational logbook is kept at each facility. The logbook entries include the operating parameters of each system (i.e., temperature, pressure, etc.), the number and type of samples taken, maintenance performed on the system, and all adjustments made by the operators to the system.

In addition, the following QA records are generated by treatment facility activities:

- Chain-of Custodies.

- Analytical data.
- Instrument calibration and maintenance logbooks.
- Assessment reports and checklists.
- Course and On-the-Job Training completion records.
- Completed Quality Improvement Forms.
- Standard traceability certificates.

E-6.3. Maintenance

Two types of maintenance are performed at the Building 854 OU ground water treatment systems:

- Preventive.
- Corrective.

E-6.3.1. Preventive Maintenance

Preventive maintenance is performed on those treatment facility components that need routine servicing and are part of systems related to quality. The preventive maintenance schedule is kept at the facility with the operations procedures. The Technician Supervisor is responsible for ensuring that preventive maintenance is scheduled and completed on schedule to minimize downtime. Maintenance will be performed by LLNL Plant Engineering and/or ERD personnel, and will follow the requirements set in the O&M manual to ensure the maintenance functions are performed as planned.

Table E-2 is a tentative schedule of the preventive maintenance for the Building 854 OU treatment systems.

E-6.3.2. Corrective Maintenance

Corrective maintenance is performed when a system component fails or is beginning to fail and the quality of facility operations could be compromised if operation continues. Using the graded approach, root cause analysis is performed when a component fails before the corrective maintenance action commences. This is to ensure that the nature of the problem is understood and can be prevented. This root cause analysis is also used to modify the preventive maintenance plan where appropriate. The results of the root cause analyses are documented in the daily facility operations logbook. Quality Improvement Forms are used to document component failures, root cause analysis, and preventive maintenance per SOP 4.12. As with preventive maintenance, corrective maintenance is performed by Plant Engineering personnel or ERD personnel in accordance with this QA/QC plan.

All corrective maintenance actions and their times of completion are recorded in the facility daily operations logs. Once complete, the specific component or system is started up and operated. This ensures that the maintenance was correctly performed and that system quality is maintained. An entry in the facility log is made, indicating that an operational check was made following preventive or corrective maintenance and the performance of the new component is noted. If successful, the system is allowed to resume normal operations. Startup sampling will be performed upon system restart, if necessary, in accordance with the requirements of the CMP for the Building 854 OU treatment system.

When the O&M manual for the Building 854 OU ground water treatment systems is developed, it will indicate the required spare parts for system components that have relatively high risk of failure or a long lead time for procurement. These components are to be maintained onsite to prevent extended shutdown of the treatment system.

E-6.3.3. Maintenance Support

Maintenance support activities including the identification and control of O&M materials, inspection and testing of treatment facilities, monitoring of operating status, control of processes, and control of measuring and test equipment, will be implemented as outlined in the Building 854 OU treatment systems O&M manual (to be developed).

E-7. Assessment Tools

ERD performs QA/Management self-assessments of the treatment facilities annually. These assessments review treatment facility activities to QA and Environmental Safety and Health (ES&H) requirements and procedures. A member of the ERD management team participates on the assessment team to identify, correct, and prevent management problems that hinder the achievement of ERD's objectives. ERD uses the results of the assessments performed by internal and external organizations to assess the performance of treatment facility activities. Additional information on assessment tools can be found in the ERD Quality Assurance Project Plan (1999) and the EPD QAMP (2001).

E-8. References

Dibley, V. (1999), *Environmental Restoration Division, Quality Assurance Project Plan, Livermore Site and Site 300 Environmental Restoration Projects,* Lawrence Livermore National Laboratory, Livermore, Calif. (UCRL-AR-103160 Rev. 2).

Dibley, V., and R. Depue (Eds.) (2003), *LLNL Livermore Site and Site 300 Environmental Restoration Project Standard Operating Procedures (SOPs),* Lawrence Livermore National Laboratory Livermore, Calif. (UCRL-MA-109115 Rev. 10).

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LLNL (November 2001), *Environmental Protection Department Quality Assurance Management Plan, Rev. 4,* Lawrence Livermore National Laboratory, Livermore Calif. (UCRL-AR-146357).

LLNL (2003), *Environmental Restoration Division, Operations and Maintenance Manual, Volume 1: Treatment Facility Quality Assurance and Documentation*, Lawrence Livermore National Laboratory, Livermore, Calif.

U.S. DOE (1999), DOE Order 414.1A, Quality Assurance Program, Office of Nuclear Safety Policy and Standards.

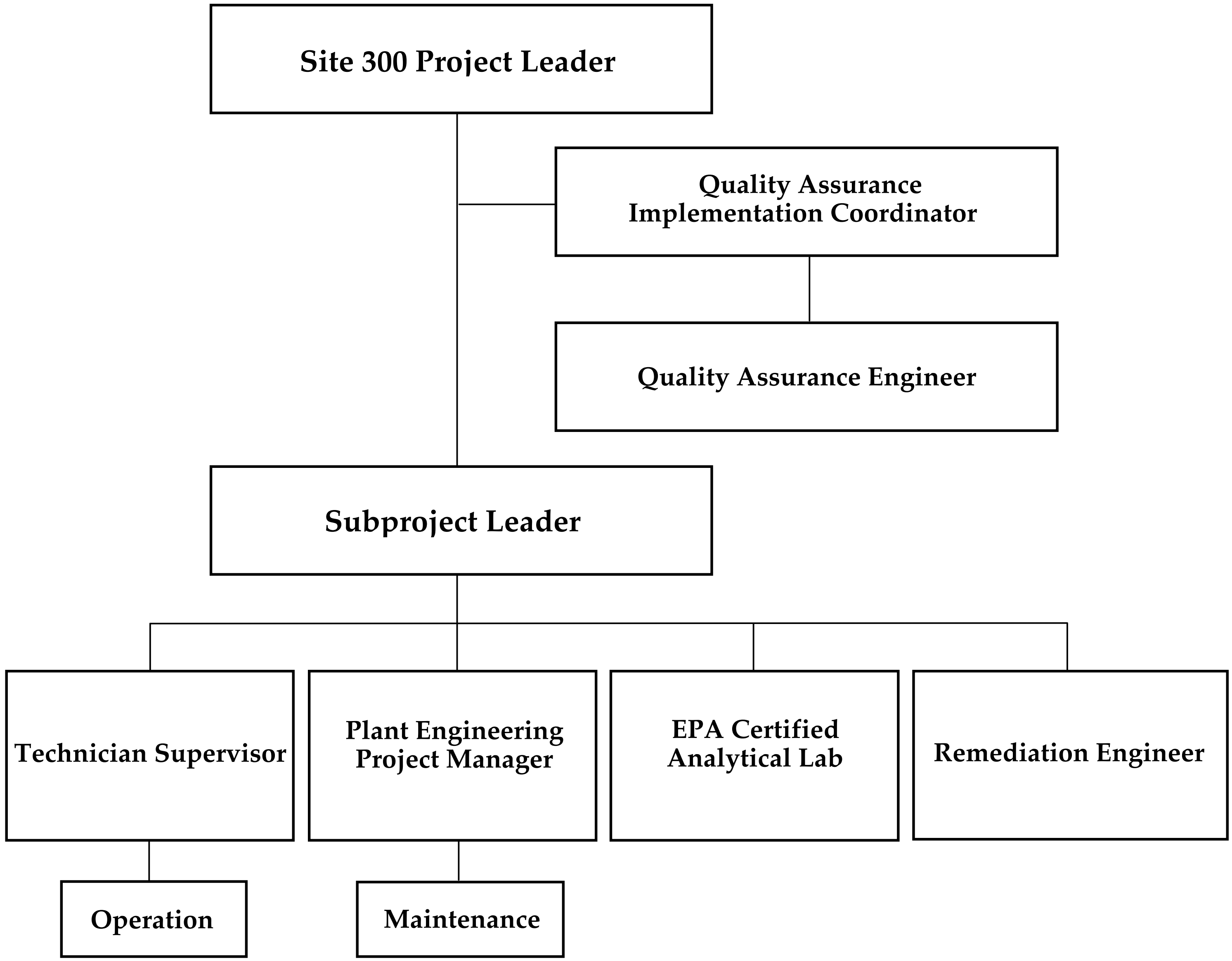

Figure E-1. Organizational chart for O&M QA/QC for the HE Process Area treatment facilities.

Table E-1. Applicability of the EPD QAMP elements to the operation and maintenance of the Building 854 OU extraction and treatment systems.

EPD QAMP requirement	Title	Applicable ?
Element 1	EPD Quality Assurance Program Description	Yes
Element 2	Training and Qualification	Yes
Element 3	Quality Improvement	Yes
Element 4	Document and Records	Yes
Element 5	Work Processes	Yes
Element 6	Design Control	Yes
Element 7	Procurement	Yes
Element 8	Inspection and Acceptance Testing	Yes
Element 9	Management Assessment	Yes
Element 10	Independent Assessment	Yes

Notes:

EPD = Environmental Protection Department.
OU = Operable Unit.
QAMP = Quality Assurance Management Plan.

Table E-2. Preventive maintenance for the Building 854 OU treatment systems.

Action	Frequency/comments
Inspect submersible pump	Annually
Check aqueous-phase granular activated carbon (GAC) units and associated piping	Weekly
Check bioreactor units and associated piping[a]	Weekly
Check ion exchange units and associated piping[a]	Weekly
Check discharge lines	Weekly
Monitor pump controller	Weekly
Monitor level sensors	Weekly
Monitor pressure indicators	Weekly
Monitor pH meter	Weekly
Monitor flow indicator	Weekly
Inspect miscellaneous hoses, seals, fittings, etc.	Weekly
Perform preventive maintenance for well pumps	Quarterly
Perform preventive maintenance for temperature sensors	Annually
Perform preventive maintenance for temperature indicators	Annually
Remove organic growth beneath misting system.	Annually
Trim/remove excess organic growth in bio-reactors	Annually
Back flush fines from bio-reactor	Annually
Inspect/replace peristaltic hose	Weekly
Monitor piezometric level of infiltration trench	Quarterly
Monitor/adjust bio-reactor water level	Weekly
Monitor/adjust acidic acid injection rate	Weekly
Interlock check	Annually
Clean Solar Array	As needed
Check electrical breakers and disconnects[b]	Annually
Inspect sampling ports	Before use
Clean organic debris from area surrounding the building	As needed

[a] Where unit is present as part of treatment train of the facility.

[b] All electrical system maintenance to be performed by a qualified electrician or electrical technician.

Appendix F

Operations and Maintenance
Health and Safety Plan

Appendix F

Operations and Maintenance Health and Safety Plan

This Appendix contains the Operations and Maintenance (O&M) Health and Safety Plan for the Building 854 Operable Unit (OU) ground water and soil vapor extraction (SVE) and treatment facilities.

F-1. Reason for Issue

Safety procedures are required to operate and maintain the ground water and SVE and treatment systems for the Building 854 OU. This Health and Safety Plan serves as an administrative tool to summarize the requirements of the Lawrence Livermore National Laboratory (LLNL) Environment, Safety, and Health (ES&H) Manual (LLNL, 2003) and Site Safety Plan for LLNL Site 300 (LLNL, 2000), that are pertinent to the Building 854 OU treatment facility O&M. The requirements of the LLNL ES&H Manual are based on Department of Energy's (DOE's) Integrated Safety Management System Principles and Work Smart Standards.

F-2. Work to be Performed and Location of Activity

F-2.1. Location of Treatment Facilities

The Building 854 OU covers an area of approximately 1.5 square miles in the southwestern portion of Site 300 (Figure 2). Two ground water treatment facilities have already been constructed and are operating at present. One treatment facility (B854-SRC) is located in the Building 854 Source Area adjacent to Building 854 F. A second treatment facility (B854-PRX) is located southeast of the Building 854 complex. Construction of one additional treatment facility is planned as discussed in Section 4.3 of the Remedial Design report. Treatment facility, Building 854 Distal (B854-DIS), will be installed in the distal portion of the VOC plume. An SVE treatability study will be conducted near B854-SRC. Locations of the treatment facilities are shown in Figure 3 of the Remedial Design report.

F-2.2. Treatment Objectives and Methods

The treatment systems in the Building 854 OU are used to remove VOCs, nitrate, and perchlorate from ground water to meet Substantive Requirements for discharge of treated water issued by the Regional Water Quality Control Board (RWQCB). Soil vapor is extracted to prevent impact to ground water and human exposure. Soil vapors are treated and discharged to atmosphere under San Joaquin Valley Unified Air Pollution Control District requirements.

Contaminated ground water will be pumped from extraction wells utilizing submersible pumps. Flow to the treatment facilities is not expected to exceed 5 gallons per minute per facility. Aqueous-phase granular activated carbon (GAC) will be used to remove volatile organic compounds (VOCs) from the extracted ground water. Ion-exchange units and/or biotreatment units will then treat perchlorate in the treatment facility influent. Nitrate will be treated by plant uptake via misting over native grasslands or by biotreatment units. VOCs in soil vapor will be removed by vapor-phase GAC.

F-2.3. Particulate Filtration

Extracted ground water passes through a five-micron filtration system to remove suspended particles from the ground water. This filtration process is designed to remove particulates from ground water that could reduce treatment system efficiency.

F-2.4. Ground Water Treatment Process

B854-SRC began operation in December 1999 and treats groundwater contaminated with trichloroethylene (TCE) (130–630 μg/L), perchlorate (4.5–9.9 μg/L), and nitrate (31–60 mg/L). Ground water is extracted from well W-854-02. Future additional extraction wells may be added to this facility including well W-854-10 and W-854-18A. The main objective of this facility is to mitigate risk and control the contaminant source area and groundwater plume migration. Influent water passes from the filtration system into two ion-exchange (IX) vessels containing SR-7 resin connected in series for perchlorate removal prior to entering the solar-powered aqueous-phase GAC treatment unit (STU08). Currently utility lines from an adjacent structure power the system. The STU08 consists of three GAC canisters connected in series to treat volatile organics within the ground water.

B854-PRX began operation in November 2000 and treats groundwater contaminated with TCE (55–150 μg/L), perchlorate (5.8–14 μg/L), and nitrate (41–50 mg/L). Ground water is extracted from well W-854-03 located southeast of the Building 854 complex. Future additional extraction wells may be added to this facility including well W-854-09. This facility has been in operation since November 2000. It consists of an aqueous-phase GAC, above ground containerized wetland bio-treatment (BTU), and an ion-exchange resin treatment. These treatment sub-units are connected in series.

The proposed treatment facility (B854-Distal) is to be located several hundred feet south of Building 854-Proximal. At least one well will be converted to an extraction well (W-854-07). It is estimated that the sustainable flow rate will be between 0.5 and 3 gpm. Contaminated groundwater will be treated by GAC and ion-exchange resin as needed for VOCs and perchlorate respectively.

F-2.5. Discharge of Treated Ground Water

Treated ground water from the treatment systems in Building 854 OU will be discharged through misting towers or infiltration trenches. Treatment facility effluent sprayed from the misting towers typically will form a cloud of water vapor that quickly evaporates. Nitrate is or is expected to be present in the treatment facility's effluent and is discharged via misting towers. The amount of nitrate released during misting operations is not significant enough to cause detectable increases in nitrate deposition rates downwind of the facility. Therefore, misting of nitrate-containing treatment facility effluent is not expected to impact local ground water quality.

F-2.6. Soil Vapor Treatment Process

Soil vapor will be extracted during treatability testing containing up to 4 parts per million by volume (ppm_v) of VOCs. The vapors will pass through at least two and usually three vapor-phase granular activated carbon canisters to remove VOCs. Treated soil vapor is discharged to the atmosphere.

F-3. Responsibilities

Ed Folsom, phone number (925) 422-0389, LLNL pager number 02892, and home phone number (925) 455-6750, is responsible for the safety of this operation and for assuring that all work is performed in conformance with this Health and Safety Plan. In the absence of the responsible individual, Greg Santucci, phone number (925) 422-3089, LLNL pager number 06502, shall assume these responsibilities.

Any changes in operations that improve or do not significantly affect safety and environmental controls may be approved by the responsible individual(s) listed above, and the LLNL ES&H team leader. The responsible individual will ensure that this action is documented in a memorandum. Any changes in the operation that increase the hazard level, introduce additional hazards, or decrease safety shall not be made until a revision to this Health and Safety Plan has been reviewed and approved, consistent with the LLNL Environmental Restoration Division (ERD) review and approval process.

Before starting operation, the responsible individual shall verify and document that the operating personnel have read and understand the Health and Safety Plan, relevant Integration Work Sheets (IWSs), and associated LLNL ES&H Manual sections referenced in Section F-5 below.

F-4. Hazard Analysis

A Preliminary Hazard Analysis of the Site 300 treatment facilities was conducted by LLNL Hazards Control. The Hazards Control team classified the ERD treatment facilities as "excluded" facilities. An excluded facility is a facility that is not designated by DOE as a nuclear facility or by LLNL as a high-, moderate-, or low-hazard non-nuclear facility. Excluded facilities do not require Facility Safety Procedures. However, a number of hazards are associated with work at the Building 854 OU as described below.

F-4.1. Electrical Hazard

B854-PRX is strictly solar and uses 24VDC only. The proposed facility (B854-Distal) is expected to be solar as well. B854-SRC has 110VAC supplied to the treatment unit and 208VAC supplied to the pump controller. Soil vapor treatment systems are connected to 230-volt power.

F-4.2. Seismic Hazard

Personnel may be injured during an earthquake due to falling equipment or missile hazards (equipment or materials moving energetically due to seismic forces).

F-4.3. Chemical Hazard

VOCs, consisting primarily of TCE, are expected to be in the extracted ground water treated in all the Building 854 OU remediation systems. Concentrations of TCE in the ground water treatment system influent are expected to range from 30 μg/L to 630 μg/L. The only other VOC that has been periodically detected in ground water monitor wells in the Building 854 OU is 1,2-dichloroethylene. TCE has been detected in soil vapor up to 4 ppm_v. These VOCs are listed as potential carcinogens and kidney and liver toxins that may enter the body through inhalation, skin absorption, and/or ingestion. It is irritating to the eyes, nose, and throat and may affect the central nervous system.

Nitrate (as NO_3^-) is or is expected to be contained in extracted ground water treated by the Building 854 OU treatment facilities at concentrations ranging from 20 mg/L to 60 mg/L. Nitrate is non-carcinogenic but significant concentrations of nitrogen in drinking water has been linked to methemoglobinemia, or blue baby syndrome, a potentially fatal disease of infants.

Perchlorate is or is expected to be contained in extracted ground water treated by the Building 854 OU treatment facilities at concentrations ranging from <4 μg/L to 14 μg/L. The concerns surrounding perchlorate contamination involves its ability to inhibit iodide anion uptake by the thyroid. This results in decreased thyroid hormone production that can affect metabolism, growth, and development. Perchlorate is currently listed as non-carcinogenic however additional studies are being conducted to provide data to evaluate the potential for cancer risk.

F-4.4. Explosives Hazard

No explosives are treated by the treatment facilities located in the Building 854 OU. However, high explosives are mechanically pressed and machined into shaped detonation devises at Building 855, within the Building 854 OU. The major hazards from explosives are personal injury and property damage caused by heat, blast, noise, fumes, and flying debris or projectiles from unintentional or inadequately controlled ignition or explosion of such materials.

F-4.5. Confined Space Hazard

A confined space is defined as an enclosed area that is large enough for an employee to enter and perform assigned work, has limited or restricted means of entry or exit, and is not designed for continuous human occupancy. If an ignition source is present in or introduced into an enclosed space that contains flammable gases, solvents, or dust, the atmosphere may burn or explode. Serious injury or death may result when the atmosphere contains even low concentrations of toxic gases.

F-4.6. Hand and Portable Power Tool Hazard

The Laboratory provides hand and portable tools that meet accepted national safety standards. However, these tools can still cause injury and must be properly used and maintained.

F-4.7. Working Alone Hazard

Working alone means performing any activity out of sight or communication for more than a few minutes at a time. For work on exposed energized electrical equipment, an individual is considered to be working alone if not within sight of someone else. The major danger in working alone is sustaining an illness or injury that precludes self-rescue.

F-4.8. Physical and Biological Hazards

Physical hazards associated with working at Site 300 include extreme temperatures with temperatures often exceeding 100º F in the summer. High air temperatures coupled with use of semi-permeable or impermeable protective clothing and/or strenuous physical activities have a high potential for inducing heat stress in workers. In addition, hazardous conditions may exist during lightning storms at Site 300. Biological hazards include rattlesnakes and insects (i.e., tarantulas, black widow spiders, scorpions, etc.).

F-4.9. Slip/Trip/Fall Hazards

The surfaces that operators stand or work on can be hazardous if not properly designed or maintained. Injuries can result from slips, trips, or falls on work surfaces. Work at heights or at elevated locations can also pose a fall hazard.

F-4.10. Material Handling Hazards

The hazards associated with improper material handling include being struck by a load, losing control of a load, physical overexertion, and exceeding equipment capacities. Such accidents can lead to injuries.

F-4.11. Mechanical Motion Hazards

A wide variety of mechanical motions and actions may present hazards to personnel. These can include the movement of rotating members, reciprocating arms, moving belts, meshing gears, cutting teeth, and any part that may cause impact or shear. These different types of hazardous mechanical motions and actions are basic in varying combinations to nearly all machines.

F-4.12. Fire Hazards

Vehicle travel off-road into grassy areas may be necessary during pipeline and/or well maintenance. Hot engine and vehicle exhaust components may present a fire hazard when contacting high, dry grass or vegetation.

F-5. Hazard Control

Controls for the hazards identified in Section F-4 are based on selected sections of LLNL ES&H Manual, the Site Safety Plan for LLNL CERCLA Investigations at Site 300 (2000), and IWSs #1084, #1390, and #1960.

F-5.1. Electrical Hazard Control

F-5.1.1. Access Control

Inadvertent contact with energized equipment is prevented by limiting access to the breaker switches. All breaker switches are contained in cabinets with keyed locks. Energized circuits are insulated from personnel contact.

F-5.1.2. Electrical System Maintenance Safety Procedures

Only qualified electricians or electrical technicians perform activities on the electrical systems for the treatment facilities during construction work. These personnel will follow safety precautions as outlined in the LLNL ES&H Manual, Document 16.1, "Electrical Safety." These personnel will also follow the LLNL Lockout and Tag program as defined in Document 12.6, "LLNL Lockout/Tagout Program" of the LLNL ES&H Manual and IWS #1084 whenever any work is to be done that would expose them to energized equipment.

F-5.2. Seismic Hazard Control

Equipment greater than 5 ft tall will remain securely bolted to concrete pads to avoid damage and injury during an earthquake. To preclude injury from missile hazards (equipment or materials moving energetically due to seismic forces), any equipment or materials stored at a height of 5 ft or more shall be seismically restrained.

F-5.3. Chemical Hazard Control

Concentrations of contaminants in the treatment facility influent are generally several orders of magnitude lower than the recommended permissible exposure limits (PELs) or threshold limit values (TLVs) for these chemicals. Therefore, it is not anticipated that exposure levels in excess of PELs or TLVs will be encountered. However, precautions, such as use of personal protective equipment or clothing (i.e., gloves, safety glasses) should be taken to prevent exposure when potential contact with contaminated, untreated ground water or soil vapor is possible per the requirements of LLNL ES&H Manual, Document 11.1, "Personal Protective Equipment." In addition, to prevent the ingestion of hazardous materials, workers should wash their hands prior to eating, drinking, smoking, or using restroom facilities. The Material Safety Data Sheets for the chemical encountered in Building 854 OU ground water are maintained at the technician's office at Site❑300 and in the Site Safety Plan for LLNL CERCLA Investigations at Site 300 (2000). Additional information on the safe handling of chemicals can be found in the LLNL ES&H Manual, Document 14.1, "Chemicals."

F-5.4. Explosives Hazard Control

Explosives treatment or handling is not anticipated as part of the construction activities in the Building 854 OU at this time. When remote operations occur in the Building 854 OU, access to the area is restricted. Workers must complete and follow the safety procedures covered in Course HS0095W “Site 300 Safety Orientation Training.” This course contains information regarding signs, procedures, and controls used to minimize exposure to hazards related to Site 300 activities. Although no explosives are used in environmental restoration activities, it is imperative that workers follow the special safety and access requirements for the Building 854 OU during construction activities in this area.

F-5.5. Confined Space Hazard Control

Confined space entries are not anticipated as part of construction activities in the Building 854 OU at this time. However, construction personnel and technicians should be familiar with and perform all work in confined spaces in accordance with the LLNL ES&H Manual, Document 18.7, “Working in Confined Spaces.” Technicians and construction personnel should contact Hazards Control Team #1 prior to entry in any confined space. A Confined Space permit is required for hazardous confined space work. Only qualified personnel with recent confined space training are permitted to work in confined spaces and are required to comply with the two-man rule.

F-5.6. Hand and Portable Tool Hazard Control

Facility technicians and construction personnel are responsible for selecting and using the proper tools for the job assigned and for wearing the appropriate personal protective equipment (i.e., safety glasses, etc.) when working with hand and portable tools. All hand and portable tools should be inspected prior to use to make sure they are not damaged and are in good-working condition. Any tool that is damaged or unfit for use should be immediately removed from service. Personnel are responsible for following the work safety standards outlined in LLNL ES&H Manual, Document 11.2, “Hazards—General and Miscellaneous” Chapter 5.0, *Hand and Portable Power Tools* and IWS #1390.

F-5.7. Working Alone Hazard Control

When working alone on a non-hazardous activity, facility technicians and construction personnel will advise a co-worker or supervisor that they will be working alone and when they expect to return. For potentially hazardous activities, technicians will: (1) exercise prudent judgment whether or not to perform the activity alone, and (2) obtain prior authorization from work supervisor before beginning planned hazardous-work-alone operations to ensure that all hazards have been thoroughly evaluated from the perspective of working alone. Work supervisors are responsible for ensuring an IWS is prepared for activities classified as hazardous for working alone. Personnel are responsible for following the work safety standards outlined in LLNL ES&H Manual, Document 11.2, “Hazards—General and Miscellaneous” Chapter 12.0, *Working Alone* and the Environmental Restoration Division Working Alone Guidelines (in ERD O&M Manual, Appendix L) for all work-alone activities.

F-5.8. Physical and Biological Hazard Control

During late spring and summer months, technicians and construction personnel should ingest fluids and evaluate their physical conditions regularly and break when necessary to avoid overheating. Work should be conducted in accordance with the LLNL ES&H Manual, Document 11.2, "Hazards—General and Miscellaneous" Chapters 16.0, *Heat Stress and* 19.0 *Working Outdoors*. All personnel should follow procedures outlined in the Site 300 Lightning Procedures (S300 MGM-T-7) during a lightning alert at Site 300. A lightning alert means the weather conditions are potentially conducive to lightning. Lightning alerts are announced through the Site 300 communications systems. Employees and visitors must evacuate and remain outside explosives hazard zones until a lightning alert is cleared.

Technicians and construction personnel should inspect work areas for snakes and other biological hazards before commencing work. The use of high top work boots is recommended. Avoid biological hazards when possible; do not harass wildlife. Anyone who is bitten should be moved to a safe area and kept calm. Notify the Emergency Dispatch by calling 911 or 925-447-6880 from a cellular phone immediately.

F-5.9. Slip/Trip/Fall Hazard Control

Work surfaces around the treatment facilities should be properly maintained at all times to prevent slips, trips, and falls. Maintenance includes assuring all spills and foreign materials (i.e., tools, excess equipment, etc.) are promptly removed, installing rubber or slip resistant mats at locations that may accumulate water, and ensuring that floor openings are equipped with adequate covers when worker exposure is possible. Any access to elevated locations or work at heights requires guardrails, an administrative control system, or fall protection devices. Personnel are responsible for following the work safety standards outlined in LLNL ES&H Manual, Document 11.1, "Personal Protective Equipment" and Document 11.2, Chapters 2.0, *Housekeeping* and 17.0, *Walking and Working Surfaces*.

F-5.10. Material Handling Hazard Control

Operators should use methods that ensure personal safety and safety of the material being handled when lifting or handling materials manually. Objects that are too heavy or bulky to handle safely should be moved using more than one person or mechanical lifting device. All material lifting or handling should be performed in accordance with the safety standards and procedures for lifting contained in the LLNL ES&H Manual, Document 15.2, "Manual and Mechanical Material Handling."

F-5.11. Mechanical Motion Hazard Control

Any machine part, function, or process, which may cause injury shall either be guarded (physical barriers which prevent access to danger areas) or safeguarded (provided with devices which inhibit machine operation, to mitigate or eliminate danger areas).

Machine operators shall be trained in the proper use of equipment and associated guards/safeguards to protect themselves and others from machine-related hazards. Machine operators shall wear protective clothing or personal protective equipment as necessary whenever engineering controls are not available or are not fully capable of protecting personnel. At a minimum, all personnel operating or working within close proximity of heavy machinery or equipment shall wear safety shoes and safety glasses. When there is a potential for head injury, hard hats shall be worn. Additional details for personal protective equipment are contained in the LLNL ES&H Manual, Document 11.1.

F-5.12. Fire Hazard Control

Technicians must obtain approval to access any construction work site that requires off-pavement travel as defined by the LLNL "Restricted Off-Pavement Travel at Site 300" policy manual. Technicians planning to travel off-pavement must receive prior permission from the Site 300 Manager, the Functional Area Supervisor, and the CAS Operator and carry a trunked radio for communications. In addition, appropriate training is required for all personnel engaging in off-road travel at Site 300. Personnel should not park or drive through dry, tall grass. Technicians performing off-road travel during construction activities shall be familiar with the "Restricted Off-Pavement Travel at Site 300" manual (LLNL, 2001) and must be listed as 'qualified personnel' on IWS #1960 "Site 300 Restricted Travel to Perform ERD Activities."

In case of fire, contact the LLNL Fire Department by dialing 911 or 925-447-6880 from a cellular phone.

F-6. Stop Work Procedures

LLNL's stop-work procedure applies to all work done at the Laboratory. Activities that are imminently dangerous to workers, the public, or the environment shall be stopped immediately by any Laboratory employee, supplemental labor employee, or contractor. Each worker is empowered to stop work if there is a perceived unsafe or unapproved condition. "Stopping work" includes stabilizing an imminent danger situation to the extent that it can be left unattended for a prolonged period of time until the issue is resolved. The person requesting the work stoppage shall notify manager responsible for the work. The manager shall notify the area ES&H Team and the Directorate ES&H Assurance Manager as soon as possible of this action. Informal stop work interventions to correct minor conditions (e.g., to remind workers to put on their hard hats, safety glasses etc.) do not require formal notification. Details of the Stop Work Process are included in the LLNL ES&H Manual, Document 2.1, "Laboratory and ES&H Policies, General Worker Responsibilities, and Integrated Safety Management."

F-7. Environmental Concerns and Controls

F-7.1. Ground Water and Soil Vapor Extraction and Treatment Systems

Concern:

- Discharge of untreated ground water or soil vapor.

Controls:

- Interlocks shut off the system and the flow of air and water if physical damage to key treatment system components occurs.
- Scheduled sampling per CMP monitors treated ground water discharge.
- Scheduled sampling per SJVUAPCD requirements monitors treated soil vapor discharge.
- Facility operator inspects the system periodically.

F-8. Training

F-8.1. Basic Facility Operator Courses

The following courses are required for all Building 854 OU treatment facility operators:

- HS-0039—SARA/OSHA Training (40-hour course with yearly refreshers).
- HS-0001—New Employee Safety Orientation.
- HS-1620—Standard First Aid (First Aid Certification valid for 2 years).
- HS-5300—Back Care Workshop.
- HS-5605 – Driving the Site 300 Trails.
- HS-5606W – LLNL Radio Course.
- HS-0095— Site 300 Safety.
- HS-2080—Site 300 Explosives Safety Training for Crafts, Protective Services, and Fire Personnel.

F-8.2. Selective Training Courses

The following courses may be required when they apply to the tasks assigned to the facility operator:

- HS-0006—Hazardous Waste Handling Practices (refresher training required annually).
- HS-4150—Confined Space Entry.
- HS-4240—Chemical Safety.
- HS-5220—Electrical Safety (required every 5 years).

- HS-5245—Lockout and Tag Procedure (refresher training required every 5 years).

F-8.3. Training Responsibilities and Documentation

Training courses identified in this section do not qualify a person to operate the treatment equipment and treatment systems located in Building 854 OU. Only the responsible individual(s) identified in Section F-3 of this Health and Safety Plan will determine if and when a person is qualified to operate the treatment facilities. Once qualified, the technician supervisor records that the technician has been qualified as a treatment facility operator.

The responsible individual, or designee, shall ensure that all required training (including on-the-job training if applicable) is completed and documented in the LLNL Laboratory Training Records and Information Network. Untrained personnel may work under the supervision of a trained person until the required training is completed.

F-9. Maintenance

Items requiring periodic maintenance do not impact the safety of the operation. Interlocks shall be tested annually.

F-10. Quality Assurance

O&M activities at the Building 854 OU treatment facilities shall be controlled by quality procedures designed to meet ground water and soil vapor treatment and discharge requirements specified by the RWQCB and the SJVUAPCD. Controls to prevent the discharge of untreated ground water and meet quality objectives include:

- Annual interlock function checks shall be performed by the Facility Electronics Staff or Plant Engineering Electronic Engineering Staff. Test documentation shall be maintained by the Facility Electronics Supervisor, or designee.
- Scheduled weekly, monthly, quarterly, and annual sampling of water and vapor to ensure compliance and quality.
- Treatment facility-related analytical data will be reviewed by the Quality Control Chemist or designee to ensure the data meets quality objectives.

F-11. Emergency Response Procedures

In the event of an emergency, facility operations personnel will first dial 911 or 925-447-6880 from a cellular phone to report to the Emergency Dispatcher, then administer first aid, if necessary and if trained appropriately, to injured personnel. The Emergency Dispatcher uses reserved telephone lines to promptly relay the emergency call to the following members of the LLNL Emergency Response Team:

- Fire Department.
- Security Department.

- Hazards Control Safety Teams.
- Plant Engineering.
- Health Services.

The Emergency Response Team will go to the scene of the emergency immediately. The phone numbers of individuals to be notified in the event of an emergency during off-shift hours are posted at the Building 854 OU treatment facilities. The LLNL ES&H Manual describes the emergency response procedures in Document 22.1, “Emergency Management” and Document 22.2, “Environmental Emergency Response.”

The Site 300 Environmental Restoration Division Emergency Self-Help Plans for buildings 843 and 835 and trailer 8726 outline the self-help procedures personnel follow in the event of a disaster.

F-12. Applicable Documents

The following documents and/or sections thereof apply to the safe operation of the Building 854 OU treatment facilities and are incorporated into this Health and Safety Plan by reference.

F-12.1. Integration Work Sheet Safety Procedures

#539	Recycling Spent Activated Carbon
#1084	ERD Electronic Routine Electronic Operations
#1661	ERD Site 300 Ion-Exchange Resin Replacement
#1265	Ground Water and Soil Vapor Treatment Facility Operations at Site 300
#1390	B843 Machine Shop Operations
#1960	Site 300 Restricted Travel to Perform ERD Activities

F-12.2. LLNL Environment, Safety, and Health Manual Sections

Document 2.1	Laboratory and ES&H Policies, General Worker Responsibilities, and Integrated Safety Management	
Document 2.5	Procured Services Subcontractor Environment, Safety, and Health Program	
Document 11.1	Personal Protective Equipment	
Document 11.2	Hazards—General and Miscellaneous	
	Chapters 2.0	Housekeeping
	Chapter 5.0	Hand and Portable Power Tools
	Chapter 12.0	Working Alone
	Chapter 16.0	Heat Stress

	Chapter 17.0	Walking and Working Surfaces
	Chapter 19.0	Working Outdoors
Document 12.6	LLNL Lockout/Tagout Program	
Document 14.1	Chemicals	
Document 15.2	Manual and Mechanical Material Handling	
Document 16.1	Electrical Safety	
Document 18.6	Hearing Conservation	
Document 18.7	Working in Confined Spaces	
Document 22.1	Emergency Management	
Document 22.2	Environmental Emergency Response	
Document 22.5	Fire	

F-12.3. Site Safety Plan for LLNL CERCLA Investigations at Site 300, November 2000

F-12.4. Site 300 Environmental Restoration Emergency Self-Help Plans

Site 300 Trailer 8726

Site 300 Building 835

Site 300 Building 843

F-12.5. Treatment Facility Operating Manuals for the Building 854 OU Ground Water Treatment Facilities

Operations and Maintenance Manual Volume 1: Treatment Facility Quality Assurance and Documentation

Operations and Maintenance Manual: Solar Treatment Units (to be produced)

Operations and Maintenance Manual: Biotreatment Unit, Containized Wetlands (to be produced)

F-12.6. LLNL Livermore Site and Site 300 Environmental Restoration Project Standard Operating Procedures (SOPs) (Dibley and Depue, 2003)

F-13. References

LLNL (2000), *Site Safety Plan for Lawrence Livermore National Laboratory CERCLA Investigations at Site 300*, Lawrence Livermore National Laboratory, Livermore, Calif. (UCRL-21172 Rev. 3).

LLNL (latest edition), *Fire Protection Program Manual*, Lawrence Livermore National Laboratory, Livermore, Calif. (UCRL-MA-116646).

LLNL (2000), LLNL Site 300 Environment Restoration Division Emergency Self-Help Plan, Trailer 8726.

LLNL (2000), LLNL Site 300 Environment Restoration Division Emergency Self-Help Plan, Building 835.

LLNL (2000), LLNL Site 300 Environment Restoration Division Emergency Self-Help Plan, Building 843.

LLNL (2001), *Restricted Off-Pavement Travel at Site 300*, Lawrence Livermore National Laboratory, Livermore, Calif. (UCRL-MI-144038).

LLNL (2003), LLNL Environment, Safety, and Health Manual.

LLNL (2003), Operations and Maintenance Manual Volume 1: Treatment Facility Quality Assurance and Documentation.

Dibley, V., and R. Depue (2003), *LLNL Livermore Site and Site 300 Environmental Restoration Project Standard Operating Procedures (SOPs)*, Lawrence Livermore National Laboratory, Livermore, Calif. (UCRL-109115 Rev. 10).

Attachment A

Analytical Data Tables

BUILDING 854 AREA GWELEV.RPT
Current Date: April 23, 2003
Current Time: 14:02:28

Table A-1. Ground water elevations, Building 854 area. Results reported by April 23, 2003.

Location / Date of Measurement	Depth to Water (ft)	Water Elevation (ft/MSL)	Notes
W-854-01			
07/11/96	218.70	1115.74	
08/08/96	218.33	1116.11	
09/04/96	218.69	1115.75	
10/09/96	218.11	1116.33	
11/08/96	217.94	1116.50	NOM
12/09/96	217.35	1117.09	
01/13/97	217.81	1116.63	
02/06/97	218.66	1115.78	
03/05/97	218.13	1116.31	
04/10/97	217.51	1116.93	
05/10/97	217.38	1117.06	
06/03/97	217.79	1116.65	
07/08/97	217.42	1117.02	
08/06/97	217.27	1117.17	
09/03/97	217.95	1116.49	
10/07/97	217.43	1117.01	
11/04/97	217.56	1116.88	
12/02/97	217.20	1117.24	
01/15/98	216.95	1117.49	
02/06/98	216.48	1117.96	
03/05/98	216.62	1117.82	
04/03/98	216.88	1117.56	
05/07/98	216.90	1117.54	
06/05/98	216.69	1117.75	
07/22/98	216.81	1117.63	
08/17/98	216.94	1117.50	
09/01/98	216.77	1117.67	
10/09/98	217.02	1117.42	
11/17/98	217.17	1117.27	
12/01/98	217.08	1117.36	
01/05/99	217.36	1117.08	
02/01/99	217.34	1117.10	
03/09/99	216.68	1117.76	
04/13/99	216.79	1117.65	
05/04/99	216.72	1117.72	
06/01/99	216.88	1117.56	
07/28/99	216.75	1117.69	
08/12/99	216.83	1117.61	
09/12/99			NM
10/18/99	216.74	1117.70	
12/03/99	217.50	1116.94	
01/19/00	216.79	1117.65	
02/23/00	216.70	1117.74	
03/16/00	216.76	1117.68	
04/07/00	216.98	1117.46	
05/02/00	217.00	1117.44	
05/17/00	217.02	1117.42	PS
06/08/00	217.01	1117.43	
07/06/00	217.19	1117.25	
08/04/00	216.96	1117.48	
08/11/00	216.89	1117.55	PS
09/05/00	217.20	1117.24	
10/10/00	217.14	1117.30	
10/27/00	216.91	1117.53	ps
11/01/00	216.91	1117.53	
12/01/00	217.37	1117.07	
01/04/01	217.29	1117.15	
02/07/01	217.07	1117.37	
02/12/01	217.07	1117.37	PS
03/06/01			NM/OBSTRUCTI
04/04/01	217.05	1117.39	
05/03/01			NM
05/08/01	217.01	1117.43	PS
06/04/01	216.95	1117.49	
07/03/01	216.92	1117.52	
08/06/01	217.14	1117.30	
W-854-01 (continued)			
09/04/01	216.96	1117.48	
10/02/01	217.02	1117.42	
11/02/01	217.17	1117.27	
11/29/01	216.93	1117.51	PS
12/06/01	217.56	1116.88	
01/08/02	217.24	1117.20	
01/28/02	217.03	1117.41	PS
02/07/02	217.26	1117.18	
03/04/02	217.27	1117.17	
04/04/02			NM
05/01/02	217.09	1117.35	
06/02/02	216.97	1117.47	
07/15/02	217.03	1117.41	
08/05/02	217.19	1117.25	
08/28/02	217.03	1117.41	PS
09/07/02	217.03	1117.41	
10/03/02	217.21	1117.23	
12/18/02	217.21	1117.23	ps
01/04/03	217.40	1117.04	
02/01/03	217.24	1117.20	
03/01/03	217.22	1117.22	
W-854-02			
07/11/96	139.77	1194.50	
08/08/96	139.76	1194.51	
09/04/96	139.74	1194.53	
10/09/96	139.77	1194.50	
11/08/96	139.77	1194.50	
12/09/96	139.79	1194.48	
01/13/97	139.81	1194.46	
02/06/97	139.77	1194.50	
03/05/97	139.70	1194.57	
04/10/97	139.53	1194.74	
05/10/97	139.58	1194.69	
06/03/97	139.55	1194.72	
07/08/97	139.49	1194.78	
08/06/97	139.44	1194.83	
09/03/97	139.41	1194.86	
10/07/97	139.42	1194.85	
11/04/97	139.41	1194.86	
12/02/97	139.42	1194.85	
01/15/98	139.43	1194.84	
02/06/98	139.41	1194.86	
03/05/98	139.24	1195.03	
04/03/98	138.60	1195.67	
05/01/98	137.97	1196.30	
06/05/98	136.98	1197.29	
07/22/98	136.04	1198.23	
08/17/98	135.77	1198.50	
09/01/98	135.52	1198.75	
10/09/98	135.58	1198.69	
11/17/98	135.92	1198.35	
12/01/98	136.13	1198.14	
01/05/99	136.48	1197.79	
02/01/99	136.73	1197.54	
03/09/99	136.74	1197.53	
04/13/99	136.87	1197.40	
05/04/99	136.88	1197.39	
06/01/99	136.94	1197.33	
07/28/99	137.20	1197.07	
08/12/99	137.31	1196.96	
09/12/99			NM
10/18/99	137.50	1196.77	
12/03/99	137.80	1196.47	
01/19/00			RA

Table A-1. Ground water elevations, Building 854 area. Results reported by April 23, 2003.

Location Date of Measurement	Depth to Water (ft)	Water Elevation (ft/MSL)	Notes
W-854-02 (continued)			
02/23/00	144.60	1189.67	
03/16/00			PE
04/07/00			PE
05/02/00			PE
06/02/00			NA
06/29/00	144.80	1189.47	PS
06/30/00	143.00	1191.27	PS
07/06/00			NM/PO
08/02/00	140.44	1193.83	PO
09/11/00	140.70	1193.57	
09/11/00	140.70	1193.57	
10/10/00	138.80	1195.47	
11/01/00	138.50	1195.77	TREATMENT UN
12/01/00			OFF/PERC HIT
01/04/01	141.90	1192.37	
02/07/01	140.20	1194.07	
03/06/01	139.90	1194.37	
04/04/01	142.10	1192.17	
05/03/01	141.10	1193.17	
06/04/01	142.66	1191.61	
07/06/01	143.40	1190.87	
08/06/01	144.40	1189.87	
09/04/01	145.80	1188.47	
10/02/01	147.20	1187.07	
11/02/01	147.10	1187.17	
12/06/01	146.30	1187.97	
12/17/01	146.50	1187.77	PS
01/08/02	148.00	1186.27	
02/07/02	145.76	1188.51	
03/04/02	144.13	1190.14	
03/14/02	144.90	1189.37	PS
04/04/02			NM
05/01/02			NA
06/02/02			NM
07/15/02			NM
08/05/02			NM
09/07/02			NM
10/03/02			NM
01/04/03			NM
02/01/03			NM
03/01/03			NM
W-854-03			
07/11/96	116.31	1122.52	
08/08/96	117.19	1121.64	
09/04/96	117.05	1121.78	
10/09/96	117.07	1121.76	
11/08/96	117.04	1121.79	
12/09/96	117.04	1121.79	
01/13/97	117.12	1121.71	
02/06/97	117.17	1121.66	
03/05/97	117.02	1121.81	
04/17/97	116.82	1122.01	
05/17/97	116.85	1121.98	
06/03/97	116.72	1122.11	
07/07/97	116.63	1122.20	
08/06/97	116.64	1122.19	
09/04/97	116.68	1122.15	
10/07/97	116.70	1122.13	
11/04/97	116.83	1122.00	
12/02/97	116.90	1121.93	
01/15/98	116.98	1121.85	
02/06/98	117.01	1121.82	
03/05/98	117.07	1121.76	
04/03/98	116.65	1122.18	

Location Date of Measurement	Depth to Water (ft)	Water Elevation (ft/MSL)	Notes
W-854-03 (continued)			
05/01/98	116.08	1122.75	
06/05/98	115.26	1123.57	
07/22/98	114.52	1124.31	
08/17/98	114.08	1124.75	
09/01/98	114.12	1124.71	
10/09/98	113.41	1125.42	
11/17/98	113.26	1125.57	
12/01/98	113.19	1125.64	
01/05/99	113.07	1125.76	
02/01/99	113.76	1125.07	
03/09/99	113.08	1125.75	
04/13/99	113.22	1125.61	
05/04/99	113.27	1125.56	
06/01/99	113.27	1125.56	
07/28/99	113.47	1125.36	
08/12/99	113.55	1125.28	
09/12/99			NM
10/18/99	113.82	1125.01	
12/03/99	114.08	1124.75	
01/19/00	114.25	1124.58	
02/28/00	115.03	1123.80	
03/16/00	115.19	1123.64	
04/07/00	115.32	1123.51	
05/02/00	115.64	1123.19	
05/16/00	115.85	1122.98	PS
06/08/00	115.81	1123.02	
07/06/00	115.97	1122.86	
08/04/00	115.88	1122.95	
08/16/00	115.90	1122.93	PS
09/05/00	115.91	1122.92	
10/10/00	115.92	1122.91	
11/01/00	115.92	1122.91	
12/01/00	115.96	1122.87	
01/04/01	116.55	1122.28	
02/07/01	116.70	1122.13	
03/06/01	116.44	1122.39	
04/04/01	116.65	1122.18	
05/03/01	116.86	1121.97	
06/04/01	117.05	1121.78	
07/09/01	117.02	1121.81	
08/06/01	117.38	1121.45	
09/04/01	117.02	1121.81	
10/02/01	117.02	1121.81	
11/05/01	117.45	1121.38	
12/06/01	116.91	1121.92	
12/17/01	117.56	1121.27	PS
01/08/02	117.26	1121.57	
02/07/02	117.45	1121.38	
03/04/02	117.50	1121.33	
04/04/02			NM
05/01/02	117.75	1121.08	
06/03/02	117.38	1121.45	
07/15/02	117.90	1120.93	
08/05/02	117.91	1120.92	
09/07/02	117.58	1121.25	
10/03/02	118.05	1120.78	
01/04/03	117.49	1121.34	
02/01/03	117.89	1120.94	
03/01/03	118.03	1122.51	
W-854-04			
07/11/96	306.37	932.01	
08/08/96	307.63	930.75	
09/04/96	307.49	930.89	
10/09/96	307.52	930.86	

Table A-1. Ground water elevations, Building 854 area. Results reported by April 23, 2003.

Location / Date of Measurement	Depth to Water (ft)	Water Elevation (ft/MSL)	Notes
W-854-04 (continued)			
11/08/96	307.84	930.54	
12/09/96	307.36	931.02	
01/13/97	307.22	931.16	
02/06/97	307.51	930.87	
03/06/97	307.61	930.77	
04/17/97	307.14	931.24	
05/17/97	307.08	931.30	
06/03/97	307.10	931.28	
07/07/97	307.09	931.29	
08/06/97	307.13	931.25	
09/04/97	307.12	931.26	
10/07/97	306.93	931.45	
11/04/97	306.68	931.70	
12/02/97	306.88	931.50	
01/15/98	306.86	931.52	
02/06/98	306.28	932.10	
03/05/98	306.55	931.83	
04/03/98	306.71	931.67	
05/07/98	306.51	931.87	
06/05/98			NEEDS 300 FT
07/22/98	306.55	931.83	
08/17/98	306.31	932.07	
09/01/98	306.28	932.10	
10/09/98	306.52	931.86	
11/17/98	300.00	938.38	
12/01/98	270.96	967.42	
01/05/99	294.77	943.61	
02/01/99			
03/09/99			BLOC
04/13/99			BLOC
05/04/99			BLOC
06/04/99			BLOC
07/28/99	305.47	932.91	
08/12/99			BLOC
09/12/99			NM
10/18/99	305.17	933.21	
12/07/99	305.24	933.14	
01/19/00	305.14	933.24	
02/28/00	304.91	933.47	
03/18/00	305.10	933.28	
04/07/00	304.88	933.50	
05/02/00	304.71	933.67	
05/16/00	304.61	933.77	PS
06/08/00	304.58	933.80	
07/06/00	305.91	932.47	
08/04/00	304.22	934.16	
08/11/00	304.26	934.12	PS
09/05/00	304.91	933.47	
10/10/00	304.09	934.29	
10/27/00	304.03	934.35	ps
11/01/00	304.03	934.35	
12/01/00	304.34	934.04	
01/04/01	304.51	933.87	
02/07/01	304.73	933.65	
03/06/01			NM
04/03/01	78.57	1159.81	ME
05/03/01	303.72	934.66	
05/08/01	303.72	934.66	PS
06/04/01	303.34	935.04	
07/03/01	303.30	935.08	
08/06/01	303.42	934.96	
09/04/01	303.18	935.20	
10/02/01	303.21	935.17	
11/05/01	303.27	935.11	
12/06/01	303.01	935.37	
01/08/02	303.24	935.14	
W-854-04 (continued)			
02/07/02	303.11	935.27	
02/26/02	303.21	935.17	PS
03/04/02	302.77	935.61	
04/04/02			NM
05/01/02	302.63	935.75	
06/03/02	302.34	936.04	
07/15/02	302.33	936.05	
08/05/02	302.29	936.09	
08/28/02	303.05	935.33	PS
09/07/02	303.05	935.33	
10/03/02	303.09	935.29	
12/18/02	302.14	936.24	ps
01/04/03	302.11	936.27	
02/01/03	301.96	936.42	
03/01/03	302.40	935.98	
W-854-05			
07/11/96	88.45	1241.89	
08/08/96	89.14	1241.20	
09/04/96	89.13	1241.21	
10/09/96	89.11	1241.23	
11/08/96	89.09	1241.25	
12/09/96	89.05	1241.29	
01/13/97	89.06	1241.28	
02/06/97	89.05	1241.29	
03/05/97	88.94	1241.40	
04/10/97	88.82	1241.52	
05/10/97	88.92	1241.42	
06/03/97	88.89	1241.45	
07/07/97	88.85	1241.49	
08/06/97	88.82	1241.52	
09/03/97	88.80	1241.54	
10/07/97	88.78	1241.56	
11/04/97	88.77	1241.57	
12/02/97	88.76	1241.58	
01/15/98	88.70	1241.64	
02/06/98	88.77	1241.57	
03/05/98	88.02	1242.32	
04/03/98	87.73	1242.61	
05/07/98	87.37	1242.97	
06/05/98	86.87	1243.47	
07/22/98	86.71	1243.63	
08/17/98	86.18	1244.16	
09/01/98	86.91	1243.43	
10/09/98	87.24	1243.10	
11/17/98	87.33	1243.01	
12/01/98	87.47	1242.87	
01/05/99	87.60	1242.74	
02/01/99	87.76	1242.58	
03/09/99	87.62	1242.72	
04/13/99	87.77	1242.57	
05/04/99	87.77	1242.57	
06/01/99	87.81	1242.53	
07/28/99	87.89	1242.45	
08/12/99	87.92	1242.42	
09/12/99			NM
10/18/99	87.92	1242.42	
12/03/99	88.29	1242.05	
01/19/00			BLOC
02/28/00	88.45	1241.89	
03/16/00	88.29	1242.05	
04/07/00	88.19	1242.15	
05/02/00			BLOC
05/16/00	85.50	1244.84	PS
06/08/00	88.31	1242.03	

Table A-1. Ground water elevations, Building 854 area. Results reported by April 23, 2003.

Location / Date of Measurement	Depth to Water (ft)	Water Elevation (ft/MSL)	Notes
W-854-05 (continued)			
07/06/00	88.47	1241.87	
08/04/00	88.59	1241.75	
08/11/00	88.43	1241.91	PS
09/05/00	88.60	1241.74	
10/10/00	88.73	1241.61	
11/01/00	88.57	1241.77	
11/10/00	88.56	1241.78	ps
12/01/00	88.64	1241.70	
01/04/01	88.62	1241.72	
02/06/01	88.69	1241.65	PS
02/07/01	88.69	1241.65	
03/06/01	88.61	1241.73	
04/04/01	88.73	1241.61	
05/03/01	88.77	1241.57	
05/09/01	88.68	1241.66	PS
06/04/01	88.74	1241.60	
07/03/01	88.64	1241.70	
08/06/01	88.75	1241.59	
09/04/01	88.80	1241.54	
10/02/01	88.87	1241.47	
11/02/01	88.88	1241.46	
11/29/01	88.93	1241.41	PS
12/06/01	88.93	1241.41	
01/08/02	88.82	1241.52	
01/30/02	88.85	1241.49	PS
02/07/02	88.84	1241.50	
03/04/02	88.86	1241.48	
04/04/02			NM
05/01/02	88.13	1242.21	
06/03/02	88.89	1241.45	
07/15/02	88.89	1241.45	
08/03/02	88.95	1241.39	
09/07/02	89.02	1241.32	
10/03/02	89.01	1241.33	
12/13/02	89.02	1241.32	ps
01/04/03	89.09	1241.25	
02/01/03	89.11	1241.23	
03/01/03	89.10	1241.24	
W-854-06			
08/08/96	120.08	988.37	
09/04/96	119.49	988.96	
10/17/96	117.02	991.43	
11/08/96	118.66	989.79	
12/09/96	117.95	990.50	
01/13/97	117.53	990.92	
02/06/97	117.58	990.87	
03/05/97	117.41	991.04	
04/03/97	116.84	991.61	
05/03/97	116.83	991.62	
06/03/97	116.52	991.93	
07/08/97	116.35	992.10	
08/06/97	116.27	992.18	
09/04/97	116.17	992.28	
10/07/97	116.05	992.40	
11/04/97	116.12	992.33	
12/02/97	116.00	992.45	
01/15/98	116.02	992.43	
02/06/98	115.75	992.70	
03/05/98	115.91	992.54	
04/03/98	115.78	992.67	
05/01/98	115.31	993.14	
06/05/98	114.78	993.67	
07/22/98	114.06	994.39	
08/17/98	113.75	994.70	

Location / Date of Measurement	Depth to Water (ft)	Water Elevation (ft/MSL)	Notes
W-854-06 (continued)			
09/01/98	113.56	994.89	
10/09/98	113.52	994.93	
11/17/98	112.88	995.57	
12/01/98	113.08	995.37	
01/05/99	113.14	995.31	
02/01/99	113.53	994.92	
03/09/99			TOO WET
04/13/99	113.18	995.27	
05/04/99	113.29	995.16	
06/01/99	113.25	995.20	
07/28/99	113.42	995.03	
08/12/99	113.82	994.63	
09/12/99			NM
10/20/99	113.91	994.54	
12/03/99	114.15	994.30	
01/20/00			RA
02/29/00			NA
03/16/00	114.40	994.05	
04/07/00	114.17	994.28	
05/02/00	114.38	994.07	
05/17/00	114.62	993.83	PS
06/08/00	114.57	993.88	
07/06/00	114.53	993.92	
08/04/00	114.81	993.64	
08/14/00	114.86	993.59	PS
09/05/00	114.98	993.47	
10/10/00	115.25	993.20	
11/01/00	115.43	993.02	
11/10/00	115.16	993.29	ps
12/01/00	115.38	993.07	
01/04/01	115.56	992.89	
02/07/01	115.29	993.16	
02/14/01	115.41	993.04	PS
03/06/01	115.47	992.98	
04/04/01	115.68	992.77	
05/03/01	115.81	992.64	
05/09/01	115.73	992.72	PS
06/04/01	115.84	992.61	
07/03/01	115.69	992.76	
08/06/01	115.92	992.53	
09/04/01	115.97	992.48	
10/02/01	115.97	992.48	
11/05/01	116.28	992.17	
12/06/01	116.51	991.94	
12/13/01	116.44	992.01	PS
01/08/02	116.33	992.12	
02/07/02	116.40	992.05	
02/26/02	116.53	991.92	PS
03/04/02	116.34	992.11	
04/04/02			NM
05/01/02	116.52	991.93	
06/08/02	116.47	991.98	
07/22/02	116.45	992.00	
08/05/02	116.66	991.79	
09/07/02	116.74	991.71	
09/10/02	116.73	991.72	PS
10/05/02	116.69	991.76	
12/19/02	116.94	991.51	ps
01/04/03	116.93	991.52	
02/01/03	116.93	991.52	
03/01/03	117.02	991.43	
W-854-07			
08/08/96	119.00	989.86	
09/04/96	118.50	990.36	

Table A-1. Ground water elevations, Building 854 area. Results reported by April 23, 2003.

Location / Date of Measurement	Depth to Water (ft)	Water Elevation (ft/MSL)	Notes
W-854-07 (continued)			
10/17/96	117.95	991.36	
11/08/96	117.69	991.17	
12/09/96	117.11	991.75	
01/13/97	116.88	991.98	
02/06/97	116.75	992.11	
03/05/97	116.57	992.29	
04/03/97	116.12	992.74	
05/03/97	116.02	992.84	
06/03/97	115.77	993.09	
07/08/97	115.57	993.29	
08/06/97	115.46	993.40	
09/04/97	115.35	993.51	
10/07/97	115.28	993.58	
11/04/97	115.39	993.47	
12/02/97	115.25	993.61	
01/15/98	115.17	993.69	
02/06/98	114.98	993.88	
03/05/98	115.08	993.78	
04/03/98	114.73	994.13	
05/01/98	114.27	994.59	
06/05/98	113.59	995.27	
07/22/98	112.96	995.90	
08/17/98	112.58	996.28	
09/01/98	112.32	996.54	
10/09/98	112.13	996.73	
11/17/98	112.07	996.79	
12/01/98	112.06	996.80	
01/05/99	112.02	996.84	
02/01/99	112.49	996.37	
03/09/99			TOO WET
04/13/99	112.83	996.03	
05/04/99	112.32	996.54	
06/01/99	112.33	996.53	
07/28/99	112.68	996.18	
08/12/99	112.75	996.11	
09/12/99			NM
10/20/99	112.95	995.91	
12/03/99	113.25	995.61	
01/20/00	113.00	995.86	
02/29/00			NA
03/16/00	113.50	995.36	
04/07/00	113.44	995.42	
05/02/00	113.63	995.23	
05/17/00	113.84	995.02	PS
06/08/00	113.74	995.12	
07/06/00	114.27	994.59	
08/04/00	114.01	994.85	
08/16/00	113.97	994.89	PS
09/05/00	114.23	994.63	
10/10/00	114.18	994.68	
11/01/00	114.51	994.35	
12/01/00	114.53	994.33	
12/14/00	114.64	994.22	ps
01/04/01	114.71	994.15	
02/07/01	114.70	994.16	
02/14/01	114.62	994.24	PS
03/06/01	114.68	994.18	
04/04/01	114.81	994.05	
05/03/01	114.96	993.90	
06/04/01	114.89	993.97	
07/09/01	115.04	993.82	
08/06/01	115.19	993.67	
09/04/01	115.22	993.64	
10/02/01	115.32	993.54	
11/05/01	115.36	993.50	
12/06/01	115.64	993.22	

Location / Date of Measurement	Depth to Water (ft)	Water Elevation (ft/MSL)	Notes
W-854-07 (continued)			
12/13/01	115.61	993.25	PS
01/08/02	115.51	993.35	
01/29/02	115.61	993.25	PS
02/07/02	115.58	993.28	
03/04/02	115.67	993.19	
04/04/02			NM
05/01/02	115.73	993.13	
06/08/02	115.75	993.11	
07/22/02	115.82	993.04	
08/05/02	115.91	992.95	
09/07/02	115.98	992.88	
10/05/02	116.04	992.82	
12/19/02		1108.86	ps
01/04/03	116.01	992.85	
02/01/03	116.20	992.66	
03/01/03	116.39	992.47	
W-854-08			
08/08/96	115.67	1158.53	
10/09/96	115.43	1158.77	
11/08/96	115.59	1158.61	
12/09/96	115.68	1158.52	
01/13/97	115.44	1158.76	
02/06/97	114.59	1159.61	
03/05/97	113.80	1160.40	
04/10/97	114.22	1159.98	
05/10/97	114.64	1159.56	
06/03/97	115.16	1159.04	
07/07/97	115.50	1158.70	
08/06/97	115.66	1158.54	
09/03/97	115.74	1158.46	
10/07/97	115.84	1158.36	
11/04/97	115.98	1158.22	
12/02/97	116.20	1158.00	
01/15/98	116.38	1157.82	
02/06/98	116.39	1157.81	
03/05/98	111.62	1162.58	
04/03/98	109.85	1164.35	
05/07/98	111.18	1163.02	
06/05/98	110.54	1163.66	
07/22/98	111.05	1163.15	
08/17/98	111.26	1162.94	
09/01/98	111.35	1162.85	
10/09/98	111.74	1162.46	
11/17/98	112.17	1162.03	
12/01/98	112.62	1161.58	
01/05/99	113.25	1160.95	
02/01/99	113.82	1160.38	
03/09/99	113.85	1160.35	
04/13/99	114.47	1159.73	
05/04/99	114.85	1159.35	
06/01/99	114.99	1159.21	
07/28/99	115.32	1158.88	
08/12/99	115.44	1158.76	
09/12/99			NM
10/18/99	115.33	1158.87	
12/03/99	115.64	1158.56	
01/19/00	115.75	1158.45	
02/28/00	116.18	1158.02	
03/16/00	116.19	1158.01	
04/07/00	116.09	1158.11	
05/02/00	116.38	1157.82	
06/08/00	116.52	1157.68	
07/06/00	116.79	1157.41	
08/04/00	116.58	1157.62	

Table A-1. Ground water elevations, Building 854 area. Results reported by April 23, 2003.

Location / Date of Measurement	Depth to Water (ft)	Water Elevation (ft/MSL)	Notes
W-854-08 (continued)			
08/11/00	116.42	1157.78	PS
09/05/00	116.36	1157.84	
10/10/00	116.21	1157.99	
11/01/00	116.39	1157.81	
11/10/00	116.48	1157.72	ps
12/01/00	116.52	1157.68	
01/04/01	116.84	1157.36	
02/07/01	116.92	1157.28	
02/12/01	116.92	1157.28	PS
03/06/01	117.04	1157.16	
04/04/01	117.13	1157.07	
05/03/01	117.37	1156.83	
05/08/01	117.24	1156.96	PS
06/04/01	117.48	1156.72	
07/10/01	117.63	1156.57	
08/06/01	117.69	1156.51	
09/04/01	117.72	1156.48	
10/02/01	117.82	1156.38	
11/05/01	117.88	1156.32	
11/29/01	117.85	1156.35	PS
12/06/01	117.85	1156.35	
01/08/02	117.94	1156.26	
02/07/02	118.07	1156.13	
03/04/02	118.14	1156.06	
04/04/02			NM
05/01/02	118.30	1155.90	
06/03/02	118.34	1155.86	
07/15/02	118.42	1155.78	
08/05/02	118.51	1155.69	
09/07/02	118.51	1155.69	
09/10/02	118.49	1155.71	PS
10/03/02	118.55	1155.65	
11/21/02	118.48	1155.72	ps
01/04/03	118.65	1155.55	
02/01/03	118.61	1155.59	
03/01/03	118.63	1155.57	
W-854-09			
10/09/96	190.66	1168.55	
11/08/96	191.38	1167.83	
12/09/96	192.02	1167.19	
01/13/97	191.21	1168.00	
02/06/97	190.94	1168.27	
03/05/97	189.62	1169.59	
04/10/97	187.46	1171.75	
05/10/97	186.98	1172.23	
06/03/97	186.83	1172.38	
07/08/97	185.71	1173.50	
08/06/97	185.37	1173.84	
09/04/97	185.44	1173.77	
10/10/97	185.49	1173.72	
11/04/97	185.46	1173.75	
12/02/97	185.32	1173.89	
01/15/98	184.98	1174.23	
02/06/98			NA/TOO MUDDY
03/05/98	184.88	1174.33	
04/03/98	184.35	1174.86	
05/01/98	183.99	1175.22	
06/05/98	183.61	1175.60	
07/22/98	183.32	1175.89	
08/17/98	183.15	1176.06	
09/01/98	183.05	1176.16	
10/09/98	182.90	1176.31	
11/17/98	182.23	1176.98	
12/01/98	182.31	1176.90	

Location / Date of Measurement	Depth to Water (ft)	Water Elevation (ft/MSL)	Notes
W-854-09 (continued)			
01/05/99	182.39	1176.82	
02/01/99			NO ACCESS
03/05/99	182.62	1176.59	
04/13/99	182.52	1176.69	
05/04/99	182.43	1176.78	
06/01/99	182.34	1176.87	
07/28/99	182.43	1176.78	
08/12/99	182.54	1176.67	
09/12/99			NM
10/20/99			DRY
12/07/99	182.30	1176.91	
01/20/00	182.44	1176.77	
02/29/00			NA
03/16/00	141.90	1217.31	
04/07/00	182.84	1176.37	
05/02/00	183.15	1176.06	
05/17/00	183.04	1176.17	PS
06/08/00	183.01	1176.20	
07/10/00	184.22	1174.99	
08/04/00	183.00	1176.21	
08/11/00	183.31	1175.90	PS
09/05/00	183.32	1175.89	
10/10/00	183.00	1176.21	
11/01/00	183.31	1175.90	
11/10/00	183.03	1176.18	
12/01/00	183.87	1175.34	
01/04/01	183.39	1175.82	
02/08/01	183.47	1175.74	
02/14/01	183.34	1175.87	PS
03/07/01	183.39	1175.82	
04/04/01	183.29	1175.92	
05/03/01	183.51	1175.70	
05/09/01	183.50	1175.71	PS
06/04/01	183.54	1175.67	
07/05/01	183.63	1175.58	
08/06/01	183.69	1175.52	
09/04/01	183.88	1175.33	
10/02/01	183.68	1175.53	
11/05/01	183.58	1175.63	
12/06/01	183.71	1175.50	
12/13/01	183.67	1175.54	PS
01/08/02			UC
01/30/02	183.78	1175.43	PS
02/07/02	183.62	1175.59	
03/04/02	183.66	1175.55	
04/04/02			NM
05/01/02	183.74	1175.47	
06/02/02	183.47	1175.74	
07/22/02	183.71	1175.50	
08/05/02	183.82	1175.39	
09/07/02	183.98	1175.23	
09/10/02	184.00	1175.21	PS
10/05/02	184.05	1175.16	
01/04/03			NM/NO ACCESS
02/01/03	184.58	1174.63	
03/01/03	184.39	1174.82	
W-854-10			
10/09/96	117.58	1208.80	
11/22/96	117.45	1208.93	
12/09/96	114.72	1211.66	
01/13/97	113.49	1212.89	
02/06/97	113.30	1213.08	
03/05/97	113.18	1213.20	
04/10/97	113.49	1212.89	

Table A-1. Ground water elevations, Building 854 area. Results reported by April 23, 2003.

Location / Date of Measurement	Depth to Water (ft)	Water Elevation (ft/MSL)	Notes
W-854-10 (continued)			
05/10/97	113.83	1212.55	
06/03/97	114.15	1212.23	
07/08/97	114.42	1211.96	
08/06/97	114.65	1211.73	
09/03/97	114.85	1211.53	
10/07/97	115.03	1211.35	
11/04/97	115.05	1211.33	
12/02/97	114.88	1211.50	
01/15/98	113.86	1212.52	
02/06/98	112.38	1214.00	
03/05/98	111.77	1214.61	
04/03/98	112.29	1214.09	
05/07/98	112.89	1213.49	
06/05/98	112.89	1213.49	
07/22/98	112.81	1213.57	
08/17/98	112.61	1213.77	
09/01/98	112.50	1213.88	
10/09/98	112.32	1214.06	
11/17/98	112.91	1213.47	
12/01/98	113.26	1213.12	
01/05/99	113.61	1212.77	
02/01/99	113.47	1212.91	
03/09/99	112.52	1213.86	
04/13/99	112.83	1213.55	
05/04/99	112.82	1213.56	
06/01/99	112.97	1213.41	
07/28/99	112.99	1213.39	
08/12/99	113.12	1213.26	
09/12/99			NM
10/18/99	111.37	1215.01	
12/03/99	112.63	1213.75	
01/19/00	113.38	1213.00	
02/28/00	113.13	1213.25	
03/16/00	113.18	1213.20	
04/07/00	113.43	1212.95	
05/02/00	111.32	1215.06	
05/17/00	111.18	1215.20	PS
06/08/00	111.86	1214.52	
07/06/00	112.31	1214.07	CB
08/04/00	117.76	1208.62	
08/14/00	111.61	1214.77	PS
09/05/00	112.37	1214.01	
10/10/00	112.75	1213.63	CB
10/27/00	112.57	1213.81	ps
11/01/00	112.57	1213.81	CB
12/01/00	112.91	1213.47	CB
01/04/01	112.60	1213.78	CB
02/06/01	112.88	1213.50	PS
02/07/01	112.88	1213.50	CB
03/06/01	113.46	1212.92	CB
04/04/01	113.44	1212.94	CB
05/03/01	113.82	1212.56	CB
05/09/01	113.81	1212.57	PS
06/04/01	113.96	1212.42	CB
07/05/01	111.53	1214.85	CB
08/06/01	112.25	1214.13	CB
09/04/01	113.12	1213.26	CB
10/02/01	113.73	1212.65	CB
11/02/01	114.09	1212.29	CB
11/29/01	114.32	1212.06	PS
12/06/01	114.32	1212.06	CB
01/08/02	114.32	1212.06	CB
01/29/02	113.61	1212.77	PS
02/07/02	113.67	1212.71	CB
03/04/02	113.92	1212.46	CB
04/04/02			NM/CB

Location / Date of Measurement	Depth to Water (ft)	Water Elevation (ft/MSL)	Notes
W-854-10 (continued)			
05/01/02	114.18	1212.20	CB
06/03/02	114.29	1212.09	CB
07/15/02	114.46	1211.92	CB
08/05/02	114.59	1211.79	CB
09/07/02	114.73	1211.65	CB
09/10/02	114.75	1211.63	PS
10/03/02	114.93	1211.45	CB
12/13/02	115.02	1211.36	ps
01/04/03	114.87	1211.51	CB
02/01/03	114.90	1211.48	CB
03/01/03	113.85	1212.53	CB
W-854-11			
10/09/96	151.93	1190.25	
11/22/96	148.73	1193.45	
12/09/96	148.85	1193.33	
01/13/97	148.88	1193.30	
02/06/97	148.89	1193.29	
03/05/97	148.77	1193.41	
04/10/97	148.49	1193.69	
05/10/97	148.65	1193.53	
06/03/97	148.62	1193.56	
07/08/97	148.57	1193.61	
08/06/97	148.51	1193.67	
09/03/97	148.52	1193.66	
10/07/97	148.49	1193.69	
11/04/97	148.53	1193.65	
12/02/97	148.50	1193.68	
01/15/98	148.51	1193.67	
02/06/98	148.49	1193.69	
03/05/98	148.31	1193.87	
04/03/98	147.61	1194.57	
05/07/98	146.82	1195.36	
06/05/98	145.95	1196.23	
07/22/98	144.98	1197.20	
08/17/98	153.61	1188.57	
09/01/98	144.56	1197.62	
10/09/98	143.61	1198.57	
11/17/98	144.82	1197.36	
12/01/98	145.08	1197.10	
01/05/99	145.27	1196.91	
02/01/99	145.63	1196.55	
03/09/99	145.61	1196.57	
04/13/99	145.75	1196.43	
05/04/99	145.79	1196.39	
06/01/99	145.72	1196.46	
07/28/99	146.15	1196.03	
08/12/99	146.18	1196.00	
09/12/99			NM
10/20/99	146.40	1195.78	
12/03/99	146.88	1195.30	
01/19/00	149.85	1192.33	
02/28/00	150.88	1191.30	
03/16/00	150.77	1191.41	
04/07/00	151.09	1191.09	
05/02/00	151.16	1191.02	
06/08/00	150.96	1191.22	
07/06/00	149.62	1192.56	CB
08/04/00	149.00	1193.18	
08/14/00	149.10	1193.08	PS
09/05/00	149.42	1192.76	
10/10/00	147.92	1194.26	CB
10/27/00	147.67	1194.51	ps
11/01/00	147.67	1194.51	CB
12/01/00	147.37	1194.81	CB

Table A-1. Ground water elevations, Building 854 area. Results reported by April 23, 2003.

Location / Date of Measurement	Depth to Water (ft)	Water Elevation (ft/MSL)	Notes
W-854-11 (continued)			
01/04/01	150.11	1192.07	CB
02/06/01	149.55	1192.63	PS
02/07/01	149.55	1192.63	CB
03/06/01	148.04	1194.14	CB
04/04/01	150.38	1191.80	CB
05/03/01	149.60	1192.58	CB
05/10/01	150.13	1192.05	PS
06/04/01	150.22	1191.96	CB
07/05/01	151.81	1190.37	CB
08/06/01	152.66	1189.52	CB
09/04/01	152.80	1189.38	CB
10/02/01	152.90	1189.28	CB
11/05/01	152.87	1189.31	CB
12/06/01	152.91	1189.27	CB
12/14/01	152.95	1189.23	PS
01/08/02	153.02	1189.16	CB
02/07/02	153.11	1189.07	CB
03/04/02			CB/DRY
04/04/02			NM/CB
05/01/02			DRY/CB
06/03/02			CB/DRY
07/15/02			DRY/CB
08/03/02			DRY/CB
09/07/02			CB/DRY
10/03/02			DRY/CB
01/04/03			DRY/CB
02/01/03			DRY/CB
03/01/03			CB/DRY
W-854-12			
04/13/99	225.79	1029.88	
05/04/99	225.78	1029.89	
06/01/99			DRY
07/28/99	225.91	1030.88	
08/12/99	226.11	1030.68	
09/12/99			NM
10/18/99	226.12	1030.67	
12/03/99	226.23	1030.56	
01/19/00	226.27	1030.52	
02/28/00	226.36	1030.43	
03/16/00	226.37	1030.42	
04/07/00	226.19	1030.60	
05/02/00	226.32	1030.47	
05/16/00	226.40	1030.39	PS
06/08/00	226.47	1030.32	
07/06/00	226.88	1029.91	
08/04/00	226.62	1030.17	
08/14/00	226.38	1030.41	PS
09/05/00	226.70	1030.09	
10/10/00	226.77	1030.02	
11/01/00	226.79	1030.00	
12/01/00	226.75	1030.04	
01/04/01	226.90	1029.89	
02/07/01	226.93	1029.86	
03/06/01	226.85	1029.94	
04/04/01	226.78	1030.01	
05/03/01	226.83	1029.96	
06/04/01	226.74	1030.05	
07/03/01	226.76	1030.03	
08/06/01	226.76	1030.03	
09/04/01	226.77	1030.02	
10/02/01	226.81	1029.98	
11/05/01	226.86	1029.93	
12/06/01	226.81	1029.98	
12/13/01	226.86	1029.93	PS

Location / Date of Measurement	Depth to Water (ft)	Water Elevation (ft/MSL)	Notes
W-854-12 (continued)			
01/08/02	226.90	1029.89	
02/07/02	226.79	1030.00	
03/04/02	226.79	1030.00	
04/04/02			NM
05/01/02	226.90	1029.89	
06/03/02	226.81	1029.98	
07/15/02	226.74	1030.05	
08/05/02	226.84	1029.95	
09/07/02	226.82	1029.97	
10/03/02	226.84	1029.95	
01/04/03	226.87	1029.92	
02/01/03	226.89	1029.90	
03/01/03	226.83	1029.96	
W-854-13			
04/13/99	101.81	1153.86	
05/04/99	101.26	1154.41	
06/01/99	101.06	1156.11	
07/28/99	100.86	1156.31	
08/12/99	101.24	1155.93	
09/12/99			NM
10/18/99	100.89	1156.28	
12/03/99	101.45	1155.72	
01/19/00	100.67	1156.50	
02/28/00	101.11	1156.06	
03/16/00	101.04	1156.13	
04/07/00	100.99	1156.18	
05/02/00	101.19	1155.98	
05/16/00	101.28	1155.89	PS
06/08/00	100.30	1156.87	
07/06/00	101.56	1155.61	
08/04/00	101.20	1155.97	
08/14/00	101.24	1155.93	PS
09/05/00	101.18	1155.99	
10/10/00	101.26	1155.91	
11/01/00	101.18	1155.99	
11/10/00	101.11	1156.06	ps
12/01/00	101.25	1155.92	
01/04/01	101.28	1155.89	
02/07/01	101.25	1155.92	
02/12/01	101.25	1155.92	PS
03/06/01	101.01	1156.16	
04/04/01	101.24	1155.93	
05/03/01	101.40	1155.77	
05/08/01	101.44	1155.73	PS
06/04/01	101.38	1155.79	
07/03/01	101.45	1155.72	
08/06/01	101.51	1155.66	
09/04/01	101.54	1155.63	
10/02/01	101.58	1155.59	
11/05/01	101.65	1155.52	
12/06/01	101.60	1155.57	
12/13/01	101.64	1155.53	PS
01/08/02	101.49	1155.68	
01/28/02	101.53	1155.64	PS
02/07/02	101.58	1155.59	
03/04/02	101.69	1155.48	
04/04/02			NM
05/01/02	101.71	1155.46	
06/03/02	101.73	1155.44	
07/15/02	101.70	1155.47	
08/05/02	101.72	1155.45	
08/28/02	101.76	1155.41	PS
09/07/02	101.76	1155.41	
10/03/02	101.77	1155.40	

Table A-1. Ground water elevations, Building 854 area. Results reported by April 23, 2003.

W-854-13 (continued)

Date of Measurement	Depth to Water (ft)	Water Elevation (ft/MSL)	Notes
12/17/02	101.69	1155.48	ps
01/04/03	101.64	1155.53	
02/01/03	101.64	1155.53	
03/01/03	101.61	1155.56	

W-854-14

Date of Measurement	Depth to Water (ft)	Water Elevation (ft/MSL)	Notes
04/13/99	62.78	944.35	POM=2.81
05/04/99	63.10	944.03	
06/01/99	63.25	943.88	
07/28/99	63.93	943.20	
08/12/99	63.98	943.15	
09/12/99			NM
10/18/99	64.43	942.70	
12/07/99	65.13	942.00	
01/19/00	65.38	941.75	
02/28/00	66.15	940.98	
03/16/00	66.28	940.85	
04/07/00	66.38	940.75	
05/02/00	64.17	940.15	POM 0.0
05/17/00	64.66	939.66	PS
06/08/00	64.39	939.93	
07/06/00	64.44	939.88	CB
08/04/00	64.63	939.69	
09/05/00	64.97	939.35	
10/10/00	65.33	938.99	CB
11/01/00	65.50	938.82	CB
12/01/00	65.83	938.49	CB
01/04/01	66.25	938.07	CB
02/07/01	66.63	937.69	CB
03/06/01	67.03	937.29	CB
04/04/01	67.50	936.82	CB
05/03/01	67.87	936.45	CB
05/08/01	67.93	936.39	PS
06/04/01	68.40	935.92	CB
07/05/01	68.80	935.52	CB
08/06/01	69.34	934.98	CB
09/04/01			CB/NM
10/02/01			CB/NM
11/05/01			DRY/CB
12/06/01	69.76	934.56	CB
12/14/01	69.97	934.35	PS
01/08/02			CB/DRY
02/07/02			CB/DRY
03/04/02			CB/DRY
04/04/02			NM/CB
05/01/02			DRY/CB
06/06/02			CB/DRY
07/22/02			DRY/CB
08/05/02			DRY/CB
09/07/02			CB/DRY
10/04/02			DRY/CB
01/04/03			DRY/CB
02/01/03			DRY/CB
03/01/03			CB/DRY

W-854-15

Date of Measurement	Depth to Water (ft)	Water Elevation (ft/MSL)	Notes
06/12/00	72.15	1057.85	
06/29/00	72.10	1057.90	PS
07/06/00	83.31	1046.69	CB
08/04/00	74.64	1055.36	
09/05/00	72.76	1057.24	
10/11/00	72.80	1057.20	CB
11/01/00	72.97	1057.03	CB
12/01/00	72.98	1057.02	CB

W-854-15 (continued)

Date of Measurement	Depth to Water (ft)	Water Elevation (ft/MSL)	Notes
01/04/01	73.38	1056.62	CB
02/07/01	73.32	1058.68	2.00 STOVE P
03/06/01	73.17	1058.83	
04/04/01	73.27	1058.73	CB
05/03/01	73.30	1058.70	
05/09/01	73.39	1058.61	PS
06/04/01	73.39	1058.61	
07/06/01	73.55	1058.45	CB
08/06/01	73.70	1058.30	
09/04/01	73.69	1058.31	
10/02/01	73.85	1058.15	CB
11/02/01	73.91	1058.09	CB
12/06/01	74.02	1057.98	CB
12/14/01	74.04	1057.96	PS
01/08/02	74.28	1057.72	CB
01/29/02	74.25	1057.75	PS
02/07/02	74.47	1057.53	CB
03/04/02	74.18	1057.82	CB
04/04/02			NM/CB
05/01/02	74.00	1058.00	CB
06/03/02	73.97	1058.03	CB
07/15/02	74.19	1057.81	CB
08/05/02	74.23	1057.77	CB
09/07/02	74.31	1057.69	CB
09/10/02	74.32	1057.68	PS
10/03/02	74.55	1057.45	CB
12/17/02	74.72	1057.28	ps
01/04/03	74.93	1057.07	CB
02/01/03	75.22	1056.78	CB
03/01/03	74.73	1057.27	CB

W-854-17

Date of Measurement	Depth to Water (ft)	Water Elevation (ft/MSL)	Notes
06/12/00	139.95	1194.19	
06/30/00	140.65	1193.49	PS
07/06/00	140.68	1193.46	
08/04/00	140.71	1193.43	
08/29/00	140.63	1193.51	PS
09/05/00	140.67	1193.47	
10/10/00	141.10	1193.04	
10/27/00	140.97	1193.17	ps
11/01/00	140.97	1193.17	
12/01/00	141.01	1193.13	
01/04/01	141.17	1192.97	
02/07/01	141.39	1192.75	
02/12/01	141.39	1192.75	PS
03/06/01	141.32	1192.82	
04/04/01	142.16	1191.98	
05/03/01	142.43	1191.71	
05/09/01	142.52	1191.62	PS
06/04/01	142.93	1191.21	
07/05/01	141.60	1192.54	
08/06/01	140.43	1193.71	
09/04/01	141.04	1193.10	
10/02/01	141.45	1192.69	
11/02/01	142.37	1191.77	
12/06/01	143.67	1190.47	
12/14/01	143.11	1191.03	PS
01/08/02	143.38	1190.76	
01/29/02	143.47	1190.67	PS
02/07/02	143.42	1190.72	
03/04/02	143.28	1190.86	
04/04/02			NM
05/01/02	143.16	1190.98	
06/06/02	143.22	1190.92	
07/15/02	143.39	1190.75	

Table A-1. Ground water elevations, Building 854 area. Results reported by April 23, 2003.

Location / Date of Measurement	Depth to Water (ft)	Water Elevation (ft/MSL)	Notes
W-854-17 (continued)			
08/05/02	143.59	1190.55	
09/07/02	143.70	1190.44	
09/10/02	143.71	1190.43	PS
10/05/02	143.80	1190.34	
12/17/02	143.81	1190.33	ps
01/04/03	143.77	1190.37	
02/01/03	143.58	1190.56	
03/01/03	143.45	1190.69	
W-854-18A			
06/13/00	139.46		
06/30/00	139.42	139.42	PS
07/06/00	139.75		
08/04/00	139.44		
08/14/00	139.43	1196.47	PS
09/05/00	139.75	1196.15	
10/10/00	140.03	1195.87	
10/27/00	140.28	1195.62	ps
11/01/00	140.28	1195.62	
12/01/00	140.46	1195.44	
01/04/01	140.71	1195.19	
02/06/01	140.63	1195.27	PS
02/07/01	140.63	1195.27	
03/06/01	140.48	1195.42	
04/04/01	140.56	1195.34	
05/03/01	140.78	1195.12	
05/10/01	140.80	1195.10	PS
06/04/01	140.98	1194.92	
07/05/01	140.77	1195.13	
08/06/01	140.64	1195.26	
09/04/01	140.57	1195.33	
10/02/01	140.70	1195.20	
11/02/01	140.85	1195.05	
12/06/01	141.00	1194.90	
12/13/01	141.02	1194.88	PS
01/08/02	141.07	1194.83	
01/28/02	141.04	1194.86	PS
02/07/02	141.05	1194.85	
03/04/02	141.06	1194.84	
04/04/02			NM
05/01/02	140.62	1195.28	
06/06/02	140.80	1195.10	
07/15/02	140.89	1195.01	
08/03/02	141.03	1194.87	
08/28/02	141.07	1194.83	PS
09/07/02	141.07	1194.83	
10/03/02	141.12	1194.78	
12/17/02	143.33	1192.57	ps
01/04/03	141.33	1194.57	
02/01/03	141.07	1194.83	
03/01/03	140.91	1194.99	
W-854-19			
10/20/99	76.32	1028.83	
12/03/99	76.53	1028.62	
01/20/00		1105.15	NM
02/29/00		1105.15	NA
03/16/00	77.64	1027.51	
04/07/00	77.76	1027.39	
05/02/00		1105.15	DRY
06/08/00	139.91	967.24	POM2.00
07/10/00	139.97	967.18	
08/04/00			DRY
09/05/00			DRY
W-854-19 (continued)			
10/10/00			DRY
11/01/00			DRY
12/01/00			DRY
01/04/01			DRY
02/07/01			DRY
03/06/01			DRY
04/04/01			DRY
05/03/01			DRY
06/04/01			DRY
07/03/01			DRY
08/06/01			DRY
09/04/01			DRY
10/02/01			DRY
11/05/01			DRY
12/06/01			DRY
01/08/02			DRY
02/07/02			DRY
03/04/02			DRY
04/04/02			NM
05/01/02			DRY
06/08/02			DRY
07/22/02			DRY
08/03/02			DRY
09/07/02			DRY
10/03/02			DRY
01/04/03			DRY
02/01/03			DRY
03/01/03			DRY
W-854-45			
02/16/01	98.74	905.26	2.00 STOVE P
03/06/01	98.60	905.40	
05/03/01	98.14	905.86	
06/04/01	97.96	906.04	
07/10/01	97.94	906.06	PS
08/06/01	97.87	906.13	
09/04/01	97.54	906.46	
10/02/01	97.53	906.47	
11/05/01	97.46	906.54	
12/06/01	97.49	906.51	
12/14/01	97.48	906.52	PS
01/08/02	97.06	906.94	
01/28/02	96.91	907.09	PS
02/07/02	96.85	907.15	
03/04/02	96.78	907.22	
04/04/02			NM
05/01/02	96.49	907.51	
06/06/02	96.20	907.80	
07/22/02	96.11	907.89	
08/05/02	96.07	907.93	
09/07/02	96.00	908.00	
10/03/02	95.98	908.02	
12/18/02	95.76	908.24	ps
01/04/03	95.64	908.36	
02/01/03	95.27	908.73	
03/01/03	95.23	908.77	
W-854-1701			
07/11/01	243.02	1007.30	PS
08/06/01	243.11	1007.21	
09/04/01	243.04	1007.28	
10/02/01	242.76	1007.56	
11/05/01	242.94	1007.38	
12/07/01	243.32	1007.00	

Table A-1. Ground water elevations, Building 854 area. Results reported by April 23, 2003.

Location / Date of Measurement	Depth to Water (ft)	Water Elevation (ft/MSL)	Notes
W-854-1701 (continued)			
12/14/01	243.51	1006.81	PS
01/08/02	242.90	1007.42	
02/07/02	243.03	1007.29	
02/26/02	243.05	1007.27	PS
03/04/02	242.43	1007.89	
04/04/02			NM
05/01/02	242.77	1007.55	
06/08/02	242.61	1007.71	
07/22/02	242.58	1007.74	
08/05/02	242.65	1007.67	
09/07/02	242.43	1007.89	
09/10/02	242.51	1007.81	PS
10/05/02	242.62	1007.70	
01/04/03			NM/NO ACCESS
02/01/03	242.45	1007.87	
03/01/03	242.42	1007.90	
W-854-1706			
08/06/01			DRY
09/04/01			DRY
10/10/01			DRY
11/06/01			DRY
12/07/01			DRY
01/08/02			DRY
02/07/02			DRY
03/04/02			DRY
04/04/02			NM
05/08/02			DRY
06/08/02			DRY
07/22/02			DRY
08/05/02			DRY
09/07/02			DRY
10/05/02			DRY
01/04/03			NM/NO ACCESS
02/01/03			DRY
03/01/03			DRY
W-854-1707			
07/09/01	1.26	855.74	PS
08/06/01	3.81	853.19	
09/04/01	6.13	850.87	
10/10/01	6.17	850.83	
11/06/01	10.11	846.89	
12/07/01	10.48	846.52	
12/12/01	10.36	846.64	PS
01/08/02	9.74	847.26	
01/30/02	11.50	845.50	PS
02/07/02	11.60	845.40	
03/04/02	11.46	845.54	
04/04/02			NM
05/08/02	11.99	845.01	
06/08/02	13.11	843.89	
07/22/02	14.16	842.84	
08/05/02	14.15	842.85	
09/07/02	14.34	842.66	
09/10/02	14.49	842.51	PS
10/05/02	14.57	842.43	
01/04/03			NM/NO ACCESS
02/01/03	12.69	844.31	
03/01/03	13.04	843.96	
W-854-1731			
12/06/01	75.47	925.53	CB

Location / Date of Measurement	Depth to Water (ft)	Water Elevation (ft/MSL)	Notes
W-854-1731 (continued)			
01/08/02	75.00	926.00	
02/07/02	75.00	928.49	
03/04/02	75.04	928.45	
04/04/02			NM
05/01/02	74.81	928.68	
06/06/02	74.55	928.94	
07/22/02	74.49	929.00	
08/04/02	74.51	928.98	
09/07/02	74.38	929.11	
09/27/02	74.38	929.11	PS
10/04/02	74.36	929.13	
12/20/02	74.34	929.15	ps
01/04/03	74.31	929.18	
02/01/03	73.76	929.73	
03/01/03	73.82	929.67	
W-854-F2			
01/21/93			DRY
02/25/93			DRY
03/16/93			DRY
05/10/93			DRY
06/16/93			DRY
07/13/93			DRY
08/12/93			DRY
10/18/93			DRY
11/16/93			DRY
12/02/93			DRY
01/11/94			DRY
02/02/94			DRY
04/06/94			DRY
07/07/94			DRY
10/19/94			DRY
01/11/95			DRY
01/12/95			DRY
04/06/95			DRY
10/05/95			DRY
01/12/96			DRY
04/05/96			DRY
07/11/96			DRY
10/09/96			DRY
01/13/97			DRY
04/10/97			DRY
07/07/97			DRY
10/07/97			DRY
01/15/98			DRY
04/03/98			DRY
07/22/98			DRY
10/09/98			DRY
01/05/99			DRY
04/13/99			DRY
07/28/99			DRY
10/18/99			DRY
01/19/00			DRY
04/07/00			DRY
07/06/00			DRY
10/10/00			DRY
01/04/01			DRY
04/04/01			DRY
07/03/01			DRY
10/02/01			DRY
01/08/02			DRY
04/04/02			NM
07/15/02			DRY
10/03/02			DRY
01/04/03			DRY

Table A-1. Ground water elevations, Building 854 area. Results reported by April 23, 2003.

Location / Date of Measurement	Depth to Water (ft)	Water Elevation (ft/MSL)	Notes
WELL13			
04/21/59	135.00	976.82	
11/23/81	208.00	903.82	
12/01/81	208.80	903.02	
12/29/81	208.50	903.32	
02/02/82	208.10	903.72	
02/23/82	209.00	902.82	
04/08/82	178.10	933.72	
05/02/82	207.00	904.82	
07/07/82	182.50	929.32	
08/21/82	180.20	931.62	
10/06/82	173.50	938.32	
07/01/90	197.21	914.61	
11/24/92	199.31	912.21	
07/13/93	198.61	912.91	
10/18/93	198.41	913.11	
01/11/94	198.23	913.29	
04/11/94	198.07	913.45	
07/07/94	197.65	913.87	
10/19/94	197.70	913.82	
01/18/95	197.73	913.79	
04/06/95	197.09	914.43	
05/23/95	197.08	914.44	PS
07/12/95	197.16	914.36	
10/06/95	196.66	914.86	
01/12/96			NA
04/05/96			ABD

Notes:

ABD	Abandoned well.
AD	Drilling of adjacent new wells disturbed water level.
BS	Water detected below bottom of screened interval.
DRY	Well dry at time of time of measurement.
ME	Measuring error suspected.
NM	Not measured.
PD	Predevelopment measurement.
PS	Measurement taken just before sampling.
PT	Pump test interfered with measurement.
WE	Well equilibrium suspect.
WR	Well recovery.

Table A-2. Volatile organic compounds in ground water and surface water (ug/L) collected from the Building 854 area. Results recorded by April 29, 2003.

VOCs in Ground Water, Site 300
April 30, 2003
gemini1

s300voc_854L.30apr2003
s300voc_854R.30apr2003

Table A-2. Volatile organic compounds in ground water and surface water (ug/L)

Location Date	Lab	Note	Val.	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	Total 1,2-DCE	TCE	PCE
W-854-01									
27-jun-1996	CS	a	V	<1 U	-	-	<1 U	<0.5 U	<1 U
15-aug-1996	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	<0.5 U	<0.5 U
26-dec-1996	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	<0.5 U	<0.5 U
23-jan-1997	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	<0.5 U	<0.5 U
07-may-1997	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	<0.5 U	<0.5 U
12-aug-1997	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	<0.5 U	<0.5 U
28-oct-1997	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	<0.5 U	<0.5 U
11-mar-1998	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	<0.5 U	<0.5 U
24-apr-1998	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	<0.5 U	<0.5 U
30-jul-1998	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	<0.5 U	<0.5 U
12-nov-1998	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	<0.5 U	<0.5 U
26-jan-1999	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	<0.5 U	<0.5 U
24-may-1999	CN	a	V	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU
26-aug-1999	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 OU
01-dec-1999	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
20-mar-2000	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
17-may-2000	CN	a	V	<1 U	<1 U	<1 U	<0.5 U	<1 U	<1 U
11-aug-2000	CN	a	V	<0.5 U	<0.5 LOU	<0.5 U	<0.5 U	<0.5 U	<0.5 U
27-oct-2000	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
12-feb-2001	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
08-may-2001	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
03-jul-2001	CN	a	V	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU
29-nov-2001	CN	a	V	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU
28-jan-2002	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
28-aug-2002	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
18-dec-2002	CN	a	V	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
W-854-02									
27-jun-1996	CS	a	V	<1 U	-	-	<1 U	460 D	<1 U
15-aug-1996	CS	a	V	<2.5 DU	<2.5 DU	<2.5 DU	-	530 D	<2.5 DU
26-dec-1996	CS	ah	V	<5 DU	<5 DU	<5 DU	-	650 D	<5 DU
26-dec-1996	CS	aeh	V	<5 DU	<5 DU	<5 DU	-	570 D	<5 DU
24-jan-1997	CS	a	V	<5 DU	<5 DU	<5 DU	-	590 D	<5 DU
12-may-1997	CS	a	V	<5 DU	<5 DU	<5 DU	-	2900 D	<5 DU
30-jul-1997	CS	ah	V	<5 DU	<5 DU	<5 DU	-	400 D	<5 DU
30-jul-1997	CS	aeh	V	<2.5 DU	<2.5 DU	<2.5 DU	-	460 D	<2.5 DU
29-oct-1997	CS	a	V	<2.5 DU	<2.5 DU	<2.5 DU	-	470 D	<2.5 DU
13-mar-1998	CS	a	V	<2.5 DU	<2.5 DU	<2.5 DU	-	390 D	<2.5 DU
01-may-1998	CS	af	V	<2.5 DU	<2.5 DU	<2.5 DU	-	410 DO	<2.5 DU
30-jul-1998	CS	af	V	<0.5 U	<0.5 U	<0.5 U	-	260 D	<0.5 U
13-nov-1998	CS	af	V	<0.5 U	<0.5 U	<0.5 U	-	180 D	<0.5 U
17-feb-1999	CS	af	V	<0.5 U	<0.5 U	<0.5 U	-	180 D	<0.5 U
28-jun-1999	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	140 D	<0.5 U
04-oct-1999	CN	af	V	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	94 DLO	<0.5 LOU
29-mar-2000	CN	a	V	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	400 DLO	<0.5 LOU
30-jun-2000	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	380 DLO	<0.5 U
30-aug-2000	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	140 DL	<0.5 U
26-mar-2001	BB	a	V	<2 DU	<2 DU	<2 DU	<3 DU	300 D	<2 DU
06-jun-2001	SE	af	V	<12 DU	<12 DU	<12 DU	<12 DU	310 D	<12 DU
06-jul-2001	BB	a	V	<0.5 U	<0.5 U	<0.5 U	<1 U	290 D	<0.5 U
15-jan-2002	SE	af	N	<5 DU	<5 DU	<5 DU	<5 DU	200 D	<5 DU
14-mar-2002	SE	af	V	<5 LODU	<5 LODU	<5 LODU	<5 LODU	230 LOD	<5 LODU
10-apr-2002	SE	af	V	<5 DU	<5 DU	<5 DU	<5 DU	240 D	<5 DU
08-may-2002	SE	af	V	<5 DLOU	<5 DLOU	<5 DLOU	<5 DLOU	220 DLO	<5 DLOU
18-jun-2002	SE	af	V	<5 DLOU	<5 LODU	<5 LODU	<5 LODU	240 LOD	<5 LODU
10-jul-2002	SE	afj	V	<5 DU	<5 DUO	<5 DU	<5 DU	270 D	<5 DU
08-aug-2002	SE	afj	V	<5 DU	<5 DU	<5 DU	<5 DU	260 D	<5 DU
09-oct-2002	SE	afj	V	<5 DU	<5 DOU	<5 DU	<5 DU	360 DL	<5 DOU
W-854-03									
17-sep-1996	CS	a	V	<1 U	-	-	<1 U	150 D	<1 U
13-dec-1996	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	180 D	<0.5 U
24-jan-1997	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	170 D	<0.5 U
07-may-1997	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	140 D	<0.5 U
12-aug-1997	CS	af	V	<0.5 U	<0.5 U	<0.5 U	-	140 D	<0.5 U
29-oct-1997	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	170 D	<0.5 U
13-mar-1998	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	130 D	<0.5 U

collected from the Building 854 area. Results recorded by April 29, 2003.

1,1-DCA	1,2-DCA	1,1,1-TCA	Chloroform	Freon 11	Freon 113	Methylene chloride	Location Date
							W-854-01
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	27-jun-1996
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	15-aug-1996
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	26-dec-1996
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	23-jan-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	07-may-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	12-aug-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	28-oct-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	11-mar-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	24-apr-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	30-jul-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	12-nov-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	26-jan-1999
<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	24-may-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 OU	<0.5 U	<0.5 U	<0.5 U	26-aug-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	01-dec-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	20-mar-2000
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<3 U	17-may-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	11-aug-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	27-oct-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	12-feb-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	08-may-2001
<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	03-jul-2001
<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	29-nov-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	28-jan-2002
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	28-aug-2002
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<3 U	18-dec-2002
							W-854-02
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	27-jun-1996
<2.5 DU	<2.5 DU	<2.5 DU	<2.5 DU	<2.5 DU	<2.5 DU	<2.5 DU	15-aug-1996
<5 DU	<5 DU	<5 DU	<5 DU	<5 DU	<5 DU	<5 DU	26-dec-1996
<5 DU	<5 DU	<5 DU	<5 DU	<5 DU	<5 DU	<5 DU	26-dec-1996
<5 DU	<5 DU	<5 DU	<5 DU	<5 DU	<5 DU	<5 DU	24-jan-1997
<5 DU	<5 DU	<5 DU	<5 DU	<5 DU	<5 DU	<5 DU	12-may-1997
<5 DU	<5 DU	<5 DU	<5 DU	<5 DU	<5 DU	<5 DU	30-jul-1997
<2.5 DU	<2.5 DU	<2.5 DU	<2.5 DU	<2.5 DU	<2.5 DU	<2.5 DU	30-jul-1997
<2.5 DU	<2.5 DU	<2.5 DU	<2.5 DU	<2.5 DU	<2.5 DU	<2.5 DU	29-oct-1997
<2.5 DU	<2.5 DU	<2.5 DU	<2.5 DU	<2.5 DU	<2.5 DU	<2.5 DU	13-mar-1998
<2.5 DU	<2.5 DU	<2.5 DU	<2.5 DU	<2.5 DU	<2.5 DU	<2.5 DU	01-may-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	30-jul-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	1.8	13-nov-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	17-feb-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	28-jun-1999
<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	04-oct-1999
<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	29-mar-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	30-jun-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	30-aug-2000
<2 DU	<2 DU	<2 DU	<2 DU	<2 DU	<2 DU	<3 DU	26-mar-2001
<12 DU	<12 DU	<12 DU	<12 DU	<12 DU	<12 DU	<12 DU	06-jun-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	06-jul-2001
<5 DU	<5 DU	<5 DU	<5 DU	<5 DU	<5 DU	<5 DU	15-jan-2002
<5 LODU	<5 LODU	<5 LODU	<5 LODU	<5 LODU	<5 LODU	<5 LODU	14-mar-2002
<5 DU	<5 DU	<5 DU	<5 DU	<5 DU	<5 DU	<5 DU	10-apr-2002
<5 DLOU	<5 DLOU	<5 DLOU	<5 DLOU	<5 DLOU	<5 DLOU	<5 DLOU	08-may-2002
<5 DLOU	<5 DLOU	<5 LODU	<5 DLOU	<5 LODU	<5 LODU	<5 LODU	18-jun-2002
<5 DU	<5 DU	<5 DUO	<5 DUO	<5 DU	<5 DU	<5 DU	10-jul-2002
<5 DU	<5 DU	<5 DU	<5 DU	<5 DU	<5 DU	<5 DU	08-aug-2002
<5 DOU	<5 DU	<5 DOU	<5 DU	<5 DU	<5 DOU	<5 DU	09-oct-2002
							W-854-03
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	17-sep-1996
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	13-dec-1996
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	24-jan-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	07-may-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	12-aug-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	29-oct-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	13-mar-1998

Table A-2. Volatile organic compounds in ground water and surface water (ug/L)

Location Date	Lab	Note	Val.	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	Total 1,2-DCE	TCE	PCE
W-854-03 (continued)									
01-may-1998	CS	af	V	<0.5 U	<0.5 U	<0.5 U	–	180 DO	<0.5 U
30-jul-1998	CS	afg	V	<0.5 U	<0.5 U	<0.5 U	–	230 D	<0.5 U
30-jul-1998	CS	af	V	<0.5 U	<0.5 U	<0.5 U	–	210 D	<0.5 U
23-nov-1998	CS	af	V	<0.5 U	<0.5 U	<0.5 U	–	230 D	<0.5 U
16-feb-1999	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	270 D	<0.5 U
28-jun-1999	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	220 D	<0.5 U
29-sep-1999	CN	af	V	<10 DLOU	<10 DLOU	<10 DLOU	<0.5 DLOU	180 DLO	<10 DLOU
01-dec-1999	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	230 D	<0.5 U
28-feb-2000	BB	afg	V	<0.5 U	<0.5 U	<0.5 U	<1 U	140 D	<0.5 U
28-feb-2000	CN	afg	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	180 DF	<0.5 U
16-may-2000	CN	af	V	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	110 DL	<0.5 LOU
16-aug-2000	CN	af	V	<0.5 U	<0.5 OU	<0.5 U	<0.5 U	97 DL	<0.5 U
26-mar-2001	BB	a	V	<0.5 U	<0.5 U	<0.5 U	<1 U	110 D	<0.5 U
06-jun-2001	SE	af	V	<6.2 DU	<6.2 DU	<6.2 DU	<6.2 DU	98 D	<6.2 DU
09-jul-2001	CN	af	V	<0.5 U	<0.5 OU	<0.5 U	<0.5 U	89 DLO	<0.5 U
06-mar-2002	SE	af	V	<2 DU	<2 DU	<2 DU	<2 DU	84 D	<2 DU
10-apr-2002	SE	af	V	<2 DLOU	<2 DLOU	<2 DLOU	<2 DLOU	93 DLO	<2 DLOU
08-may-2002	SE	af	V	<2.5 DLOU	<2.5 DLOU	<2.5 DLOU	<2.5 DLOU	80 DLO	<2.5 DLOU
18-jun-2002	SE	af	V	<1 LODU	<1 LODU	<1 LODU	<1 LODU	72 LOD	<1 LODU
10-jul-2002	SE	afj	V	<2.5 DU	<2.5 DUO	<2.5 DU	<2.5 DU	79 D	<2.5 DU
08-aug-2002	SE	afj	V	<2.5 DU	<2.5 DU	<2.5 DU	<2.5 DU	120 D	<2.5 DU
09-oct-2002	SE	afj	V	<2.5 DU	<2.5 DOU	<2.5 DU	<2.5 DU	150 DL	<2.5 DOU
W-854-04									
16-aug-1996	CS	a	V	<1 U	–	–	<1 U	<0.5 U	<1 U
13-dec-1996	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	0.62	<0.5 U
24-jan-1997	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	<0.5 U	<0.5 U
07-may-1997	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	<0.5 U	<0.5 U
12-aug-1997	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	<0.5 U	<0.5 U
28-oct-1997	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	<0.5 U	<0.5 U
11-mar-1998	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	<0.5 U	<0.5 U
24-apr-1998	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	<0.5 U	<0.5 U
30-jul-1998	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	<0.5 U	<0.5 U
12-nov-1998	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	<0.5 U	<0.5 U
29-jan-1999	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	<0.5 U	<0.5 U
26-aug-1999	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 OU
16-may-2000	CN	a	V	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU
11-aug-2000	CN	a	V	<0.5 U	<0.5 LOU	<0.5 U	<0.5 U	<0.5 U	<0.5 U
27-oct-2000	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
12-feb-2001	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
08-may-2001	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
03-jul-2001	CN	a	V	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU
29-nov-2001	CN	a	V	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU
26-feb-2002	CN	a	V	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU
28-aug-2002	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
18-dec-2002	CN	a	V	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
W-854-05									
16-aug-1996	CS	a	V	<1 U	–	–	<1 U	<0.5 U	<1 U
12-dec-1996	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	<0.5 U	<0.5 U
23-jan-1997	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	<0.5 U	<0.5 U
07-may-1997	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	<0.5 U	<0.5 U
12-aug-1997	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	<0.5 U	<0.5 U
28-oct-1997	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	<0.5 U	<0.5 U
11-mar-1998	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	<0.5 U	<0.5 U
24-apr-1998	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	<0.5 U	<0.5 U
30-jul-1998	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	<0.5 U	<0.5 U
13-nov-1998	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	<0.5 U	<0.5 U
26-jan-1999	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	<0.5 U	<0.5 U
28-jun-1999	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
01-dec-1999	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
29-feb-2000	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
16-may-2000	CN	af	V	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU
11-aug-2000	CN	a	V	<0.5 U	<0.5 LOU	<0.5 U	<0.5 U	<0.5 U	<0.5 U
10-nov-2000	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
06-feb-2001	CN	ag	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
06-feb-2001	SE	ag	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
09-may-2001	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

collected from the Building 854 area. Results recorded by April 29, 2003.

1,1-DCA	1,2-DCA	1,1,1-TCA	Chloro-form	Freon 11	Freon 113	Methylene chloride	Location Date
							(continued) W-854-03
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	01-may-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	30-jul-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	30-jul-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	23-nov-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	16-feb-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	28-jun-1999
<10 DLOU	<10 DLOU	<10 DLOU	<10 DLOU	<10 DLOU	<0.5 DLOU	<10 DLOU	29-sep-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	01-dec-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	28-feb-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	28-feb-2000
<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	16-may-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	16-aug-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	26-mar-2001
<6.2 DU	<6.2 DU	<6.2 DU	<6.2 DU	<6.2 DU	<6.2 DU	<6.2 DU	06-jun-2001
<0.5 U	<0.5 OU	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	09-jul-2001
<2 DU	<2 DU	<2 DU	<2 DU	<2 DU	<2 DU	<2 DU	06-mar-2002
<2 DLOU	<2 DLOU	<2 DLOU	<2 DLOU	<2 DLOU	<2 DLOU	<2 DLOU	10-apr-2002
<2.5 DLOU	<2.5 DLOU	<2.5 DLOU	<2.5 DLOU	<2.5 DLOU	<2.5 DLOU	<2.5 DLOU	08-may-2002
<1 LODU	<1 LODU	<1 LODU	<1 LODU	<1 LODU	<1 LODU	<1 LODU	18-jun-2002
<2.5 DU	<2.5 DU	<2.5 DUO	<2.5 DUO	<2.5 DU	<2.5 DU	<2.5 DU	10-jul-2002
<2.5 DU	<2.5 DU	<2.5 DU	<2.5 DU	<2.5 DU	<2.5 DU	<2.5 DU	08-aug-2002
<2.5 DOU	<2.5 DU	<2.5 DOU	<2.5 DU	<2.5 DU	<2.5 DOU	<2.5 DU	09-oct-2002
							W-854-04
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	16-aug-1996
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	13-dec-1996
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	24-jan-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	07-may-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	12-aug-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	28-oct-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	11-mar-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	24-apr-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	30-jul-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	12-nov-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	29-jan-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 OU	<0.5 U	<0.5 U	<0.5 U	26-aug-1999
<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	16-may-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	11-aug-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	27-oct-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	12-feb-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	08-may-2001
<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	03-jul-2001
<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	29-nov-2001
<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	26-feb-2002
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	28-aug-2002
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<3 U	18-dec-2002
							W-854-05
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	16-aug-1996
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	12-dec-1996
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	23-jan-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	07-may-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	12-aug-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	28-oct-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	11-mar-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	24-apr-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	30-jul-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	13-nov-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	26-jan-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	28-jun-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	01-dec-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	29-feb-2000
<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	16-may-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	11-aug-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	10-nov-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	06-feb-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	06-feb-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	09-may-2001

Table A-2. Volatile organic compounds in ground water and surface water (ug/L)

Location Date	Lab	Note	Val.	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	Total 1,2-DCE	TCE	PCE
W-854-05 (continued)									
03-jul-2001	CN	af	V	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU
29-nov-2001	CN	a	V	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU
30-jan-2002	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 LU	<0.5 U
21-jun-2002	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
13-aug-2002	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
13-dec-2002	CN	a	N	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
W-854-06									
30-may-1996	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	<0.5 U	<0.5 U
10-sep-1996	CS	a	V	<1 U	–	–	<1 U	<0.5 U	<1 U
26-dec-1996	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	<0.5 U	<0.5 U
27-jan-1997	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	<0.5 U	<0.5 U
09-may-1997	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	<0.5 U	<0.5 U
06-aug-1997	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	<0.5 U	<0.5 U
28-oct-1997	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	<0.5 U	<0.5 U
11-mar-1998	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	1.1	<0.5 U
01-may-1998	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	1.3 O	<0.5 U
30-jul-1998	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	<0.5 U	<0.5 U
12-nov-1998	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	1.6	<0.5 U
17-feb-1999	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	1.8	<0.5 U
28-jun-1999	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	2.2	<0.5 U
01-sep-1999	CN	a	V	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	1.9 LO	<0.5 LOU
01-dec-1999	BB	ag	V	<0.5 U	<0.5 U	<0.5 U	<1 U	2 F	<0.5 U
01-dec-1999	CN	ag	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	2.5	<0.5 U
20-mar-2000	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	4.6	<0.5 U
17-may-2000	BB	ag	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	1.9	<0.5 U
17-may-2000	CN	ag	V	<1 U	<1 U	<1 U	<0.5 U	2	<1 U
14-aug-2000	CN	a	V	<0.5 U	<0.5 LOU	<0.5 U	<0.5 U	1.8	<0.5 U
10-nov-2000	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	1.7	<0.5 U
14-feb-2001	BB	a	V	<0.5 U	<0.5 U	<0.5 U	<1 U	2.8	<0.5 U
09-may-2001	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	2.7 F	<0.5 U
03-jul-2001	CN	ah	V	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	1.8 LO	<0.5 LOU
03-jul-2001	CN	aeh	V	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	1.8 LO	<0.5 LOU
13-dec-2001	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	2.3 L	<0.5 U
26-feb-2002	CN	a	V	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	2.5 LO	<0.5 LOU
21-jun-2002	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	2	<0.5 U
10-sep-2002	CN	aeh	V	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	2.2 L	<0.5 LU
10-sep-2002	CN	ah	V	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	2.2 L	<0.5 LU
19-dec-2002	BB	ag	V	<0.5 U	<0.5 U	<0.5 U	<1 U	2.4	<0.5 U
19-dec-2002	CN	a	V	<1 U	<1 U	<1 U	<1 U	2	<1 U
W-854-07									
17-jun-1996	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	1.5	<0.5 U
10-sep-1996	CS	a	V	<1 U	–	–	<1 U	6.7	<1 U
26-dec-1996	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	18	<0.5 U
27-jan-1997	CS	aeh	V	<0.5 U	<0.5 U	<0.5 U	–	19	<0.5 U
27-jan-1997	CS	ah	V	<0.5 U	<0.5 U	<0.5 U	–	19	<0.5 U
09-may-1997	CS	aeh	V	<0.5 U	<0.5 U	<0.5 U	–	20	<0.5 U
09-may-1997	CS	ah	V	<0.5 U	<0.5 U	<0.5 U	–	19	<0.5 U
06-aug-1997	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	17	<0.5 U
29-oct-1997	BB	ag	V	<0.5 U	<0.5 U	<0.5 U	<1 U	20	<0.5 U
29-oct-1997	CS	ag	V	<0.5 U	<0.5 U	<0.5 U	–	18	<0.5 U
11-mar-1998	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	31	<0.5 U
01-may-1998	CS	aeh	V	<0.5 U	<0.5 U	<0.5 U	–	37 O	<0.5 U
01-may-1998	CS	ah	V	<0.5 U	<0.5 U	<0.5 U	–	39 O	<0.5 U
13-nov-1998	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	18	<0.5 U
17-feb-1999	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	31	<0.5 U
28-jun-1999	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	30	<0.5 U
24-sep-1999	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	31	<0.5 U
01-dec-1999	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	32	<0.5 U
20-mar-2000	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	26 D	<0.5 U
17-may-2000	CN	af	V	<1 U	<1 U	<1 U	<0.5 U	30	<1 U
16-aug-2000	CN	a	V	<0.5 U	<0.5 OU	<0.5 U	<0.5 U	34 L	<0.5 U
14-dec-2000	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	22	<0.5 U
14-feb-2001	BB	ah	V	<0.5 U	<0.5 U	<0.5 U	<1 U	26	<0.5 U
14-feb-2001	BB	aeh	V	<0.5 U	<0.5 U	<0.5 U	<1 U	26	<0.5 U
11-jun-2001	CN	af	V	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	46 LO	<0.5 LOU
09-jul-2001	BB	ag	V	<0.5 U	<0.5 U	<0.5 U	<1 U	34	<0.5 U

collected from the Building 854 area. Results recorded by April 29, 2003.

1,1-DCA	1,2-DCA	1,1,1-TCA	Chloro-form	Freon 11	Freon 113	Methylene chloride	Location Date
							(continued) W-854-05
<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	03-jul-2001
<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	29-nov-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	30-jan-2002
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	21-jun-2002
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	13-aug-2002
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	13-dec-2002
							W-854-06
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	30-may-1996
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	10-sep-1996
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	26-dec-1996
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	27-jan-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	09-may-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	06-aug-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	28-oct-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	11-mar-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	01-may-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	30-jul-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	12-nov-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	17-feb-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	28-jun-1999
<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	01-sep-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	01-dec-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	01-dec-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	20-mar-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 LU	<0.5 U	<1 U	17-may-2000
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<3 U	17-may-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	14-aug-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	10-nov-2000
<0.5 U	0.56	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	14-feb-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	09-may-2001
<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	03-jul-2001
<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	03-jul-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	13-dec-2001
<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	26-feb-2002
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	21-jun-2002
<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	10-sep-2002
<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	10-sep-2002
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	19-dec-2002
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<3 U	19-dec-2002
							W-854-07
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	17-jun-1996
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	10-sep-1996
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	26-dec-1996
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	27-jan-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	27-jan-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	09-may-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	09-may-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	06-aug-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	29-oct-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	29-oct-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	11-mar-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	01-may-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	01-may-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	13-nov-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	17-feb-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	28-jun-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	24-sep-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	01-dec-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	20-mar-2000
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<3 U	17-may-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	16-aug-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	14-dec-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	14-feb-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	14-feb-2001
<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	11-jun-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	09-jul-2001

Table A-2. Volatile organic compounds in ground water and surface water (ug/L)

Location Date	Lab	Note	Val.	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	Total 1,2-DCE	TCE	PCE
W-854-07 (continued)									
09-jul-2001	CN	agf	V	<0.5 U	<0.5 OU	<0.5 U	<0.5 U	29 DLO	<0.5 U
13-dec-2001	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	47 L	<0.5 U
29-jan-2002	CN	afh	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	35	<0.5 U
29-jan-2002	CN	aefh	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	40 L	<0.5 U
20-jun-2002	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	39	<0.5 U
13-aug-2002	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	50 DLO	<0.5 U
19-dec-2002	CN	af	V	<1 U	<1 U	<1 U	<1 U	39	<1 U
W-854-08									
24-jun-1996	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	2.3	<0.5 U
10-sep-1996	CS	a	V	<1 U	-	-	<1 U	<0.5 U	<1 U
13-dec-1996	CS	a	V	<1 UO	-	-	<1 U	<0.5 U	<1 U
23-jan-1997	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	<0.5 U	<0.5 U
12-may-1997	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	<0.5 U	<0.5 U
30-jul-1997	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	<0.5 U	<0.5 U
28-oct-1997	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	<0.5 U	<0.5 U
11-mar-1998	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	<0.5 U	<0.5 U
24-apr-1998	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	<0.5 U	<0.5 U
31-jul-1998	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	<0.5 U	<0.5 U
13-nov-1998	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	<0.5 U	<0.5 U
26-jan-1999	CS	aeh	V	<0.5 U	<0.5 U	<0.5 U	-	<0.5 U	<0.5 U
26-jan-1999	CS	ah	V	<0.5 U	<0.5 U	<0.5 U	-	<0.5 U	<0.5 U
28-jun-1999	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
01-dec-1999	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
28-feb-2000	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
17-may-2000	CN	a	V	<1 U	<1 U	<1 U	<0.5 U	<1 U	<1 U
11-aug-2000	CN	a	V	<0.5 U	<0.5 LOU	<0.5 U	<0.5 U	<0.5 U	<0.5 U
10-nov-2000	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
12-feb-2001	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
08-may-2001	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
10-jul-2001	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
21-jun-2002	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
10-sep-2002	CN	af	V	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU
22-nov-2002	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
W-854-09									
11-jul-1996	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	<0.5 U	<0.5 U
06-feb-1997	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	<0.5 U	<0.5 U
07-may-1997	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	1.3	<0.5 U
06-aug-1997	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	3.5	<0.5 U
29-oct-1997	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	4	<0.5 U
11-mar-1998	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	3.7	<0.5 U
01-may-1998	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	4.7 O	<0.5 U
31-jul-1998	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	6.7	<0.5 U
23-nov-1998	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	6.7	<0.5 U
05-mar-1999	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	7.2	<0.5 U
28-jun-1999	CN	aeh	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	12	<0.5 U
28-jun-1999	CN	ah	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	11	<0.5 U
24-sep-1999	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	11	<0.5 U
07-dec-1999	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	13	<0.5 U
20-mar-2000	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	28	<0.5 U
17-may-2000	CN	af	V	<1 U	<1 U	<1 U	<0.5 U	17	<1 U
11-aug-2000	CN	a	V	<0.5 U	<0.5 LOU	<0.5 U	<0.5 U	14	<0.5 U
10-nov-2000	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	16	<0.5 U
14-feb-2001	BB	a	V	<0.5 U	<0.5 U	<0.5 U	<1 U	16	<0.5 U
09-may-2001	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	17 F	<0.5 U
05-jul-2001	CN	af	V	<0.5 U	<0.5 OU	<0.5 U	<0.5 U	28	<0.5 U
13-dec-2001	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	22 L	<0.5 U
30-jan-2002	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	14 L	<0.5 U
07-jun-2002	CN	af	V	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	26 LO	<0.5 LOU
10-sep-2002	CN	af	V	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	18 L	<0.5 LU
W-854-10									
06-feb-1997	CS	a	V	<1 U	-	-	<1 U	<0.5 U	<1 U
06-jun-1997	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	6.9	<0.5 U
16-sep-1997	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	1.5	<0.5 U
28-oct-1997	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	12	<0.5 U
11-mar-1998	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	7.8	<0.5 U

collected from the Building 854 area. Results recorded by April 29, 2003.

1,1-DCA	1,2-DCA	1,1,1-TCA	Chloro-form	Freon 11	Freon 113	Methylene chloride	Location Date
							(continued) W-854-07
<0.5 U	<0.5 OU	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	09-jul-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	13-dec-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	29-jan-2002
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	29-jan-2002
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	20-jun-2002
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	13-aug-2002
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<3 U	19-dec-2002
							W-854-08
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	24-jun-1996
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	10-sep-1996
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	13-dec-1996
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	23-jan-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	12-may-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	30-jul-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	28-oct-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	11-mar-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	24-apr-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	31-jul-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	13-nov-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	26-jan-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	26-jan-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	28-jun-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	01-dec-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	28-feb-2000
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<3 U	17-may-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	11-aug-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	10-nov-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	12-feb-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	08-may-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	10-jul-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	21-jun-2002
<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	10-sep-2002
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	22-nov-2002
							W-854-09
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	11-jul-1996
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	06-feb-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	07-may-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	06-aug-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	29-oct-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	11-mar-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	01-may-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	31-jul-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	23-nov-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	05-mar-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	28-jun-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	28-jun-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	24-sep-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	07-dec-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	20-mar-2000
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<3 U	17-may-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	11-aug-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	10-nov-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	14-feb-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	09-may-2001
<0.5 U	<0.5 OU	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	05-jul-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	13-dec-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	30-jan-2002
<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	07-jun-2002
<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	10-sep-2002
							W-854-10
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	06-feb-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	06-jun-1997
<0.5 U	<0.5 U	<0.5 U	0.5	<0.5 U	<0.5 U	<0.5 U	16-sep-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	28-oct-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	11-mar-1998

Table A-2. Volatile organic compounds in ground water and surface water (ug/L)

Location Date	Lab	Note	Val.	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	Total 1,2-DCE	TCE	PCE
W-854-10 (continued)									
24-apr-1998	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	9.9	<0.5 U
17-aug-1998	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	8.4	<0.5 U
12-nov-1998	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	12	<0.5 U
16-feb-1999	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	14	<0.5 U
28-jun-1999	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	8.7	<0.5 U
24-sep-1999	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	7	<0.5 U
02-dec-1999	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	8.3	<0.5 U
29-feb-2000	CN	aeh	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	7.3	<0.5 U
29-feb-2000	CN	ah	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	7.2	<0.5 U
17-may-2000	CN	a	V	<1 U	<1 U	<1 U	<0.5 U	5	<1 U
14-aug-2000	CN	a	V	<0.5 U	<0.5 LOU	<0.5 U	<0.5 U	6.2	<0.5 U
27-oct-2000	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	4	<0.5 U
06-feb-2001	CN	ag	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	3.3	<0.5 U
06-feb-2001	SE	ag	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	3.46	<0.5 U
09-may-2001	BB	ag	V	<0.5 U	<0.5 U	<0.5 U	<1 U	4.6	<0.5 U
09-may-2001	CN	afg	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	5.6 F	<0.5 U
05-jul-2001	CN	a	V	<0.5 U	<0.5 OU	<0.5 U	<0.5 U	5.2	<0.5 U
29-nov-2001	CN	a	V	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	5.2 LO	<0.5 LOU
29-jan-2002	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	4	<0.5 U
07-jun-2002	CN	a	V	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	5.6 LO	<0.5 LOU
10-sep-2002	CN	a	V	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	5.9 L	<0.5 LU
13-dec-2002	CN	ah	N	<0.5 U	<0.5 U	<0.5 U	<0.5 U	9	<0.5 U
13-dec-2002	CN	aeh	N	<0.5 U	<0.5 U	<0.5 U	<0.5 U	9.2	<0.5 U
W-854-11									
19-feb-1997	CS	a	V	<1 U	-	-	<1 U	48 D	<1 U
16-sep-1997	CS	af	V	<0.5 U	<0.5 U	<0.5 U	-	47 D	<0.5 U
29-jun-1998	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	34	<0.5 U
17-aug-1998	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	31	<0.5 U
13-nov-1998	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	18	<0.5 U
17-feb-1999	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	26	<0.5 U
28-jun-1999	BB	ag	V	<0.5 U	<0.5 U	<0.5 U	<1 U	22	<0.5 U
28-jun-1999	CN	ag	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	23	<0.5 U
24-sep-1999	CN	af	V	<0.5 U	10	<0.5 U	<0.5 U	6.1	<0.5 U
02-dec-1999	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	19	<0.5 U
29-feb-2000	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	15	<0.5 U
14-aug-2000	CN	ah	V	<0.5 U	<0.5 LOU	<0.5 U	<0.5 U	24	<0.5 U
14-aug-2000	CN	aeh	V	<0.5 U	<0.5 LOU	<0.5 U	<0.5 U	21	<0.5 U
27-oct-2000	CN	a	V	<0.5 U	4.3	<0.5 U	<0.5 U	11	<0.5 U
06-feb-2001	CN	ag	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	3.1	<0.5 U
06-feb-2001	SE	ag	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	3.06	<0.5 U
10-may-2001	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	15	<0.5 U
W-854-12									
16-may-2000	CN	a	V	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU
14-aug-2000	CN	a	V	<0.5 U	<0.5 LOU	<0.5 U	<0.5 U	<0.5 U	<0.5 U
W-854-13									
22-mar-1999	CS	a	N	<1 U	-	-	<1 U	<0.5 U	<1 U
25-may-1999	CN	a	V	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 ULLO	<0.5 LOU
26-aug-1999	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 OU
02-dec-1999	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
28-feb-2000	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	1.6 F	<0.5 U
16-may-2000	CN	a	V	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 U	<0.5 LOU
14-aug-2000	BB	a	V	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
10-nov-2000	BB	a	V	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
12-feb-2001	BB	a	V	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
08-may-2001	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
03-jul-2001	CN	a	V	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU
13-dec-2001	BB	a	V	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
28-jan-2002	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
28-aug-2002	BB	a	V	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
17-dec-2002	CN	a	N	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
W-854-14									
31-mar-1999	BB	a	V	<0.5 U	<0.5 U	<0.5 U	<1 U	0.56	<0.5 U
24-may-1999	CN	af	V	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU
01-sep-1999	CN	a	V	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU

collected from the Building 854 area. Results recorded by April 29, 2003.

1,1-DCA	1,2-DCA	1,1,1-TCA	Chloro-form	Freon 11	Freon 113	Methylene chloride	Location Date
							(continued) W-854-10
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	24-apr-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	17-aug-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	12-nov-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	16-feb-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	28-jun-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	24-sep-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	02-dec-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	29-feb-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	29-feb-2000
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<3 U	17-may-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	14-aug-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	27-oct-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	06-feb-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	06-feb-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	09-may-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	09-may-2001
<0.5 U	<0.5 OU	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	05-jul-2001
<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	29-nov-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	29-jan-2002
<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	07-jun-2002
<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	10-sep-2002
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	13-dec-2002
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	13-dec-2002
							W-854-11
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	19-feb-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	16-sep-1997
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	29-jun-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	17-aug-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	1.6	13-nov-1998
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	17-feb-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	28-jun-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	28-jun-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	24-sep-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	02-dec-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	29-feb-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	14-aug-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	14-aug-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	27-oct-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	06-feb-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	06-feb-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	10-may-2001
							W-854-12
<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	16-may-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	14-aug-2000
							W-854-13
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	22-mar-1999
<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	25-may-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 OU	<0.5 U	<0.5 U	<0.5 U	26-aug-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	02-dec-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	28-feb-2000
<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	16-may-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	14-aug-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	10-nov-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	12-feb-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	08-may-2001
<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	03-jul-2001
<0.5 U	<0.5 OU	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	13-dec-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	28-jan-2002
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	28-aug-2002
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<3 U	17-dec-2002
							W-854-14
<0.5 U	<0.5 U	<0.5 U	3.8	<0.5 U	<0.5 U	<1 U	31-mar-1999
<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	24-may-1999
<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	01-sep-1999

Table A-2. Volatile organic compounds in ground water and surface water (ug/L)

Location Date	Lab	Note	Val.	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	Total 1,2-DCE	TCE	PCE
W-854-14 (continued)									
07-dec-1999	CN	afh	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
07-dec-1999	CN	aefh	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
28-feb-2000	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.9 F	<0.5 U
17-may-2000	CN	af	V	<1 U	<1 U	<1 U	<0.5 U	<1 U	<1 U
08-may-2001	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
05-jul-2001	CN	af	V	<0.5 U	<0.5 OU	<0.5 U	<0.5 U	<0.5 U	<0.5 U
W-854-15									
29-jun-2000	CN	af	V	<1 OU	<1 U	<1 U	<0.5 U	<1 OU	<1 U
09-may-2001	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
06-jul-2001	BB	a	V	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
14-dec-2001	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
29-jan-2002	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
20-jun-2002	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
10-sep-2002	CN	a	V	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU
17-dec-2002	CN	a	N	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
W-854-17									
30-jun-2000	CN	af	V	<1 LOU	7 LO	<1 LOU	<0.5 LOU	6 LO	<1 LOU
29-aug-2000	CN	af	V	<1 U	9	<1 U	<0.5 U	18	<1 U
27-oct-2000	CN	aeh	V	<0.5 U	7.8	<0.5 U	<0.5 U	17	<0.5 U
27-oct-2000	CN	ah	V	<0.5 U	5.7	<0.5 U	<0.5 U	25	<0.5 U
12-feb-2001	CN	a	V	<0.5 U	13	<0.5 U	<0.5 U	4.1	<0.5 U
09-may-2001	BB	ag	V	<0.5 U	<0.5 U	<0.5 U	<1 U	4.4	<0.5 U
09-may-2001	CN	ag	V	<0.5 U	16	<0.5 U	<0.5 U	4.9 F	<0.5 U
05-jul-2001	CN	a	V	<0.5 U	19 O	<0.5 U	<0.5 U	9.9	<0.5 U
14-dec-2001	CN	a	V	<0.5 U	14	<0.5 U	<0.5 U	5.1	<0.5 U
29-jan-2002	CN	aeh	V	<0.5 U	14	<0.5 U	14	3.7	<0.5 U
29-jan-2002	CN	ah	V	<0.5 U	14	<0.5 U	14	3.7	<0.5 U
07-jun-2002	BB	aefg	V	<0.5 U	11	<0.5 U	12	4.8	<0.5 U
07-jun-2002	CN	ag	V	<0.5 U	17	<0.5 U	<0.5 U	7.1	<0.5 U
10-sep-2002	BB	ag	V	<0.5 U	13	<0.5 U	13	5	<0.5 U
10-sep-2002	CN	ag	V	<0.5 LU	14 L	<0.5 LU	14 L	5.4 L	<0.5 LU
17-dec-2002	CN	aeh	N	<1 U	11	<1 U	11	11	<1 U
17-dec-2002	CN	ah	N	<1 U	11	<1 U	11	10	<1 U
W-854-18A									
30-jun-2000	CN	af	V	<1 LOU	<1 LOU	<1 LOU	<0.5 LOU	9 LO	<1 LOU
14-aug-2000	CN	a	V	<0.5 U	<0.5 LOU	<0.5 U	<0.5 U	15	<0.5 U
27-oct-2000	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	18	<0.5 U
06-feb-2001	CN	ag	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	18	<0.5 U
06-feb-2001	SE	ag	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	13.9	<0.5 U
10-may-2001	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	21	<0.5 U
05-jul-2001	CN	a	V	<0.5 U	<0.5 OU	<0.5 U	<0.5 U	20	<0.5 U
13-dec-2001	CN	ah	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	37 L	<0.5 U
13-dec-2001	CN	aeh	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	39 L	<0.5 U
28-jan-2002	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	18	<0.5 U
28-aug-2002	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	32	<0.5 U
17-dec-2002	CN	a	N	<1 U	<1 U	<1 U	<1 U	36	<1 U
W-854-45									
10-jul-2001	CN	af	V	<1 HU	<1 HU	<1 HU	<1 HU	<1 HU	<1 HU
14-dec-2001	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
28-jan-2002	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
07-jun-2002	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
13-aug-2002	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
18-dec-2002	CN	af	V	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
W-854-1701									
11-jul-2001	CN	af	V	<1 LUH	<1 LUH	<1 LUH	<1 LUH	<1 LUH	<1 LUH
26-feb-2002	CN	a	V	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU
21-jun-2002	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
10-sep-2002	CN	a	V	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU
W-854-1707									
09-jul-2001	CN	af	V	<1 HU	<1 LOUH	<1 LOUH	<1 HU	<1 LOUH	<1 LOUH
12-dec-2001	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 LU	<0.5 U
30-jan-2002	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 LU	<0.5 U

collected from the Building 854 area. Results recorded by April 29, 2003.

1,1-DCA	1,2-DCA	1,1,1-TCA	Chloro-form	Freon 11	Freon 113	Methylene chloride	Location Date
							(continued) W-854-14
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	07-dec-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	07-dec-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	28-feb-2000
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<3 U	17-may-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	08-may-2001
<0.5 U	<0.5 OU	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	05-jul-2001
							W-854-15
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<3 U	29-jun-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	09-may-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	06-jul-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	14-dec-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	29-jan-2002
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	20-jun-2002
<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	10-sep-2002
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<3 U	17-dec-2002
							W-854-17
<1 LOU	<1 LOU	<1 LOU	<1 LOU	<1 LOU	<1 LOU	<3 LOU	30-jun-2000
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<3 U	29-aug-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	27-oct-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	27-oct-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	12-feb-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	09-may-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	09-may-2001
<0.5 U	<0.5 OU	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	05-jul-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	14-dec-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	29-jan-2002
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	29-jan-2002
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	07-jun-2002
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	07-jun-2002
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	10-sep-2002
<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	10-sep-2002
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<3 U	17-dec-2002
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<3 U	17-dec-2002
							W-854-18A
<1 LOU	<1 LOU	<1 LOU	<1 LOU	<1 LOU	<1 LOU	<3 LOU	30-jun-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	14-aug-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	27-oct-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	06-feb-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	06-feb-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	10-may-2001
<0.5 U	<0.5 OU	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	05-jul-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	13-dec-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	13-dec-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	28-jan-2002
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	28-aug-2002
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<3 U	17-dec-2002
							W-854-45
<1 HU	<1 HU	<1 HU	<1 HU	<1 HU	<1 HU	<3 HU	10-jul-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	14-dec-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	28-jan-2002
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	07-jun-2002
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	13-aug-2002
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<3 U	18-dec-2002
							W-854-1701
<1 LUH	<1 LUH	<1 LUH	<1 LUH	<1 LUH	<1 LUH	<3 LUH	11-jul-2001
<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	26-feb-2002
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	21-jun-2002
<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	10-sep-2002
							W-854-1707
<1 HU	<1 OUH	<1 HU	<1 LOUH	<1 LOUH	<1 LOUH	<3 LOUH	09-jul-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	12-dec-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	30-jan-2002

Table A-2. Volatile organic compounds in ground water and surface water (ug/L)

Location Date	Lab	Note	Val.	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	Total 1,2-DCE	TCE	PCE
W-854-1707 (continued)									
21-jun-2002	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
10-sep-2002	CN	a	V	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU
W-854-1731									
27-sep-2002	CN	af	V	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
W-854-1822									
11-mar-2003	CN	a	N	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
W-854-1823									
07-mar-2003	BB	a	V	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
20-mar-2003	CN	a	N	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
W-854-1902									
07-mar-2003	BB	a	V	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
20-mar-2003	CN	a	N	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
WELL13									
09-aug-1990	BC	a	U	<0.5 P	<0.5 P	<0.5 P	<0.5 P	6 P	<0.5 P
08-oct-1990	BC	a	U	<0.5 P	<0.5 P	<0.5 P	<0.5 P	1.2 P	<0.5 P
11-jan-1991	BC	a	U	<0.5 P	<0.5 P	<0.5 P	<0.5 P	1.6 P	<0.5 P
18-apr-1991	BC	a	U	<0.5 P	<0.5 P	<0.5 P	<0.5 P	3.2 P	<0.5 P
12-jul-1991	BC	a	U	<0.5 P	<0.5 P	<0.5 P	<0.5 P	1.9 P	<0.5 P
21-oct-1991	CL	ag	U	<0.5 P	<0.5 P	<0.5 P	<0.5 P	2.5 P	<0.5 P
21-oct-1991	BC	ag	U	<0.5 P	<0.5 P	<0.5 P	<0.5 P	2.9 P	<0.5 P
22-apr-1992	BC	a	U	<0.5 P	<0.5 P	<0.5 P	<0.5 P	3 P	<0.5 P
15-oct-1992	BC	a	U	<0.5 P	<0.5 P	<0.5 P	<0.5 P	7.7 P	<0.5 P
27-apr-1993	BC	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	3.5	<0.5 U
25-aug-1993	CS	a	V	<0.5 U	–	–	<0.5 U	10	<0.5 U
16-dec-1993	CS	a	V	<0.5 U	–	–	<0.5 U	2.9	<0.5 U
09-feb-1994	CS	a	V	<0.5 U	–	–	<0.5 U	2.5	<0.5 U
20-jun-1994	CS	a	V	<0.5 U	–	–	<0.5 U	3.4	<0.5 U
19-dec-1994	CS	aj	V	<0.5 U	–	–	<0.5 U	2.8	<0.5 U
19-dec-1994	CS	aj	V	<0.5 U	–	–	<0.5 U	17	<0.5 U
19-dec-1994	CS	a	V	<0.5 U	–	–	<0.5 U	5	<0.5 U
24-feb-1995	CS	a	V	<0.5 U	–	–	<0.5 U	4.9	<0.5 U
23-may-1995	CS	a	V	<0.5 U	–	–	<0.5 U	5.1	<0.5 U
25-jul-1995	CS	a	V	<0.5 U	–	–	<0.5 U	5.3	<0.5 U
29-feb-1996	CS	a	V	<0.5 U	–	–	<0.5 U	7.1	<0.5 U
SPRING10									
16-dec-1982	BC	a	U	–	–	–	–	<0.5 P	–
04-may-1983	BC	a	U	–	–	–	–	0.6 P	–
03-aug-1983	BC	a	U	–	–	–	–	<0.5 P	–
10-feb-1986	BC	a	U	<0.5 P	–	–	<0.5 P	<0.5 P	<0.5 P
19-nov-1991	BC	a	U	<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P
22-sep-1993	CS	a	V	<0.5 U	–	–	<0.5 U	<0.5 U	<0.5 U
28-apr-1994	CS	a	V	<0.5 U	–	–	<0.5 U	<0.5 U	<0.5 U
13-oct-1995	CS	a	V	<0.5 U	–	–	<0.5 U	0.7 LO	<0.5 U
01-dec-1995	CS	a	V	<0.5 U	–	–	<0.5 U	<0.5 U	<0.5 U
17-jun-1996	CS	a	V	<0.5 U	<0.5 U	<0.5 U	–	<0.5 U	<0.5 U
18-aug-1999	CN	a	V	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU
11-may-2000	BB	a	V	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
22-aug-2000	CN	a	V	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	32 L	<0.5 LU
30-nov-2000	CN	a	V	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	26 LO	<0.5 LOU
06-feb-2001	BB	a	V	<0.5 U	<0.5 U	<0.5 U	<1 U	1.9	<0.5 U
08-may-2001	BB	ag	V	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
08-may-2001	CN	ag	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
11-jul-2001	CN	a	V	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	1.5 L	<0.5 LU
12-dec-2001	BB	ag	V	<0.5 U	<0.5 U	<0.5 U	<1 U	0.73	<0.5 U
12-dec-2001	CN	ag	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	1 L	<0.5 U
14-mar-2002	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
28-sep-2002	CN	a	V	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
26-mar-2003	BB	ah	V	<0.5 U	<0.5 U	<0.5 U	<1 U	1.4	<0.5 U
26-mar-2003	BB	aeh	V	<0.5 U	<0.5 U	<0.5 U	<1 U	1.1	<0.5 U

collected from the Building 854 area. Results recorded by April 29, 2003.

1,1-DCA	1,2-DCA	1,1,1-TCA	Chloro-form	Freon 11	Freon 113	Methylene chloride	Location Date
							(continued) W-854-1707
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	21-jun-2002
<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	10-sep-2002
							W-854-1731
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<3 U	27-sep-2002
							W-854-1822
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<3 U	11-mar-2003
							W-854-1823
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	07-mar-2003
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<3 U	20-mar-2003
							W-854-1902
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	07-mar-2003
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<3 U	20-mar-2003
							WELL13
<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	<2 P	09-aug-1990
<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	<2 P	08-oct-1990
<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	11-jan-1991
<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	18-apr-1991
<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	12-jul-1991
<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	-	<0.5 P	21-oct-1991
<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	<2 P	21-oct-1991
<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	22-apr-1992
<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	<3 P	15-oct-1992
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	27-apr-1993
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	25-aug-1993
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	16-dec-1993
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	09-feb-1994
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	20-jun-1994
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	19-dec-1994
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	19-dec-1994
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	19-dec-1994
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	24-feb-1995
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	23-may-1995
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	25-jul-1995
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	29-feb-1996
							SPRING10
-	-	-	-	-	-	-	16-dec-1982
-	-	-	-	-	-	-	04-may-1983
-	-	-	-	-	-	-	03-aug-1983
<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	10-feb-1986
<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	<2 P	19-nov-1991
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	22-sep-1993
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	28-apr-1994
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	13-oct-1995
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	01-dec-1995
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	17-jun-1996
<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	18-aug-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	11-may-2000
<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	22-aug-2000
<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	30-nov-2000
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 RU	06-feb-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 LU	<0.5 U	<1 U	08-may-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	08-may-2001
<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	11-jul-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	12-dec-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	12-dec-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	14-mar-2002
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<3 U	28-sep-2002
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	26-mar-2003
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	26-mar-2003

Table A-2. Volatile organic compounds in ground water and surface water (ug/L)

Location Date	Lab	Note	Val.	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	Total 1,2-DCE	TCE	PCE
SPRING11									
16-dec-1982	BC	a	U	-	-	-	-	<0.5 P	-
04-may-1983	BC	a	U	-	-	-	-	<0.5 P	-
10-feb-1986	BC	a	U	<0.5 P	-	-	<0.5 P	<0.5 P	<0.5 P
14-nov-1991	BC	a	U	<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P
22-sep-1993	CS	a	V	<0.5 U	-	-	<0.5 U	<0.5 U	<0.5 U
28-apr-1994	CS	a	V	<0.5 U	-	-	<0.5 U	<0.5 U	<0.5 U
13-oct-1995	CS	a	V	<0.5 U	-	-	<0.5 U	0.75 LO	<0.5 U
01-dec-1995	CS	a	V	<0.5 U	-	-	<0.5 U	<0.5 U	<0.5 U
17-jun-1996	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	1	<0.5 U
28-jun-1996	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	<0.5 U	<0.5 U
08-may-1997	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	<0.5 U	<0.5 U
18-aug-1999	CN	a	V	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU
17-may-2000	BB	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
22-aug-2000	CN	a	V	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	0.8 L	<0.5 LU
30-nov-2000	CN	a	V	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU
06-feb-2001	BB	a	V	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
08-may-2001	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
11-jul-2001	CN	a	V	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU
12-dec-2001	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 LU	<0.5 U
14-mar-2002	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
21-jun-2002	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
28-sep-2002	CN	a	V	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
26-mar-2003	BB	a	V	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
SPRING16									
19-nov-1991	BC	a	U	<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P
22-sep-1993	CS	a	V	<0.5 U	-	-	<0.5 U	<0.5 U	<0.5 U
16-may-1994	CS	a	V	<0.5 U	-	-	<0.5 U	<0.5 U	<0.5 U
13-oct-1995	CS	a	V	<0.5 U	-	-	<0.5 U	<0.5 ULO	<0.5 U
18-jun-1996	CS	a	V	<0.5 U	<0.5 U	<0.5 U	-	<0.5 U	<0.5 U
11-may-2000	BB	a	V	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U

collected from the Building 854 area. Results recorded by April 29, 2003.

1,1-DCA	1,2-DCA	1,1,1-TCA	Chloro-form	Freon 11	Freon 113	Methylene chloride	Location Date
							SPRING11
-	-	-	-	-	-	-	16-dec-1982
-	-	-	-	-	-	-	04-may-1983
<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	10-feb-1986
<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	<2 P	14-nov-1991
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	22-sep-1993
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	28-apr-1994
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	13-oct-1995
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	01-dec-1995
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	17-jun-1996
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	28-jun-1996
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	08-may-1997
<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	18-aug-1999
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 LU	<0.5 U	<1 U	17-may-2000
<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	22-aug-2000
<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU	30-nov-2000
<0.5 U	<0.5 OU	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	06-feb-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	08-may-2001
<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	<0.5 LU	11-jul-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	12-dec-2001
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	14-mar-2002
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	21-jun-2002
<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<3 U	28-sep-2002
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	26-mar-2003
							SPRING16
<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	<0.5 P	<2 P	19-nov-1991
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	22-sep-1993
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	16-may-1994
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	13-oct-1995
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	18-jun-1996
<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	11-may-2000

See following page for notes

Table A-2. Volatile organic compounds in ground water and surface water (ug/L) collected from the Building 854 area. Results recorded by April 29, 2003.

Notes:

- Indicates no analysis performed for this compound

Val. = Validation code

Footnotes:

a ERD data
b ORAD WGMG data
c Analytical results for this sample are suspect
d Sample collected during hydraulic testing
e Blind sample, sent to lab without location identity
f Sample dilution necessary for analysis; detection limits increased
g Interlaboratory collocated sample
h Intralaboratory collocated sample
i Sample collected as part of pilot study
j Note field may contain important information regarding this sample
k Pre-development sample
l Norm month, norm quarter or norm year inconsistent with sample date
m Confirmation sample
n Sample analyzed after standard holding time
o Sample comprised of partial composite
p Alpha spectroscopy analysis of uranium isotopes
q Gamma spectroscopy analysis of uranium isotopes
r Tritium data represents non-detect with activity calc'd for 100 percent error.

Lab Codes:

BB	BC Laboratories, Inc.	Bakersfield, CA
BC	Brown & Caldwell Emeryville	
CL	Clayton Environmental Cnslt	Pleasanton, CA, (formerly McKesson Envnmtl)
CN	Caltest Analytical Laboratory	1885 N. Kelly Rd, Napa, CA 94558
CS	California Laboratory Services	3249 Fitzgerald Rd. Rancho Cordova, CA 95742
SE	Sequoia Analytical	1551 Industrial Road, San Carlos, CA 94070

Validation Codes:

V Validated
N Not validated (default value)
U Undeclared
H Historical comparison only

CLP flags: (follow result)

B Analyte found in method blank
D Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E The analyte was detected below the LLNL reporting limit, but above the analytical laboratory minimum detection limit.
F Analyte found in field blank, trip blank, or equipment blank
G Quantitated using fuel calibration, but does not match typical fuel fingerprint (fuel maybe gasoline, diesel, motor oil etc.).
H Sample analyzed outside of holding time, sample results should be evaluated
J Analyte was postively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
L Spike accuracy not within control limits
O Duplicate spike or sample precision not within control limits
P Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S Analytical results for this sample are suspect
T Analyte is tentatively identified compound; result is approximate
U Compound was analyzed for, but not detected above detection limit

Table A-3. Volatile organic compounds in soil and rock (mg/kg) collected from the Building 854 area. Results recorded by April 29, 2003.

VOCs in Soil

epdbs::epddata
April 30, 2003
epddata

s3vocSO_854L.
s3vocSO_854R.

Table A-3. Volatile organic compounds in soil and rock (mg/kg) collected from the

Location Date	Lab	Val. Note	Depth (ft)	1,1- DCE	cis- 1,2- DCE	trans- 1,2- DCE	Total 1,2- DCE	TCE	PCE
854-14									
03-sep-1996	CS a	V	1.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
03-sep-1996	CS a	V	6.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
04-sep-1996	CS a	V	12.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
04-sep-1996	CS a	V	18.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
854-15									
14-aug-1996	CS a	V	1.5	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
14-aug-1996	CS a	V	6.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
14-aug-1996	CS a	V	12.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
14-aug-1996	CS a	V	18.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
854-16									
13-aug-1996	CS a	V	1.5	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
13-aug-1996	CS a	V	6.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
13-aug-1996	CS a	V	12.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
13-aug-1996	CS a	V	18.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
854-17									
26-aug-1996	CS a	V	1.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
26-aug-1996	CS a	V	6.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
26-aug-1996	CS a	V	12.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
26-aug-1996	CS a	V	18.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
854-18									
28-aug-1996	CS ag	V	1.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
28-aug-1996	CS ag	V	6.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
30-aug-1996	CS a	V	12.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
30-aug-1996	CS a	V	18.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
854-19									
15-aug-1996	CS ag	V	1.5	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 UO	<0.0005 U
15-aug-1996	CS a	V	6.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 UO	<0.0005 U
15-aug-1996	CS a	V	12.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 UO	<0.0005 U
15-aug-1996	CS a	V	18.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 UO	<0.0005 U
854-20									
14-aug-1996	CS a	V	1.5	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
14-aug-1996	CS a	V	6.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
14-aug-1996	CS a	V	12.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
15-aug-1996	CS a	V	16.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 UO	<0.0005 U
854-21									
26-apr-2000	CN aj	V	95.0	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	-
26-apr-2000	CN aj	V	100.0	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	-
26-apr-2000	CN aj	V	105.0	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	-
26-apr-2000	CN aj	V	111.0	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	-
26-apr-2000	CN a	V	115.0	<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
26-apr-2000	CN a	V	120.0	<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
27-apr-2000	CN a	V	130.0	<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
27-apr-2000	CN a	V	140.0	<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
10-may-2000	CN a	V	182.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
10-may-2000	CN a	V	192.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
10-may-2000	CN a	V	197.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
10-may-2000	BB a	V	202.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
10-may-2000	CN a	V	202.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
10-may-2000	CN a	V	207.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
10-may-2000	CN a	V	214.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
854-21A									
31-may-2000	CN a	V	172.4	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 LU	<0.0005 U
31-may-2000	CN a	V	188.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 LU	<0.0005 U
854-22									
14-aug-1996	CS a	V	1.5	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
14-aug-1996	CS a	V	6.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
14-aug-1996	CS a	V	12.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
14-aug-1996	CS a	V	18.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U

Building 854 area. Results recorded by April 29, 2003.

1,1-DCA	1,2-DCA	1,1,1-TCA	Chloro-form	Freon 11	Freon 113	Methylene chloride	Location Date
							854-14
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00097 B	03-sep-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0013 B	03-sep-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00068 B	04-sep-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00092 B	04-sep-1996
							854-15
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0021 B	14-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0025 B	14-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0025 B	14-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0027 B	14-aug-1996
							854-16
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0026 B	13-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0038 B	13-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0035 B	13-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0028 B	13-aug-1996
							854-17
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0033 B	26-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0017 B	26-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0031 B	26-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0025 B	26-aug-1996
							854-18
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0016 B	28-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0017 B	28-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0011 B	30-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00073 B	30-aug-1996
							854-19
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0042 B	15-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0038 B	15-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.003 B	15-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0035 B	15-aug-1996
							854-20
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0021 B	14-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0015 B	14-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0018 B	14-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0031 B	15-aug-1996
							854-21
<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	26-apr-2000
<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	26-apr-2000
<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	26-apr-2000
<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	26-apr-2000
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 U	26-apr-2000
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 U	26-apr-2000
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 U	27-apr-2000
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 U	27-apr-2000
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.005 U	10-may-2000
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	10-may-2000
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	10-may-2000
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.002 U	0.0006	10-may-2000
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.005 U	10-may-2000
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.005 U	10-may-2000
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.005 U	10-may-2000
							854-21A
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	31-may-2000
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	31-may-2000
							854-22
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0026 B	14-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0022 B	14-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0023 B	14-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0016 B	14-aug-1996

Table A-3. Volatile organic compounds in soil and rock (mg/kg) collected from the

Location Date	Lab	Val. Note	Depth (ft)	1,1- DCE	cis- 1,2- DCE	trans- 1,2- DCE	Total 1,2- DCE	TCE	PCE
854-23									
03-sep-1996	CS a	V	1.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
03-sep-1996	CS a	V	6.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
03-sep-1996	CS a	V	12.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
03-sep-1996	CS a	V	18.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
854-24									
19-aug-1996	CS a	V	1.5	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
19-aug-1996	CS a	V	6.0	<0.0005 U	<0.0005 U	<0.0005 U	-	0.00079	<0.0005 U
19-aug-1996	CS a	V	12.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
19-aug-1996	CS a	V	18.0	<0.0005 U	<0.0005 U	<0.0005 U	-	0.00058	<0.0005 U
854-25									
28-aug-1996	CS a	V	1.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
28-aug-1996	CS a	V	6.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
28-aug-1996	CS a	V	12.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
28-aug-1996	CS a	V	18.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
28-aug-1996	CS a	V	20.5	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
28-aug-1996	CS a	V	26.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
854-26									
16-aug-1996	CS a	V	1.5	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
16-aug-1996	CS a	V	6.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
16-aug-1996	CS a	V	12.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
16-aug-1996	CS a	V	18.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
854-27									
27-aug-1996	CS a	V	1.0	<0.005 U	-	-	<0.005 U	<0.005 U	<0.005 U
27-aug-1996	CS a	V	6.0	<0.005 U	-	-	<0.005 U	<0.005 U	<0.005 U
27-aug-1996	CS a	V	12.0	<0.005 U	-	-	<0.005 U	<0.005 U	<0.005 U
27-aug-1996	CS a	V	18.0	<0.005 U	-	-	<0.005 U	<0.005 U	<0.005 U
854-27A									
27-aug-1996	CS a	V	1.0	<0.005 U	-	-	<0.005 U	<0.005 U	<0.005 U
27-aug-1996	CS a	V	6.0	<0.005 U	-	-	<0.005 U	<0.005 U	<0.005 U
28-aug-1996	CS a	V	12.0	<0.005 U	-	-	<0.005 U	<0.005 U	<0.005 U
28-aug-1996	CS a	V	18.0	<0.005 U	-	-	<0.005 U	<0.005 U	<0.005 U
854-28									
21-aug-1996	CS a	V	1.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
21-aug-1996	CS a	V	3.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
21-aug-1996	CS a	V	6.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
21-aug-1996	CS a	V	12.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
21-aug-1996	CS a	V	18.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
21-aug-1996	CS a	V	24.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
854-29									
22-aug-1996	CS a	V	1.0	<0.0005 IUJ	<0.0005 IUJ	<0.0005 IUJ	-	0.00089 IJ	<0.0005 IUJ
22-aug-1996	CS ag	V	6.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
22-aug-1996	CS a	V	12.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
22-aug-1996	CS a	V	18.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
23-aug-1996	CS a	V	24.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
26-aug-1996	CS a	V	30.0	<0.0005 U	<0.0005 U	<0.0005 U	-	0.00072	<0.0005 U
26-aug-1996	CS a	V	36.0	<0.0005 U	<0.0005 U	<0.0005 U	-	0.0015	<0.0005 U
26-aug-1996	CS a	V	42.0	<0.0005 U	<0.0005 U	<0.0005 U	-	0.0059	<0.0005 U
854-29A									
05-nov-1996	CS a	V	44.0	<0.0005 U	<0.0005 U	<0.0005 U	-	0.023 LO	<0.0005 U
05-nov-1996	CS agh	V	54.0	<0.0005 U	<0.0005 U	<0.0005 U	-	0.035 LO	<0.0005 U
05-nov-1996	CS a	V	64.0	<0.0005 U	<0.0005 U	<0.0005 U	-	0.0087	<0.0005 U
854-30									
15-aug-1996	CS a	V	1.5	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 UO	<0.0005 U
15-aug-1996	CS ag	V	6.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 UO	<0.0005 U
15-aug-1996	CS a	V	12.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 UO	<0.0005 U
15-aug-1996	CS a	V	18.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 UO	<0.0005 U

Building 854 area. Results recorded by April 29, 2003.

1,1-DCA	1,2-DCA	1,1,1-TCA	Chloro-form	Freon 11	Freon 113	Methylene chloride	Location Date
							854-23
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0022 B	03-sep-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0034 B	03-sep-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.002 B	03-sep-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0018 B	03-sep-1996
							854-24
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	19-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	19-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	19-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	19-aug-1996
							854-25
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0024 B	28-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0016 B	28-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0014 B	28-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0016 B	28-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0017 B	28-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0015 B	28-aug-1996
							854-26
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0046 B	16-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0047 B	16-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0039 B	16-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0034 B	16-aug-1996
							854-27
<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	27-aug-1996
<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	0.0061 S	27-aug-1996
<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	0.0055 S	27-aug-1996
<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	27-aug-1996
							854-27A
<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	0.0056 S	27-aug-1996
<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	27-aug-1996
<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	28-aug-1996
<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	0.0059 S	28-aug-1996
							854-28
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0029	21-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0025 S	21-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0019 S	21-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0017 S	21-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0015 S	21-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0019 S	21-aug-1996
							854-29
<0.0005 IUJ	<0.0005 IUJ	<0.0005 IUJ	<0.0005 IUJ	<0.0005 IUJ	<0.0005 IUJ	0.0047 BIJ	22-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0025 B	22-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0028 B	22-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0038 B	22-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0029 S	23-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0022 B	26-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0022 B	26-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.002 B	26-aug-1996
							854-29A
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	05-nov-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	05-nov-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	05-nov-1996
							854-30
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0035 B	15-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0036 B	15-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0036 B	15-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.003 B	15-aug-1996

Table A-3. Volatile organic compounds in soil and rock (mg/kg) collected from the

Location Date	Lab	Val. Note	Depth (ft)	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	Total 1,2-DCE	TCE	PCE
854-31									
30-aug-1996	CS a	V	1.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
30-aug-1996	CS a	V	6.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
30-aug-1996	CS a	V	12.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
30-aug-1996	CS a	V	18.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
854-32									
20-aug-1996	CS a	V	1.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
20-aug-1996	CS a	V	3.0	<0.0005 U	<0.0005 U	<0.0005 U	-	0.00065	<0.0005 U
20-aug-1996	CS a	V	6.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
20-aug-1996	CS a	V	12.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
21-aug-1996	CS a	V	18.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
21-aug-1996	CS a	V	24.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
854-33									
28-aug-1996	CS a	V	6.0	<0.0005 U	<0.0005 U	<0.0005 U	-	0.0016	<0.0005 U
28-aug-1996	CS a	V	11.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
854-34									
22-aug-1996	CS a	V	1.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
22-aug-1996	CS a	V	6.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
22-aug-1996	CS a	V	12.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
22-aug-1996	CS ag	V	18.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
22-aug-1996	CS a	V	24.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
854-34A									
07-nov-1996	CS a	V	56.0	<0.0005 U	<0.0005 U	<0.0005 U	-	0.0048	<0.0005 U
07-nov-1996	CS a	V	66.0	<0.0005 U	<0.0005 U	<0.0005 U	-	0.033	<0.0005 U
07-nov-1996	CS a	V	76.0	<0.0005 U	<0.0005 U	<0.0005 U	-	0.018	<0.0005 U
854-35									
19-aug-1996	CS a	V	6.0	<0.0005 U	<0.0005 U	<0.0005 U	-	0.0016	<0.0005 U
19-aug-1996	CS a	V	12.0	<0.0005 U	<0.0005 U	<0.0005 U	-	0.0016	<0.0005 U
19-aug-1996	CS a	V	18.0	<0.0005 U	<0.0005 U	<0.0005 U	-	0.00096	<0.0005 U
20-aug-1996	CS ag	V	24.0	<0.0005 U	<0.0005 U	<0.0005 U	-	0.0029	<0.0005 U
854-36									
20-aug-1996	CS a	V	6.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
20-aug-1996	CS ag	V	12.0	<0.0005 U	<0.0005 U	<0.0005 U	-	0.00056	<0.0005 U
20-aug-1996	CS a	V	18.0	<0.0005 U	<0.0005 U	<0.0005 U	-	0.0022	<0.0005 U
20-aug-1996	CS a	V	24.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
854-38									
06-sep-1996	CS a	V	1.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
06-sep-1996	CS a	V	6.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
06-sep-1996	CS a	V	12.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
06-sep-1996	CS a	V	18.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
854-40									
04-sep-1996	CS a	V	1.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
04-sep-1996	CS ag	V	6.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
04-sep-1996	CS a	V	12.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
04-sep-1996	CS a	V	18.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
854-41									
06-sep-1996	CS a	V	1.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
16-sep-1996	EC a	N	7.0	<0.0004 U	<0.0004 U	-	-	<0.0004 U	<0.0004 U
16-sep-1996	CS ag	V	12.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
16-sep-1996	EC ag	N	12.0	<0.0004 U	<0.0004 U	-	-	<0.0004 U	<0.0004 U
16-sep-1996	EC a	N	18.0	<0.0004 U	<0.0004 U	-	-	<0.0004 U	<0.0004 U
16-sep-1996	CS ag	V	24.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
16-sep-1996	EC ag	N	24.0	<0.0004 U	<0.0004 U	-	-	<0.0004 U	<0.0004 U
16-sep-1996	EC a	N	30.0	<0.0004 U	<0.0004 U	-	-	<0.0004 U	<0.0004 U
854-42									
12-sep-1996	EC a	N	1.0	<0.0004 U	<0.0004 U	-	-	<0.0004 U	<0.0004 U
12-sep-1996	EC a	N	6.0	<0.0004 U	<0.0004 U	-	-	<0.0004 U	<0.0004 U
12-sep-1996	EC a	N	12.0	<0.0004 U	<0.0004 U	-	-	<0.0004 U	<0.0004 U
12-sep-1996	EC a	N	18.0	<0.0004 U	<0.0004 U	-	-	<0.0004 U	<0.0004 U

Building 854 area. Results recorded by April 29, 2003.

1,1-DCA	1,2-DCA	1,1,1-TCA	Chloroform	Freon 11	Freon 113	Methylene chloride	Location Date
							854-31
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0008 B	30-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00064 B	30-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.001 B	30-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00092 B	30-aug-1996
							854-32
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00067 S	20-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00065 S	20-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00068 S	20-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0006 S	20-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.001 S	21-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0017 S	21-aug-1996
							854-33
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0016 B	28-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0015 B	28-aug-1996
							854-34
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0027 B	22-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0028 B	22-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0026 B	22-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0021 B	22-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0026 B	22-aug-1996
							854-34A
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	07-nov-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	07-nov-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	07-nov-1996
							854-35
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	19-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	19-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	19-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00068 S	20-aug-1996
							854-36
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00059 S	20-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00064 S	20-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00062 S	20-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00065 S	20-aug-1996
							854-38
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.009 B	06-sep-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0062 B	06-sep-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0062 B	06-sep-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0052 B	06-sep-1996
							854-40
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00063 B	04-sep-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	04-sep-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00078 B	04-sep-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00074 B	04-sep-1996
							854-41
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.008 B	06-sep-1996
-	<0.0004 U	<0.0004 U	<0.0004 U	-	<0.0004 U	-	16-sep-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	16-sep-1996
-	<0.0004 U	<0.0004 U	<0.0004 U	-	<0.0004 U	-	16-sep-1996
-	<0.0004 U	<0.0004 U	<0.0004 U	-	<0.0004 U	-	16-sep-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	16-sep-1996
-	<0.0004 U	<0.0004 U	<0.0004 U	-	<0.0004 U	-	16-sep-1996
-	<0.0004 U	<0.0004 U	<0.0004 U	-	<0.0004 U	-	16-sep-1996
							854-42
-	<0.0004 U	<0.0004 U	<0.0004 U	-	<0.0004 U	-	12-sep-1996
-	<0.0004 U	<0.0004 U	<0.0004 U	-	<0.0004 U	-	12-sep-1996
-	<0.0004 U	<0.0004 U	<0.0004 U	-	<0.0004 U	-	12-sep-1996
-	<0.0004 U	<0.0004 U	<0.0004 U	-	<0.0004 U	-	12-sep-1996

Table A-3. Volatile organic compounds in soil and rock (mg/kg) collected from the

Location Date	Lab	Val. Note	Depth (ft)	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	Total 1,2-DCE	TCE	PCE
854-42 (continued)									
12-sep-1996	EC a	N	24.0	<0.0004 U	<0.0004 U	-	-	<0.0004 U	<0.0004 U
12-sep-1996	EC a	N	30.0	<0.0004 U	<0.0004 U	-	-	<0.0004 U	<0.0004 U
854-44									
29-oct-1996	CS a	V	1.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
29-oct-1996	CS a	V	6.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
29-oct-1996	CS a	V	12.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
854-B1									
31-aug-1983	MS a	U	1.5	-	-	-	-	30.74 P	-
854-F1									
02-aug-1983	MS a	U	1.9	-	-	-	-	29 P	-
21-jul-1983	BC a	U	5.4	-	-	-	-	5.4 P	-
02-aug-1983	MS a	U	5.8	-	-	-	-	5.4 P	-
21-jul-1983	BC a	U	10.5	-	-	-	-	0.34 P	-
02-aug-1983	MS a	U	11.0	-	-	-	-	1.6 P	-
02-aug-1983	MS a	U	21.5	-	-	-	-	0.44 P	-
02-aug-1983	MS a	U	31.0	-	-	-	-	0.03 P	-
02-aug-1983	MS a	U	46.5	-	-	-	-	<0.03 P	-
854-G1									
31-aug-1983	MS a	U	1.4	-	-	-	-	0.136 P	-
854-H1									
26-jul-1983	BC a	U	1.5	-	-	-	-	<0.05 P	-
02-aug-1983	MS a	U	2.0	-	-	-	-	<0.03 P	-
02-aug-1983	MS a	U	7.8	-	-	-	-	<0.03 P	-
02-aug-1983	MS a	U	21.6	-	-	-	-	<0.03 P	-
B-854-18									
23-jun-1999	CN a	V	9.2	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
23-jun-1999	CN a	V	20.4	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
23-jun-1999	CN a	V	30.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
24-jun-1999	CN a	V	84.6	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
24-jun-1999	CN a	V	90.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
24-jun-1999	CN a	V	95.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
24-jun-1999	CN a	V	104.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
28-jun-1999	CN a	V	108.3	<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 OU	<0.0005 OU
28-jun-1999	CN a	V	115.0	<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 OU	<0.0005 OU
28-jun-1999	CN a	V	120.1	<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 OU	<0.0005 OU
28-jun-1999	CN a	V	123.2	<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 OU	<0.0005 OU
28-jun-1999	CN a	V	125.1	<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 OU	<0.0005 OU
28-jun-1999	BB agj	V	130.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
28-jun-1999	CN ag	V	130.0	<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 OU	<0.0005 OU
29-jun-1999	CN a	V	134.4	<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 OU	<0.0005 OU
29-jun-1999	CN a	V	141.0	<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 OU	<0.0005 OU
29-jun-1999	CN a	V	145.8	<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 OU	<0.0005 OU
B-854-1706									
27-mar-2001	BB a	V	2.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
28-mar-2001	BB a	V	7.5	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
28-mar-2001	BB a	V	9.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
28-mar-2001	BB a	V	11.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
28-mar-2001	BB a	V	13.5	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
B-854-1707									
23-apr-2001	BB a	V	57.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
23-apr-2001	BB a	V	64.6	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
B-854-1834									
29-jan-2003	SE af	V	6.5	<0.0014 LDU	<0.0014 LDU	<0.0014 LDU	<0.0014 LDU	<0.0014 LDU	<0.0014 LDU
29-jan-2003	SE af	V	16.0	<0.0014 LDU	<0.0014 LDU	<0.0014 LDU	<0.0014 LDU	<0.0014 LDU	<0.0014 LDU
B-854-1835									
16-jan-2003	SE af	V	1.8	<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0018 DU
16-jan-2003	SE af	V	6.8	<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0018 DU
16-jan-2003	SE af	V	15.2	<0.0014 DU	<0.0014 DU	<0.0014 DU	<0.0014 DU	<0.0014 DU	<0.0014 DU

Building 854 area. Results recorded by April 29, 2003.

1,1-DCA	1,2-DCA	1,1,1-TCA	Chloro-form	Freon 11	Freon 113	Methylene chloride	Location Date
							(continued) 854-42
-	<0.0004 U	<0.0004 U	<0.0004 U	-	<0.0004 U	-	12-sep-1996
-	<0.0004 U	<0.0004 U	<0.0004 U	-	<0.0004 U	-	12-sep-1996
							854-44
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	29-oct-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	29-oct-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	29-oct-1996
							854-B1
-	-	-	-	-	-	-	31-aug-1983
							854-F1
-	-	-	-	-	-	-	02-aug-1983
-	-	-	-	-	-	-	21-jul-1983
-	-	-	-	-	-	-	02-aug-1983
-	-	-	-	-	-	-	21-jul-1983
-	-	-	-	-	-	-	02-aug-1983
-	-	-	-	-	-	-	02-aug-1983
-	-	-	-	-	-	-	02-aug-1983
-	-	-	-	-	-	-	02-aug-1983
							854-G1
-	-	-	-	-	-	-	31-aug-1983
							854-H1
-	-	-	-	-	-	-	26-jul-1983
-	-	-	-	-	-	-	02-aug-1983
-	-	-	-	-	-	-	02-aug-1983
-	-	-	-	-	-	-	02-aug-1983
							B-854-18
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	23-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	23-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	23-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	24-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	24-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	24-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	24-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 U	28-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 U	28-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 U	28-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 U	28-jun-1999
<0.0005 U	<0.0005 UO	<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 U	28-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.002 U	0.003 B	28-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 U	28-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 U	29-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 U	29-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 U	29-jun-1999
							B-854-1706
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.002 U	<0.0005 U	27-mar-2001
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.002 U	<0.0005 U	28-mar-2001
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.002 U	<0.0005 U	28-mar-2001
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.002 U	<0.0005 U	28-mar-2001
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.002 U	<0.0005 U	28-mar-2001
							B-854-1707
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.002 U	<0.0005 U	23-apr-2001
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.002 U	0.0007 B	23-apr-2001
							B-854-1834
<0.0014 LDU	<0.0014 LDU	<0.0014 LDU	<0.0014 LDU	<0.0014 LDU	<0.0014 LDU	<0.0055 LDU	29-jan-2003
<0.0014 LDU	<0.0014 LDU	<0.0014 LDU	<0.0014 LDU	<0.0014 LDU	<0.0014 LDU	<0.0057 LDU	29-jan-2003
							B-854-1835
<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0074 DU	16-jan-2003
<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0071 DU	16-jan-2003
<0.0014 DU	<0.0014 DU	<0.0014 DU	<0.0014 DU	<0.0014 DU	<0.0014 DU	<0.0056 DU	16-jan-2003

Table A-3. Volatile organic compounds in soil and rock (mg/kg) collected from the

Location Date	Lab	Val. Note	Depth (ft)	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	Total 1,2-DCE	TCE	PCE
B-854-1835 (continued)									
16-jan-2003	SE af	V	24.6	<0.0012 DU	<0.0012 DU	<0.0012 DU	<0.0012 DU	<0.0012 DU	<0.0012 DU
22-jan-2003	SE af	V	33.5	<0.0013 DLU	<0.0013 DLU	<0.0013 DLU	<0.0013 DLU	<0.0013 DLU	<0.0013 DLU
B-854-1836									
12-dec-2002	SE af	V	1.0	<0.001 DU	<0.001 DU	<0.001 DU	<0.001 DU	<0.001 DU	<0.001 DU
12-dec-2002	SE af	V	5.0	<0.0022 IJDU	<0.0022 IJDU	<0.0022 IJDU	<0.0022 IJDU	<0.0022 IJDU	<0.0022 DU
12-dec-2002	SE af	V	11.5	<0.0016 DU	<0.0016 DU	<0.0016 DU	<0.0016 DU	<0.0016 DU	<0.0016 DU
12-dec-2002	SE af	V	24.5	<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0018 DU
17-dec-2002	SE af	V	30.0	<0.0022 DU	<0.0022 DU	<0.0022 DU	<0.0022 DU	<0.0022 DU	<0.0022 DU
17-dec-2002	SE af	V	37.0	<0.0015 DU	<0.0015 DU	<0.0015 DU	<0.0015 DU	<0.0015 DU	<0.0015 DU
17-dec-2002	SE af	V	42.0	<0.0016 DU	<0.0016 DU	<0.0016 DU	<0.0016 DU	<0.0016 DU	<0.0016 DU
17-dec-2002	SE af	V	48.0	<0.0014 DU	<0.0014 DU	<0.0014 DU	<0.0014 DU	<0.0014 DU	<0.0014 DU
17-dec-2002	SE af	V	62.0	<0.0016 DU	<0.0016 DU	<0.0016 DU	<0.0016 DU	<0.0016 DU	<0.0016 DU
17-dec-2002	SE af	V	72.0	<0.0011 DU	<0.0011 DU	<0.0011 DU	<0.0011 DU	<0.0011 DU	<0.0011 DU
17-dec-2002	SE af	V	76.5	<0.00094 DU	<0.00094 DU	<0.00094 DU	<0.00094 DU	<0.00094 DU	<0.00094 DU
17-dec-2002	SE af	V	78.5	<0.0012 DU	<0.0012 DU	<0.0012 DU	<0.0012 DU	<0.0012 DU	<0.0012 DU
17-dec-2002	SE af	V	80.0	<0.0013 DU	<0.0013 DU	<0.0013 DU	<0.0013 DU	<0.0013 DU	<0.0013 DU
17-dec-2002	SE af	V	81.5	<0.001 DU	<0.001 DU	<0.001 DU	<0.001 DU	<0.001 DU	<0.001 DU
17-dec-2002	SE af	V	81.5	-	<0.025 U	<0.025 U	<0.025 U	<0.025 U	<0.025 U
17-dec-2002	SE af	V	83.5	<0.0023 DU	<0.0023 DU	<0.0023 DU	<0.0023 DU	<0.0023 DU	<0.0023 DU
17-dec-2002	SE af	V	85.5	<0.0012 DU	<0.0012 DU	<0.0012 DU	<0.0012 DU	<0.0012 DEU	<0.0012 DU
17-dec-2002	SE af	V	87.0	<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0018 DU
B-854-1862									
06-jan-2003	SE af	V	0.7	<0.0015 DU	<0.0015 DU	<0.0015 DU	<0.0015 DU	<0.0015 DU	<0.0015 DU
08-jan-2003	SE af	V	20.0	<0.0017 DU	<0.0017 DU	<0.0017 DU	<0.0017 DU	<0.0017 DU	<0.0017 DU
08-jan-2003	SE af	V	30.5	<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0018 DU
08-jan-2003	SE af	V	35.5	<0.0014 DU	<0.0014 DU	<0.0014 DU	<0.0014 DU	<0.0014 DU	<0.0014 DU
09-jan-2003	SE af	V	50.0	<0.0017 LODU	<0.0017 LODU	<0.0017 LODU	<0.0017 LODU	<0.0017 LODU	<0.0017 LODU
09-jan-2003	SE af	V	59.7	<0.0018 LODU	<0.0018 LODU	<0.0018 LODU	<0.0018 LODU	<0.0018 LODU	<0.0018 LODU
09-jan-2003	SE af	V	66.0	<0.0014 LODU	<0.0014 LODU	<0.0014 LODU	<0.0014 LODU	<0.0014 LODU	<0.0014 LODU
09-jan-2003	SE af	V	68.0	<0.0014 LODU	<0.0014 LODU	<0.0014 LODU	<0.0014 LODU	<0.0014 LODU	<0.0014 LODU
09-jan-2003	SE af	V	70.3	<0.0018 LODU	<0.0018 LODU	<0.0018 LODU	<0.0018 LODU	<0.0018 LODU	<0.0018 LODU
09-jan-2003	SE af	V	72.2	<0.0014 LODU	<0.0014 LODU	<0.0014 LODU	<0.0014 LODU	<0.0014 LODU	<0.0014 LODU
09-jan-2003	SE af	V	75.2	<0.0015 LODU	<0.0015 LODU	<0.0015 LODU	<0.0015 LODU	<0.0015 LODU	<0.0015 LODU
09-jan-2003	SE af	V	88.0	<0.0013 LODU	<0.0013 LODU	<0.0013 LODU	<0.0013 LODU	<0.0013 LODU	<0.0013 LODU
W-854-01									
21-nov-1995	CS a	V	0.5	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
21-nov-1995	CS ag	V	5.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
21-nov-1995	CS ag	V	10.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
21-nov-1995	CS a	V	20.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
21-nov-1995	CS a	V	22.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
21-nov-1995	CS a	V	25.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
21-nov-1995	CS a	V	40.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
22-nov-1995	CS a	V	60.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
22-nov-1995	CS ag	V	80.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
22-nov-1995	FS ag	V	80.0	<0.005 U	<0.005 U	<0.005 U	-	<0.005 U	<0.005 U
27-nov-1995	CS a	V	100.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
27-nov-1995	CS a	V	121.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
13-dec-1995	CS a	V	141.0	<0.0005 U	-	-	<0.0005 U	0.0017	<0.0005 U
04-jan-1996	CS a	V	193.3	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
04-jan-1996	CS a	V	223.1	<0.0005 U	-	-	<0.0005 U	0.0008	<0.0005 U
04-jan-1996	CS a	V	236.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
05-jan-1996	CS a	V	246.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
05-jan-1996	CS a	V	256.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
05-jan-1996	CS a	V	264.0	<0.0005 IUJ	-	-	<0.0005 IUJ	<0.0005 IUJ	<0.0005 IUJ
08-jan-1996	CS a	V	301.1	<0.0005 IUJ	-	-	<0.0005 IUJ	<0.0005 IUJ	<0.0005 IUJ
09-jan-1996	CS a	V	350.8	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
09-jan-1996	CS ag	V	391.0	<0.0005 IUJ	-	-	<0.0005 IUJ	<0.0005 IUJ	<0.0005 IUJ
09-jan-1996	FS ag	V	391.0	<0.005 U	<0.005 LOU	<0.005 U	-	<0.005 U	<0.005 OU
W-854-02									
22-jan-1996	CS a	V	0.5	<0.0005 UO	-	-	<0.0005 U	0.0044	<0.0005 U
22-jan-1996	CS a	V	5.0	<0.0005 UO	-	-	<0.0005 U	0.00081	<0.0005 U
22-jan-1996	CS a	V	10.0	<0.0005 UO	-	-	<0.0005 U	0.0015	<0.0005 U
23-jan-1996	CS a	V	20.1	<0.0005 UO	-	-	<0.0005 U	0.001	<0.0005 U
23-jan-1996	CS a	V	33.0	<0.0005 UO	-	-	<0.0005 U	0.0085	<0.0005 U

Building 854 area. Results recorded by April 29, 2003.

1,1-DCA	1,2-DCA	1,1,1-TCA	Chloro-form	Freon 11	Freon 113	Methylene chloride	Location Date
						(continued)	B-854-1835
<0.0012 DU	<0.0012 DU	<0.0012 DU	<0.0012 DU	<0.0012 DU	<0.0012 DU	<0.0047 DU	16-jan-2003
<0.0013 DLU	<0.0013 DLU	<0.0013 DLU	<0.0013 DLU	<0.0013 DLU	<0.0013 DLU	<0.0053 DLU	22-jan-2003
							B-854-1836
<0.001 DU	<0.001 DU	<0.001 DU	<0.001 DU	<0.001 DU	<0.001 DU	<0.004 DU	12-dec-2002
<0.0022 IJD	<0.0022 IJD	<0.0022 IJD	<0.0022 IJD	<0.0022 IJD	<0.0022 DU	<0.0087 IJD	12-dec-2002
<0.0016 DU	<0.0016 DU	<0.0016 DU	<0.0016 DU	<0.0016 DU	<0.0016 DU	<0.0063 DU	12-dec-2002
<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0073 DU	12-dec-2002
<0.0022 DU	<0.0022 DU	<0.0022 DU	<0.0022 DU	<0.0022 DU	<0.0022 DU	<0.0088 DU	17-dec-2002
<0.0015 DU	<0.0015 DU	<0.0015 DU	<0.0015 DU	<0.0015 DU	<0.0015 DU	<0.0061 DU	17-dec-2002
<0.0016 DU	<0.0016 DU	<0.0016 DU	<0.0016 DU	<0.0016 DU	<0.0016 DU	<0.0064 DU	17-dec-2002
<0.0014 DU	<0.0014 DU	<0.0014 DU	<0.0014 DU	<0.0014 DU	<0.0014 DU	<0.0055 DU	17-dec-2002
<0.0016 DU	<0.0016 DU	<0.0016 DU	<0.0016 DU	<0.0016 DU	<0.0016 DU	<0.0065 DU	17-dec-2002
<0.0011 DU	<0.0011 DU	<0.0011 DU	<0.0011 DU	<0.0011 DU	<0.0011 DU	<0.0045 DU	17-dec-2002
<0.00094 DU	<0.00094 DU	<0.00094 DU	<0.00094 DU	<0.00094 DU	<0.00094 DU	<0.0037 DU	17-dec-2002
<0.0012 DU	<0.0012 DU	<0.0012 DU	<0.0012 DU	<0.0012 DU	<0.0012 DU	<0.005 DU	17-dec-2002
<0.0013 DU	<0.0013 DU	<0.0013 DU	<0.0013 DU	<0.0013 DU	<0.0013 DU	<0.0052 DU	17-dec-2002
<0.001 DU	<0.001 DU	<0.001 DU	<0.001 DU	<0.001 DU	<0.001 DU	<0.0042 DU	17-dec-2002
<0.025 U	<0.025 U	<0.025 U	<0.025 U	<0.1 U	<0.025 U	<0.025 U	17-dec-2002
<0.0023 DU	<0.0023 DU	<0.0023 DU	<0.0023 DU	<0.0023 DU	<0.0023 DU	<0.0093 DU	17-dec-2002
<0.0012 DU	<0.0012 DU	<0.0012 DU	<0.0012 DU	<0.0012 DU	<0.0012 DU	<0.0047 DU	17-dec-2002
<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0074 DU	17-dec-2002
							B-854-1862
<0.0015 DU	<0.0015 DU	<0.0015 DU	<0.0015 DU	<0.0015 DU	<0.0015 DU	<0.0059 DU	06-jan-2003
<0.0017 DU	<0.0017 DU	<0.0017 DU	<0.0017 DU	<0.0017 DU	<0.0017 DU	<0.0069 DU	08-jan-2003
<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0018 DU	<0.0074 DU	08-jan-2003
<0.0014 DU	<0.0014 DU	<0.0014 DU	<0.0014 DU	<0.0014 DU	<0.0014 DU	<0.0054 DU	08-jan-2003
<0.0017 LOD	<0.0017 LOD	<0.0017 LOD	<0.0017 LOD	<0.0017 LOD	<0.0017 LOD	<0.0069 LOD	09-jan-2003
<0.0018 LOD	<0.0018 LOD	<0.0018 LOD	<0.0018 LOD	<0.0018 LOD	<0.0018 LOD	<0.0071 LOD	09-jan-2003
<0.0014 LOD	<0.0014 LOD	<0.0014 LOD	<0.0014 LOD	<0.0014 LOD	<0.0014 LOD	<0.0058 LOD	09-jan-2003
<0.0014 LOD	<0.0014 LOD	<0.0014 LOD	<0.0014 LOD	<0.0014 LOD	<0.0014 LOD	<0.0058 LOD	09-jan-2003
<0.0018 LOD	<0.0018 LOD	<0.0018 LOD	<0.0018 LOD	<0.0018 LOD	<0.0018 LOD	<0.007 LOD	09-jan-2003
<0.0014 LOD	<0.0014 LOD	<0.0014 LOD	<0.0014 LOD	<0.0014 LOD	<0.0014 LOD	<0.0057 LOD	09-jan-2003
<0.0015 LOD	<0.0015 LOD	<0.0015 LOD	<0.0015 LOD	<0.0015 LOD	<0.0015 LOD	<0.0061 LOD	09-jan-2003
<0.0013 LOD	<0.0013 LOD	<0.0013 LOD	<0.0013 LOD	<0.0013 LOD	<0.0013 LOD	<0.0052 LOD	09-jan-2003
							W-854-01
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00055	21-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00066	22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995
<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0035	27-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.003	27-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0014 B	13-dec-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	04-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	04-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	04-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	05-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	05-jan-1996
<0.0005 IUJ	<0.0005 IUJ	<0.0005 IUJ	<0.0005 IUJ	<0.0005 IUJ	<0.0005 IUJ	<0.0005 IUJ	05-jan-1996
<0.0005 IUJ	<0.0005 IUJ	<0.0005 IUJ	<0.0005 IUJ	<0.0005 IUJ	<0.0005 IUJ	<0.0005 IUJ	08-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	09-jan-1996
<0.0005 IUJ	<0.0005 IUJ	<0.0005 IUJ	<0.0005 IUJ	<0.0005 IUJ	<0.0005 IUJ	<0.0005 IUJ	09-jan-1996
<0.005 LOU	<0.005 U	<0.005 UL	<0.005 OU	<0.005 U	<0.005 U	<0.005 LOU	09-jan-1996
							W-854-02
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00053 B	22-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	23-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00053 B	23-jan-1996

Table A-3. Volatile organic compounds in soil and rock (mg/kg) collected from the

Location Date	Lab	Val. Note	Depth (ft)	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	Total 1,2-DCE	TCE	PCE
W-854-02 (continued)									
24-jan-1996	CS a	V	42.0	<0.0005 U	-	-	<0.0005 U	0.007	<0.0005 U
24-jan-1996	CS a	V	52.5	<0.0005 U	-	-	<0.0005 U	0.0053	<0.0005 U
24-jan-1996	CS a	V	62.0	<0.0005 U	-	-	<0.0005 U	0.0087	<0.0005 U
24-jan-1996	CS a	V	73.0	<0.0005 U	-	-	<0.0005 U	0.0072	<0.0005 U
25-jan-1996	CS a	V	93.0	<0.0005 U	-	-	<0.0005 U	0.0091	<0.0005 U
25-jan-1996	CS a	V	106.0	<0.0005 U	-	-	<0.0005 U	0.00094	<0.0005 U
25-jan-1996	CS a	V	116.0	<0.0005 U	-	-	<0.0005 U	0.0029	<0.0005 U
25-jan-1996	CS a	V	124.1	<0.0005 U	-	-	<0.0005 U	0.017	<0.0005 U
30-jan-1996	CS a	V	132.0	<0.0005 U	-	-	<0.0005 U	0.0056	<0.0005 U
30-jan-1996	CS a	V	139.1	<0.0005 U	-	-	<0.0005 U	0.019	<0.0005 U
01-feb-1996	CS a	V	147.7	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
01-feb-1996	CS a	V	156.5	<0.0005 U	-	-	<0.0005 U	0.042	<0.0005 U
01-feb-1996	CS a	V	162.0	<0.0005 U	-	-	<0.0005 U	0.0093	<0.0005 U
01-feb-1996	CS a	V	167.0	<0.0005 U	-	-	<0.0005 U	0.0015	<0.0005 U
01-feb-1996	CS a	V	170.6	<0.0005 U	-	-	<0.0005 U	0.00073	<0.0005 U
01-feb-1996	CS a	V	176.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
01-feb-1996	CS a	V	181.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
01-feb-1996	CS a	V	186.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
01-feb-1996	CS a	V	190.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
W-854-03									
14-feb-1996	CS ag	V	0.5	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
14-feb-1996	CS ag	V	0.5	<0.005 U	-	-	<0.005 U	<0.005 U	<0.005 U
14-feb-1996	CS ag	V	5.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
14-feb-1996	CS ag	V	5.0	<0.005 U	-	-	<0.005 U	<0.005 U	<0.005 U
14-feb-1996	CS a	V	10.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
14-feb-1996	CS a	V	20.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
14-feb-1996	CS ag	V	30.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
14-feb-1996	FS ag	V	30.0	<0.005 U	<0.005 U	<0.005 U	-	<0.005 U	<0.005 U
15-feb-1996	CS a	V	41.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
15-feb-1996	CS a	V	54.0	<0.0005 U	-	-	<0.0005 U	0.0011	<0.0005 U
15-feb-1996	CS a	V	61.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
15-feb-1996	CS a	V	76.0	<0.0005 U	-	-	<0.0005 U	0.00094	<0.0005 U
15-feb-1996	CS ag	V	87.0	<0.0005 U	-	-	<0.0005 U	0.0017	<0.0005 U
15-feb-1996	FS ag	V	87.0	<0.005 U	<0.005 U	<0.005 U	-	<0.005 U	<0.005 U
15-feb-1996	CS a	V	94.0	<0.0005 U	-	-	<0.0005 U	0.00084	<0.0005 U
20-feb-1996	CS a	V	105.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
20-feb-1996	CS a	V	115.0	<0.0005 U	-	-	<0.0005 U	0.00075	<0.0005 U
20-feb-1996	CS a	V	121.0	<0.0005 U	-	-	<0.0005 U	0.009	<0.0005 U
20-feb-1996	CS a	V	125.0	<0.0005 U	-	-	<0.0005 U	0.0049	<0.0005 U
21-feb-1996	CS a	V	133.0	<0.0005 U	-	-	<0.0005 U	0.0024	<0.0005 U
21-feb-1996	CS a	V	152.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
21-feb-1996	CS a	V	157.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
21-feb-1996	CS a	V	162.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
W-854-04									
28-feb-1996	CS a	V	0.5	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
28-feb-1996	CS a	V	0.5	<0.005 U	-	-	<0.005 U	<0.005 U	<0.005 U
29-feb-1996	CS a	V	51.0	<0.0005 U	-	-	<0.0005 U	0.0011	<0.0005 U
29-feb-1996	CS a	V	61.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
29-feb-1996	CS a	V	78.0	<0.0005 U	-	-	<0.0005 U	0.0017	<0.0005 U
29-feb-1996	CS a	V	91.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
04-mar-1996	CS a	V	121.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
04-mar-1996	CS a	V	135.0	<0.0005 U	-	-	<0.0005 U	0.0022	<0.0005 U
05-mar-1996	CS a	V	157.0	<0.0005 U	-	-	<0.0005 U	<0.0005 ULO	<0.0005 U
05-mar-1996	CS a	V	162.0	<0.0005 U	-	-	<0.0005 U	<0.0005 ULO	<0.0005 U
18-mar-1996	CS a	V	183.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
19-mar-1996	CS a	V	219.0	<0.0005 UO	-	-	<0.0005 U	<0.0005 UO	<0.0005 U
19-mar-1996	CS a	V	235.0	<0.0005 UO	-	-	<0.0005 U	<0.0005 UO	<0.0005 U
20-mar-1996	CS a	V	267.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
20-mar-1996	CS a	V	277.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
21-mar-1996	CS a	V	315.0	<0.0005 U	-	-	<0.0005 U	<0.0005 ULO	<0.0005 U
25-mar-1996	CS a	V	336.0	<0.0005 UO	-	-	<0.0005 U	<0.0005 UO	<0.0005 U
W-854-05									
04-apr-1996	CS a	V	0.5	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
04-apr-1996	CS a	V	5.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
04-apr-1996	CS a	V	20.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U

Building 854 area. Results recorded by April 29, 2003.

1,1-DCA	1,2-DCA	1,1,1-TCA	Chloro-form	Freon 11	Freon 113	Methylene chloride	Location Date
							(continued) W-854-02
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00064 B	24-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00054 B	24-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	24-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	24-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00069 S	25-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00072 S	25-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00088 S	25-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00061 S	25-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	30-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	30-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00063 B	01-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00064 B	01-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0007 B	01-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00061 B	01-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0009 B	01-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00083 B	01-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0011 B	01-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0012 B	01-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0012 B	01-feb-1996
							W-854-03
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0011 B	14-feb-1996
<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	14-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00075 B	14-feb-1996
<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	14-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00094 B	14-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00081 B	14-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0012 B	14-feb-1996
<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	14-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	15-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	15-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	15-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	15-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	15-feb-1996
<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	15-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	15-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0028 B	20-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.002 B	20-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0021 B	20-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0033 B	20-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00081 S	21-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0015 S	21-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0012 S	21-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0009 S	21-feb-1996
							W-854-04
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0014 B	28-feb-1996
<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	28-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00061 B	29-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00071 B	29-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00078 B	29-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00067 B	29-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00089 B	04-mar-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00093 B	04-mar-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00054 S	05-mar-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	05-mar-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00058 S	18-mar-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00092 B	19-mar-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0013 B	19-mar-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0035 B	20-mar-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.003 B	20-mar-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.002 B	21-mar-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	25-mar-1996
							W-854-05
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	04-apr-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	04-apr-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	04-apr-1996

Table A-3. Volatile organic compounds in soil and rock (mg/kg) collected from the

Location Date	Lab	Val. Note	Depth (ft)	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	Total 1,2-DCE	TCE	PCE
W-854-05 (continued)									
10-apr-1996	CS a	V	30.0	<0.0005 U	–	–	<0.0005 U	<0.0005 U	<0.0005 U
10-apr-1996	CS a	V	40.0	<0.0005 U	–	–	<0.0005 U	<0.0005 U	<0.0005 U
10-apr-1996	CS a	V	60.0	<0.0005 U	–	–	<0.0005 U	<0.0005 U	<0.0005 U
11-apr-1996	CS a	V	80.0	<0.0005 U	–	–	<0.0005 U	<0.0005 U	<0.0005 U
W-854-06									
29-apr-1996	CS a	V	60.0	<0.0005 U	–	–	<0.0005 U	<0.0005 U	<0.0005 U
29-apr-1996	CS a	V	80.0	<0.0005 U	–	–	<0.0005 U	<0.0005 U	<0.0005 U
29-apr-1996	CS a	V	100.0	<0.0005 U	–	–	<0.0005 U	<0.0005 U	<0.0005 U
30-apr-1996	CS a	V	120.0	<0.0005 U	–	–	<0.0005 U	<0.0005 U	<0.0005 U
30-apr-1996	CS a	V	133.0	<0.0005 U	–	–	<0.0005 U	<0.0005 U	<0.0005 U
16-may-1996	BB a	V	136.0	<0.0004 U	<0.0005 U	<0.0005 U	–	<0.00037 LOU	<0.0009 U
30-apr-1996	CS a	V	140.0	<0.0005 U	–	–	<0.0005 U	<0.0005 U	<0.0005 U
16-may-1996	CS a	V	163.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
20-may-1996	CS a	V	173.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
20-may-1996	CS a	V	183.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
W-854-07									
07-jun-1996	CS a	V	115.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
07-jun-1996	CS a	V	121.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
07-jun-1996	CS a	V	124.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
07-jun-1996	CS a	V	129.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
07-jun-1996	CS a	V	134.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
07-jun-1996	CS a	V	140.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
W-854-08									
19-jun-1996	CS a	V	0.5	<0.0005 UO	<0.0005 U	<0.0005 U	–	<0.0005 UO	<0.0005 U
19-jun-1996	CS a	V	6.5	<0.0005 UO	<0.0005 U	<0.0005 U	–	<0.0005 UO	<0.0005 U
19-jun-1996	CS a	V	11.0	<0.0005 UO	<0.0005 U	<0.0005 U	–	<0.0005 UO	<0.0005 U
19-jun-1996	CS a	V	21.0	<0.0005 UO	<0.0005 U	<0.0005 U	–	<0.0005 UO	<0.0005 U
19-jun-1996	CS a	V	41.0	<0.0005 UO	<0.0005 U	<0.0005 U	–	<0.0005 UO	<0.0005 U
19-jun-1996	CS a	V	50.0	<0.0005 UO	<0.0005 U	<0.0005 U	–	<0.0005 UO	<0.0005 U
20-jun-1996	CS a	V	70.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
20-jun-1996	CS a	V	80.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
20-jun-1996	CS a	V	84.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
20-jun-1996	CS a	V	90.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
20-jun-1996	CS a	V	100.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
20-jun-1996	CS a	V	110.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
20-jun-1996	CS a	V	120.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
24-jun-1996	CS a	V	121.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
24-jun-1996	CS a	V	131.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
W-854-09									
03-jul-1996	CS a	V	0.5	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
03-jul-1996	CS a	V	10.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
03-jul-1996	CS a	V	20.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
03-jul-1996	CS a	V	30.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
08-jul-1996	CS a	V	40.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
11-jul-1996	CS a	V	180.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
11-jul-1996	CS a	V	185.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
11-jul-1996	CS a	V	190.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
W-854-10									
24-jul-1996	CS a	V	1.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
24-jul-1996	CS a	V	10.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
24-jul-1996	CS a	V	20.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
24-jul-1996	BB ag	V	30.0	<0.0004 U	<0.0005 U	<0.0005 U	–	<0.00037 U	<0.0009 U
24-jul-1996	CS ag	V	30.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
25-jul-1996	CS a	V	40.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
25-jul-1996	CS a	V	50.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
25-jul-1996	CS a	V	60.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
25-jul-1996	CS a	V	70.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
30-jul-1996	CS a	V	80.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
30-jul-1996	CS a	V	100.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
31-jul-1996	CS a	V	120.0	<0.0005 U	<0.0005 U	<0.0005 U	–	<0.0005 U	<0.0005 U
31-jul-1996	CS a	V	135.0	<0.0005 U	<0.0005 U	<0.0005 U	–	0.0013	<0.0005 U

1,1-DCA	1,2-DCA	1,1,1-TCA	Chloro-form	Freon 11	Freon 113	Methylene chloride	Location Date
							(continued) W-854-05
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	10-apr-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	10-apr-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	10-apr-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.001 B	11-apr-1996
							W-854-06
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	29-apr-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	29-apr-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	29-apr-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0029 S	30-apr-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0034 S	30-apr-1996
<0.0006 U	<0.0005 U	<0.0006 U	<0.0007 U	<0.0005 U	<0.0005 U	0.0007 B	16-may-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0036 S	30-apr-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0022 S	16-may-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	20-may-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	20-may-1996
							W-854-07
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00099 B	07-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0013 B	07-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0017 B	07-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.002 B	07-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0023 B	07-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0017 B	07-jun-1996
							W-854-08
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0018 B	19-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0017 B	19-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.003 B	19-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0029 B	19-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0026 B	19-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0017 B	19-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0012 S	20-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0018 S	20-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0022 S	20-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0019 S	20-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0016 S	20-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0013 S	20-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0016 S	20-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0014 B	24-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0013 B	24-jun-1996
							W-854-09
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0015 B	03-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0015 B	03-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0014 B	03-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0018 B	03-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0022 B	08-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0008 B	11-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0011 B	11-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0011 B	11-jul-1996
							W-854-10
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0039 B	24-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0033 B	24-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.003 B	24-jul-1996
<0.0006 U	<0.0005 U	<0.0006 U	<0.0007 U	<0.0005 U	<0.0005 U	0.0036 B	24-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0028 B	24-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	25-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0021	25-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0018	25-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0016	25-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0023 B	30-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0022 B	30-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0042 B	31-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0041 B	31-jul-1996

Table A-3. Volatile organic compounds in soil and rock (mg/kg) collected from the

Location Date	Lab	Val. Note	Depth (ft)	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	Total 1,2-DCE	TCE	PCE
W-854-11									
08-aug-1996	CS a	V	1.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
08-aug-1996	CS a	V	10.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
08-aug-1996	CS a	V	20.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
12-aug-1996	CS a	V	30.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
12-aug-1996	CS a	V	40.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
12-aug-1996	CS a	V	50.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
12-aug-1996	CS a	V	60.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
13-aug-1996	CS a	V	80.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
13-aug-1996	BB ag	V	90.0	<0.0004 U	<0.0005 U	<0.0005 U	-	<0.00037 U	<0.0009 U
13-aug-1996	CS ag	V	90.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
13-aug-1996	CS a	V	100.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
14-aug-1996	CS a	V	125.0	<0.0005 U	<0.0005 U	<0.0005 U	-	0.00099	<0.0005 U
14-aug-1996	CS a	V	140.0	<0.0005 U	<0.0005 U	<0.0005 U	-	0.00063	<0.0005 U
14-aug-1996	CS a	V	150.0	<0.0005 U	<0.0005 U	<0.0005 U	-	0.00092	<0.0005 U
14-aug-1996	CS a	V	160.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
14-aug-1996	CS a	V	170.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
W-854-12									
21-jan-1998	CS a	V	0.5	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
21-jan-1998	CS a	V	5.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
21-jan-1998	CS a	V	21.8	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
21-jan-1998	CS a	V	41.2	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
21-jan-1998	CS a	V	51.1	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
21-jan-1998	BB ahg	V	59.2	<0.0016 U	<0.001 U	<0.00102 U	-	<0.00116 U	<0.00149 U
21-jan-1998	CS ag	V	59.2	<0.0005 U	<0.0005 U	<0.0005 U	-	0.00063	<0.0005 U
22-jan-1998	CS a	V	71.1	<0.0005 U	<0.0005 U	<0.0005 U	-	0.00082	<0.0005 U
22-jan-1998	CS a	V	86.4	<0.0005 U	<0.0005 U	<0.0005 U	-	0.00064	<0.0005 U
23-jan-1998	CS a	V	91.0	<0.0005 U	<0.0005 U	<0.0005 U	-	0.00058	<0.0005 U
23-jan-1998	CS a	V	111.5	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
23-jan-1998	BB ag	V	129.5	<0.0016 U	<0.001 U	<0.00102 U	-	<0.00116 UL	<0.00149 U
23-jan-1998	CS ag	V	129.5	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
23-jan-1998	CS a	V	133.2	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
23-jan-1998	CS a	V	136.4	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
26-jan-1998	BB ag	V	148.9	<0.0016 U	<0.001 U	<0.00102 U	-	<0.00116 UL	<0.00149 U
26-jan-1998	CS a	V	148.9	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
09-feb-1998	CS a	V	151.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
10-feb-1998	CS a	V	170.1	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
10-feb-1998	CS a	V	187.7	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
12-feb-1998	CS a	V	218.3	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
W-854-13									
10-mar-1998	CS a	V	97.2	<0.0005 U	<0.0005 U	<0.0005 U	-	0.001	<0.0005 U
10-mar-1998	CS a	V	104.1	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
10-mar-1998	CS a	V	107.3	<0.0005 U	<0.0005 U	<0.0005 U	-	0.00095	<0.0005 U
10-mar-1998	BB ag	V	110.2	<0.0016 U	<0.001 U	<0.00102 U	-	<0.00116 U	<0.00149 U
10-mar-1998	CS a	V	110.5	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
10-mar-1998	CS a	V	113.7	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
12-mar-1998	CS a	V	124.7	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 UL	<0.0005 U
12-mar-1998	CS a	V	130.6	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 UL	<0.0005 U
12-mar-1998	CS a	V	134.4	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 UL	<0.0005 U
12-mar-1998	CS a	V	139.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 UL	<0.0005 U
12-mar-1998	CS a	V	144.9	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 UL	<0.0005 U
12-mar-1998	CS a	V	150.6	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 UL	<0.0005 U
12-mar-1998	CS a	V	154.3	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 UL	<0.0005 U
12-mar-1998	BB ag	V	158.6	<0.0016 U	<0.001 U	<0.00102 U	-	<0.00116 LU	<0.00149 U
12-mar-1998	CS a	V	158.9	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 UL	<0.0005 U
17-mar-1998	CS a	V	165.5	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
W-854-14									
14-jul-1998	CS a	V	0.5	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
14-jul-1998	CS a	V	3.9	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
15-jul-1998	CS a	V	15.0	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
15-jul-1998	CS a	V	50.6	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
20-jul-1998	CS a	V	60.1	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
20-jul-1998	BB ag	V	70.3	<0.0016 U	<0.001 U	<0.00102 U	-	<0.00116 U	<0.00149 U
20-jul-1998	CS a	V	70.3	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
22-jul-1998	CS a	V	81.5	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
22-jul-1998	CS a	V	91.7	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U

Building 854 area. Results recorded by April 29, 2003.

1,1- DCA	1,2- DCA	1,1,1- TCA	Chloro- form	Freon 11	Freon 113	Methylene chloride	Location Date
							W-854-11
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0026 S	08-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.002 S	08-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0025 S	08-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0019 B	12-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.002 B	12-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0018 B	12-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0016 B	12-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0028 B	13-aug-1996
<0.0006 U	<0.0005 U	<0.0006 U	<0.0007 U	<0.0005 U	<0.0005 U	0.0009 B	13-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0031 B	13-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0028 B	13-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0035 B	14-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0034 B	14-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.003 B	14-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0029 B	14-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0029 B	14-aug-1996
							W-854-12
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0014	21-jan-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.001	21-jan-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0014	21-jan-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00099	21-jan-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0012	21-jan-1998
<0.00119 U	<0.00151 U	<0.00105 U	<0.00074 U	<0.00139 U	<0.00135 U	0.0021 B	21-jan-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0012	21-jan-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0013	22-jan-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0017	22-jan-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00081	23-jan-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00099	23-jan-1998
<0.00119 U	<0.00151 U	<0.00105 U	<0.00074 U	<0.00139 U	<0.00135 U	0.011 B	23-jan-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0011	23-jan-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00078	23-jan-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00081	23-jan-1998
<0.00119 U	<0.00151 U	<0.00105 U	<0.00074 U	<0.00139 U	<0.00135 U	0.0021 B	26-jan-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0018	26-jan-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	09-feb-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	10-feb-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	10-feb-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0014 B	12-feb-1998
							W-854-13
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0023	10-mar-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0018	10-mar-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0014	10-mar-1998
<0.00119 U	<0.00151 U	<0.00105 U	<0.00074 U	<0.00139 U	<0.00135 U	0.0066 B	10-mar-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0013	10-mar-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0013	10-mar-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0035 B	12-mar-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.003 B	12-mar-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0032 B	12-mar-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.003 B	12-mar-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0031 B	12-mar-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0019 B	12-mar-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0032 B	12-mar-1998
<0.00119 U	<0.00151 U	<0.00105 U	<0.00074 U	<0.00139 U	<0.00135 U	0.0044 B	12-mar-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.003 B	12-mar-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0022 B	17-mar-1998
							W-854-14
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.011 B	14-jul-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0082 B	14-jul-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00057	15-jul-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	15-jul-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	20-jul-1998
<0.00119 U	<0.00151 U	<0.00105 U	<0.00074 U	<0.00139 U	<0.00135 U	0.0082 B	20-jul-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	20-jul-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0018 BB	22-jul-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0022 BB	22-jul-1998

Table A-3. Volatile organic compounds in soil and rock (mg/kg) collected from the

Location Date	Lab	Val. Note	Depth (ft)	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	Total 1,2-DCE	TCE	PCE
W-854-14 (continued)									
22-jul-1998	CS a	V	102.3	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
22-jul-1998	CS a	V	111.2	<0.0005 U	<0.0005 U	<0.0005 U	-	<0.0005 U	<0.0005 U
W-854-15									
17-jun-1999	CN a	V	70.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
17-jun-1999	CN a	V	75.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
17-jun-1999	CN a	V	80.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
17-jun-1999	CN a	V	85.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
23-jun-1999	CN a	V	90.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
23-jun-1999	CN a	V	95.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
23-jun-1999	CN a	V	100.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
23-jun-1999	BB agj	V	105.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 UL	<0.0005 U
23-jun-1999	CN ag	V	105.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
23-jun-1999	CN a	V	115.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
23-jun-1999	CN a	V	128.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
23-jun-1999	CN a	V	137.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
23-jun-1999	CN a	V	142.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
W-854-17									
22-jul-1999	CN a	V	8.5	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 LU	<0.0005 U
22-jul-1999	CN a	V	19.5	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 LU	<0.0005 U
22-jul-1999	CN a	V	30.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 LU	<0.0005 U
26-jul-1999	CN a	V	85.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 LU	<0.0005 U
26-jul-1999	CN a	V	90.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 LU	<0.0005 U
26-jul-1999	CN a	V	95.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 LU	<0.0005 U
26-jul-1999	CN a	V	105.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 LU	<0.0005 U
28-jul-1999	CN a	V	110.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 UL	<0.0005 U
28-jul-1999	BB ag	V	115.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00086	<0.0005 U
28-jul-1999	CN ag	V	115.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 UL	<0.0005 U
28-jul-1999	CN a	V	119.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 UL	<0.0005 U
28-jul-1999	CN a	V	130.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 UL	<0.0005 U
28-jul-1999	CN a	V	134.5	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 UL	<0.0005 U
28-jul-1999	CN a	V	145.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 UL	<0.0005 U
W-854-19									
08-jul-1999	CN a	V	52.5	<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	0.0099 O	<0.0005 U
08-jul-1999	CN a	V	60.0	<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 OU	<0.0005 U
08-jul-1999	CN a	V	65.0	<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 OU	<0.0005 U
08-jul-1999	CN a	V	70.0	<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 OU	<0.0005 U
08-jul-1999	BB agj	V	75.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
08-jul-1999	CN ag	V	75.0	<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 OU	<0.0005 U
W-854-45									
27-nov-2000	BB a	V	5.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
29-nov-2000	BB a	V	91.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
29-nov-2000	BB a	V	106.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
29-nov-2000	BB a	V	112.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
3SS-44-01									
25-sep-1991	BC a	U	0.0	<0.005 P	<0.005 P	<0.005 P	<0.005 P	<0.005 P	<0.005 P
3SS-854-001									
29-nov-1995	CS a	V	0.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
3SS-854-002									
29-nov-1995	CS a	V	0.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
3SS-854-003									
21-nov-1995	CS a	V	0.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
3SS-854-004									
21-nov-1995	CS a	V	0.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
3SS-854-005									
21-nov-1995	CS a	V	0.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U

Building 854 area. Results recorded by April 29, 2003.

1,1-DCA	1,2-DCA	1,1,1-TCA	Chloroform	Freon 11	Freon 113	Methylene chloride	Location Date
							(continued) W-854-14
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.003 B	22-jul-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0011 B	22-jul-1998
							W-854-15
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	17-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	17-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	17-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	17-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	23-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	23-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	23-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.002 U	0.0042	23-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	23-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	23-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	23-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	23-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	23-jun-1999
							W-854-17
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0038 F	22-jul-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.004 F	22-jul-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-jul-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	26-jul-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	26-jul-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	26-jul-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	26-jul-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	28-jul-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.002 U	0.0038 B	28-jul-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	28-jul-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	28-jul-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	28-jul-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	28-jul-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	28-jul-1999
							W-854-19
<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	08-jul-1999
<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	08-jul-1999
<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	08-jul-1999
<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	08-jul-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.002 U	0.0028 B	08-jul-1999
<0.0005 U	<0.0005 OU	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	08-jul-1999
							W-854-45
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.002 U	<0.0005 U	27-nov-2000
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.002 U	<0.0005 U	29-nov-2000
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.002 U	<0.0005 U	29-nov-2000
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.002 U	<0.0005 U	29-nov-2000
							3SS-44-01
<0.005 P	<0.005 P	<0.005 P	<0.005 P	<0.005 P	<0.005 P	<0.02 P	25-sep-1991
							3SS-854-001
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0014	29-nov-1995
							3SS-854-002
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0011	29-nov-1995
							3SS-854-003
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0013	21-nov-1995
							3SS-854-004
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-nov-1995
							3SS-854-005
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00093	21-nov-1995

Table A-3. Volatile organic compounds in soil and rock (mg/kg) collected from the

Location Date	Lab	Val. Note	Depth (ft)	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	Total 1,2-DCE	TCE	PCE
3SS-854-006									
21-nov-1995	CS a	V	0.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
3SS-854-007									
21-nov-1995	CS a	V	0.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
3SS-854-008									
21-nov-1995	CS a	V	0.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
3SS-854-009									
21-nov-1995	CS a	V	0.0	<0.0005 U	-	-	<0.0005 U	0.0016	<0.0005 U
3SS-854-010									
21-nov-1995	CS a	V	0.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
21-nov-1995	FS a	V	0.0	<0.005 U	<0.005 U	<0.005 U	-	<0.005 U	<0.005 U
3SS-854-011									
22-nov-1995	CS a	V	0.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
3SS-854-012									
22-nov-1995	CS a	V	0.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
3SS-854-013									
22-nov-1995	CS a	V	0.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
3SS-854-014									
22-nov-1995	CS a	V	0.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
3SS-854-015									
22-nov-1995	CS a	V	0.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
3SS-854-016									
22-nov-1995	CS a	V	0.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
3SS-854-017									
22-nov-1995	CS a	V	0.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
3SS-854-018									
22-nov-1995	CS a	V	0.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
3SS-854-019									
22-nov-1995	CS a	V	0.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
3SS-854-020									
22-nov-1995	CS a	V	0.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
22-nov-1995	FS a	V	0.0	<0.005 U	<0.005 U	<0.005 U	-	<0.005 U	<0.005 U
3SS-854-021									
29-nov-1995	CS a	V	0.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
29-nov-1995	CS a	V	0.0	<0.005 U	-	-	<0.005 U	<0.005 U	<0.005 U
3SS-854-022									
22-nov-1995	CS a	V	0.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
22-nov-1995	CS a	V	0.0	<0.005 U	-	-	<0.005 U	<0.005 U	<0.005 U
3SS-854-023									
22-nov-1995	CS a	V	0.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
3SS-854-024									
22-nov-1995	CS a	V	0.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
3SS-854-025									
22-nov-1995	CS a	V	0.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
3SS-854-026									
22-nov-1995	CS a	V	0.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U

Building 854 area. Results recorded by April 29, 2003.

1,1-DCA	1,2-DCA	1,1,1-TCA	Chloroform	Freon 11	Freon 113	Methylene chloride	Location Date
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00087	3SS-854-006 21-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	3SS-854-007 21-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	3SS-854-008 21-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	3SS-854-009 21-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	3SS-854-010 21-nov-1995
<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	21-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00091	3SS-854-011 22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00068	3SS-854-012 22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	3SS-854-013 22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	3SS-854-014 22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0023	3SS-854-015 22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	3SS-854-016 22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0019 B	3SS-854-017 22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0032	3SS-854-018 22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0033	3SS-854-019 22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0023	3SS-854-020 22-nov-1995
<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0013	3SS-854-021 29-nov-1995
<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.01 U	29-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00056	3SS-854-022 22-nov-1995
<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.01 U	22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0032	3SS-854-023 22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0037	3SS-854-024 22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0032	3SS-854-025 22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0016	3SS-854-026 22-nov-1995

Table A-3. Volatile organic compounds in soil and rock (mg/kg) collected from the

Location Date	Lab	Val. Note	Depth (ft)	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	Total 1,2-DCE	TCE	PCE
3SS-854-027									
29-nov-1995	CS a	V	0.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
29-nov-1995	CS a	V	0.0	<0.005 U	-	-	<0.005 U	<0.005 U	<0.005 U
3SS-854-028									
29-nov-1995	CS a	V	0.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
29-nov-1995	CS a	V	0.0	<0.005 U	-	-	<0.005 U	<0.005 U	<0.005 U
3SS-854-029									
29-nov-1995	CS a	V	0.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
29-nov-1995	CS a	V	0.0	<0.005 U	-	-	<0.005 U	<0.005 U	<0.005 U
3SS-854-030									
29-nov-1995	CS a	V	0.0	<0.0005 U	-	-	<0.0005 U	<0.0005 U	<0.0005 U
29-nov-1995	CS a	V	0.0	<0.005 U	-	-	<0.005 U	<0.005 U	<0.005 U
29-nov-1995	FS a	V	0.0	<0.005 U	-	<0.005 U	-	<0.005 U	<0.005 U

Building 854 area. Results recorded by April 29, 2003.

1,1-DCA	1,2-DCA	1,1,1-TCA	Chloro-form	Freon 11	Freon 113	Methylene chloride	Location Date
							3SS-854-027
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.00087	<0.0005 U	0.0043	29-nov-1995
<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.01 U	29-nov-1995
							3SS-854-028
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0028	29-nov-1995
<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.01 U	29-nov-1995
							3SS-854-029
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0014	29-nov-1995
<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.01 U	29-nov-1995
							3SS-854-030
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	0.0015	29-nov-1995
<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.01 U	29-nov-1995
<0.005 U	<0.005 U	<0.005 U	0.03	<0.005 U	–	<0.005 U	29-nov-1995

See following page for notes

Table A-3. Volatile organic compounds in soil and rock (mg/kg) collected from the Building 854 area. Results recorded by April 29, 2003.

Notes:

- Indicates no analysis performed for this compound

Tetrachloroethene assigned an "R" flag due to LCS %R < LCL. Val. = Validation code

Footnotes:

a ERD data
b ORAD WGMG data
c Analytical results for this sample are suspect
d Sample collected during hydraulic testing
e Blind sample, sent to lab without location identity
f Sample dilution necessary for analysis; detection limits increased
g Interlaboratory collocated sample
h Intralaboratory collocated sample
i Sample collected as part of pilot study
j Note field may contain important information regarding this sample
k Pre-development sample
l Norm month, norm quarter or norm year inconsistent with sample date
m Confirmation sample
n Sample analyzed after standard holding time
o Sample comprised of partial composite
p Alpha spectroscopy analysis of uranium isotopes
q Gamma spectroscopy analysis of uranium isotopes
r Tritium data represents non-detect with activity calc'd for 100 percent error.

Lab Codes:

BB	BC Laboratories, Inc.	Bakersfield, CA
BC	Brown & Caldwell Emeryville	
CN	Caltest Analytical Laboratory	1885 N. Kelly Rd, Napa, CA 94558
CS	California Laboratory Services	3249 Fitzgerald Rd. Rancho Cordova, CA 95742
EC	Environmental Chemistry Lab	
FS	FruitGrowers Environmental Lab	2500 Stagecoach Rd., Stockton, CA 95215
MS	C & MS-Gas Chromatography	
SE	Sequoia Analytical	1551 Industrial Road, San Carlos, CA 94070

Validation Codes:

V Validated
N Not validated (default value)
U Undeclared
H Historical comparison only

CLP flags: (follow result)

B Analyte found in method blank
D Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E The analyte was detected below the LLNL reporting limit, but above the analytical laboratory minimum detection limit.
F Analyte found in field blank, trip blank, or equipment blank
G Quantitated using fuel calibration, but does not match typical fuel fingerprint (fuel maybe gasoline, diesel, motor oil etc.).
H Sample analyzed outside of holding time, sample results should be evaluated
J Analyte was postively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
L Spike accuracy not within control limits
O Duplicate spike or sample precision not within control limits
P Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S Analytical results for this sample are suspect
T Analyte is tentatively identified compound; result is approximate
U Compound was analyzed for, but not detected above detection limit

Table A-4. Volatile organic compounds in soil vapor (Petrex ion counts, ppm v/v) collected from Building 854 area. Results recorded by March 20, 2003.

Site 300 Petrex soil vapor analyses
March 21, 2003
gemini2

s3petrex.21mar2003

Table A-4. Volatile organic compounds in soil vapor (Petrex ion counts, ppm v/v) collected from Building 854 area. Results recorded by March 20, 2003.

Location Date	Lab	Val. Note	Depth (ft)	Duration (days)	PCE (total ion count)	TCE (total ion count)
SVX-854-001						
29-aug-1994	NE	a	N 1.0	19	663	<200 U
SVX-854-002						
29-aug-1994	NE	a	N 1.0	19	4075	<200 U
SVX-854-003						
29-aug-1994	NE	a	N 1.0	19	4289	<200 U
SVX-854-004						
29-aug-1994	NE	a	N 1.0	21	3151	<200 U
SVX-854-005						
29-aug-1994	NE	a	N 1.0	21	11423	<200 U
SVX-854-006						
29-aug-1994	NE	a	N 1.0	19	77789	18238
SVX-854-007						
29-aug-1994	NE	a	N 1.0	19	3681	<200 U
SVX-854-008						
29-aug-1994	NE	a	N 1.0	19	6662	<200 U
SVX-854-009						
29-aug-1994	NE	a	N 1.0	21	3173	<200 U
SVX-854-010						
29-aug-1994	NE	a	N 1.0	19	2360	3612
SVX-854-011						
29-aug-1994	NE	a	N 1.0	19	10598	941640
SVX-854-012						
29-aug-1994	NE	a	N 1.0	19	7507	658469
SVX-854-013						
29-aug-1994	NE	a	N 1.0	19	3712	2647
SVX-854-014						
29-aug-1994	NE	a	N 1.0	21	3863	<200 U
SVX-854-015						
29-aug-1994	NE	a	N 1.0	19	5417	4197
SVX-854-016						
29-aug-1994	NE	a	N 1.0	19	1379	2984
SVX-854-017						
29-aug-1994	NE	a	N 1.0	19	1677	<200 U
SVX-854-018						
29-aug-1994	NE	a	N 1.0	19	2025	<200 U
SVX-854-019						
29-aug-1994	NE	a	N 1.0	19	<200 U	<200 U
SVX-854-020						
29-aug-1994	NE	a	N 1.0	19	1511	3436
SVX-854-021						
29-aug-1994	NE	a	N 1.0	19	<200 U	<200 U
SVX-854-022						
29-aug-1994	NE	a	N 1.0	19	<200 U	110839

Table A-4. Volatile organic compounds in soil vapor (Petrex ion counts, ppm v/v) collected from Building 854 area. Results recorded by March 20, 2003.

Location Date	Lab	Val. Note	Depth (ft)	Duration (days)	PCE (total ion count)	TCE (total ion count)
SVX-854-023 29-aug-1994	NE	a	N 1.0	19	1357	1411
SVX-854-024 29-aug-1994	NE	a	N 1.0	19	<200 U	12725
SVX-854-025 29-aug-1994	NE	a	N 1.0	19	30001	<200 U
SVX-854-026 29-aug-1994	NE	a	N 1.0	19	4848	61854
SVX-854-027 29-aug-1994	NE	a	N 1.0	19	1519	<200 U
SVX-854-028 29-aug-1994	NE	a	N 1.0	19	13456	39199
SVX-854-029 29-aug-1994	NE	a	N 1.0	19	601	<200 U
SVX-854-030 29-aug-1994	NE	a	N 1.0	21	1468	<200 U
SVX-854-031 29-aug-1994	NE	a	N 1.0	19	<200 U	<200 U
SVX-854-032 29-aug-1994	NE	a	N 1.0	19	9780	<200 U
SVX-854-033 29-aug-1994	NE	a	N 1.0	19	872	12514
SVX-854-034 29-aug-1994	NE	a	N 1.0	19	<200 U	<200 U

See following page for notes

Table A-4. Volatile organic compounds in soil vapor (Petrex ion counts, ppm v/v) collected from Building 854 area. Results recorded by March 20, 2003.

Notes:

- Indicates no analysis performed for this compound

Val. = Validation code

Footnotes:

a ERD data
b ORAD WGMG data
c Analytical results for this sample are suspect
d Sample collected during hydraulic testing
e Blind sample, sent to lab without location identity
f Sample dilution necessary for analysis; detection limits increased
g Interlaboratory collocated sample
h Intralaboratory collocated sample
i Sample collected as part of pilot study
j Note field may contain important information regarding this sample
k Pre-development sample
l Norm month, norm quarter or norm year inconsistent with sample date
m Confirmation sample
n Sample analyzed after standard holding time
o Sample comprised of partial composite
p Alpha spectroscopy analysis of uranium isotopes
q Gamma spectroscopy analysis of uranium isotopes
r Tritium data represents non-detect with activity calc'd for 100 percent error.

Lab Codes:

NE Northeast Research Institute

Validation Codes:

V Validated
N Not validated (default value)
U Undeclared
H Historical comparison only

CLP flags: (follow result)

B Analyte found in method blank
D Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E The analyte was detected below the LLNL reporting limit, but above the analytical laboratory minimum detection limit.
F Analyte found in field blank, trip blank, or equipment blank
G Quantitated using fuel calibration, but does not match typical fuel fingerprint (fuel maybe gasoline, diesel, motor oil etc.).
H Sample analyzed outside of holding time, sample results should be evaluated
J Analyte was postively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
L Spike accuracy not within control limits
O Duplicate spike or sample precision not within control limits
P Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S Analytical results for this sample are suspect
T Analyte is tentatively identified compound; result is approximate
U Compound was analyzed for, but not detected above detection limit

Table A-5. Volatile organic compounds in soil vapor (active vapor induced) (ppm v/v), collected from the Building 854 area. Results recorded by April 22, 2003.

Active Vacuum Soil Vapor Analyses, Site 300
April 23, 2003
gemini1

s3vapor_854L.23apr2003
s3vapor_854R.23apr2003

Table A-5. Volatile organic compounds in soil vapor (active vapor induced) (ppm v/v),

Location Date	Lab	Val. Note	Depth (ft)	1,1- DCE	cis- 1,2- DCE	trans- 1,2- DCE	Total 1,2- DCE	TCE	PCE
SVV-854-014									
03-sep-1996	MO a	V	0.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
03-sep-1996	MO a	V	5.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
04-sep-1996	MO a	V	11.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
04-sep-1996	MO ag	V	17.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
04-sep-1996	EC ag	N	17.5	-	-	-	-	<1 U	<1 U
SVV-854-015									
14-aug-1996	MO a	N	0.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
14-aug-1996	MO a	N	5.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
14-aug-1996	MO a	N	11.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
14-aug-1996	MO a	N	17.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
SVV-854-016									
13-aug-1996	MO a	V	0.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
13-aug-1996	MO a	V	5.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
13-aug-1996	MO a	V	11.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
13-aug-1996	MO a	V	17.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
SVV-854-017									
26-aug-1996	MO a	V	0.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
26-aug-1996	MO a	V	5.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
26-aug-1996	MO a	V	11.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
26-aug-1996	MO a	V	17.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
26-aug-1996	MO a	V	29.5	<0.2 U	-	<0.3 U	-	14	<0.2 U
SVV-854-018									
28-aug-1996	MO a	V	0.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
28-aug-1996	MO a	V	5.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
30-aug-1996	MO a	V	11.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
30-aug-1996	MO a	V	23.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
SVV-854-019									
15-aug-1996	MO a	N	0.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
15-aug-1996	MO a	N	5.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
15-aug-1996	MO a	N	11.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
15-aug-1996	EC ag	N	11.5	-	-	-	-	<1 U	<1 U
15-aug-1996	MO a	N	17.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
SVV-854-020									
14-aug-1996	MO a	V	0.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
14-aug-1996	MO a	V	5.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
14-aug-1996	MO a	V	11.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
15-aug-1996	MO a	N	15.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
SVV-854-023									
03-sep-1996	MO a	V	0.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
03-sep-1996	MO a	V	5.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
03-sep-1996	MO a	V	11.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
03-sep-1996	MO a	V	17.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
SVV-854-021									
03-sep-1996	MO a	V	0.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
03-sep-1996	MO a	V	5.5	<0.2 U	-	<0.3 U	-	0.9	<0.2 U
03-sep-1996	MO a	V	11.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
03-sep-1996	MO a	V	17.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
SVV-854-029A									
05-nov-1996	MO a	V	43.5	<0.2 U	-	<0.3 U	-	0.71	<0.2 U
05-nov-1996	MO ah	V	53.5	<0.2 U	-	<0.3 U	-	1.7	<0.2 U
05-nov-1996	EC ah	N	53.5	-	-	-	-	6.3	<1 U
05-nov-1996	MO ah	V	63.5	<0.2 U	-	<0.3 U	-	8.8	<0.2 U
05-nov-1996	EC ah	N	63.5	-	-	-	-	7.5	<1 U
06-nov-1996	MO a	V	73.5	<0.2 U	-	<0.3 U	-	0.87	<0.2 U
06-nov-1996	MO a	V	83.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U

collected from the Building 854 area. Results recorded by April 22, 2003.

1,1-DCA	1,2-DCA	1,1,1-TCA	Chloro-form	Freon 11	Freon 113	Methylene chloride	Location Date
							SVV-854-014
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	03-sep-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	03-sep-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	04-sep-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	04-sep-1996
-	-	-	-	-	-	-	04-sep-1996
							SVV-854-015
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	14-aug-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	14-aug-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	14-aug-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	14-aug-1996
							SVV-854-016
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	13-aug-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	13-aug-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	13-aug-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	13-aug-1996
							SVV-854-017
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	26-aug-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	26-aug-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	26-aug-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	26-aug-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	26-aug-1996
							SVV-854-018
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	28-aug-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	28-aug-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	30-aug-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	30-aug-1996
							SVV-854-019
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	15-aug-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	15-aug-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	15-aug-1996
-	-	-	-	-	-	-	15-aug-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	15-aug-1996
							SVV-854-020
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	14-aug-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	14-aug-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	14-aug-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	15-aug-1996
							SVV-854-023
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	03-sep-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	03-sep-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	03-sep-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	03-sep-1996
							SVV-854-021
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	03-sep-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	03-sep-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	03-sep-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	03-sep-1996
							SVV-854-029A
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	05-nov-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	05-nov-1996
-	-	-	-	-	-	-	05-nov-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	05-nov-1996
-	-	-	-	-	-	-	05-nov-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	06-nov-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	06-nov-1996

Table A-5. Volatile organic compounds in soil vapor (active vapor induced) (ppm v/v),

Location Date	Lab	Val. Note	Depth (ft)	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	Total 1,2-DCE	TCE	PCE
SVV-854-033A									
28-oct-1996	MO a	V	25.0	1.9	-	<0.3 U	-	0.51	<0.2 U
28-oct-1996	MO a	V	35.0	<0.2 U	-	<0.3 U	-	3.6	<0.2 U
04-nov-1996	MO a	V	45.5	<0.2 U	-	<0.3 U	-	1.9	<0.2 U
04-nov-1996	MO a	V	55.5	<0.2 U	-	<0.3 U	-	0.63	<0.2 U
SVV-854-034A									
07-nov-1996	MO a	V	35.5	<0.2 U	-	<0.3 U	-	1.1	<0.2 U
07-nov-1996	MO a	V	45.5	<0.2 U	-	<0.3 U	-	11	<0.2 U
07-nov-1996	MO a	V	55.5	<0.2 U	-	<0.3 U	-	2.6	<0.2 U
07-nov-1996	EC a	N	55.5	-	-	-	-	3.5	<1 U
07-nov-1996	MO a	V	65.5	<0.2 U	-	<0.3 U	-	4.9	<0.2 U
07-nov-1996	MO a	V	75.5	<0.2 U	-	<0.3 U	-	3	<0.2 U
SVV-854-044									
29-oct-1996	MO a	V	0.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
29-oct-1996	MO a	V	5.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U
29-oct-1996	MO a	V	11.5	<0.2 U	-	<0.3 U	-	<0.2 U	<0.2 U

collected from the Building 854 area. Results recorded by April 22, 2003.

1,1-DCA	1,2-DCA	1,1,1-TCA	Chloro-form	Freon 11	Freon 113	Methylene chloride	Location Date
							SVV-854-033A
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	28-oct-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	28-oct-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	04-nov-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	04-nov-1996
							SVV-854-034A
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	07-nov-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	07-nov-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	07-nov-1996
-	-	-	-	-	-	-	07-nov-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	07-nov-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	07-nov-1996
							SVV-854-044
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	29-oct-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	29-oct-1996
<0.2 U	<0.3 U	<0.2 U	<0.2 U	<0.2 U	-	<0.4 U	29-oct-1996

See following page for notes

Table A-5. Volatile organic compounds in soil vapor (active vapor induced) (ppm v/v), collected from the Building 854 area. Results recorded by April 22, 2003.

Notes:

- Indicates no analysis performed for this compound

Val. = Validation code

Footnotes:

a ERD data
b ORAD WGMG data
c Analytical results for this sample are suspect
d Sample collected during hydraulic testing
e Blind sample, sent to lab without location identity
f Sample dilution necessary for analysis; detection limits increased
g Interlaboratory collocated sample
h Intralaboratory collocated sample
i Sample collected as part of pilot study
j Note field may contain important information regarding this sample
k Pre-development sample
l Norm month, norm quarter or norm year inconsistent with sample date
m Confirmation sample
n Sample analyzed after standard holding time
o Sample comprised of partial composite
p Alpha spectroscopy analysis of uranium isotopes
q Gamma spectroscopy analysis of uranium isotopes
r Tritium data represents non-detect with activity calc'd for 100 percent error.

Lab Codes:

EC Environmental Chemistry Lab
MO Mobile Chem Labs, Inc. 1678 Reliz Valley Road, Lafayette, CA, 94549

Validation Codes:

V Validated
N Not validated (default value)
U Undeclared
H Historical comparison only

CLP flags: (follow result)

B Analyte found in method blank
D Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E The analyte was detected below the LLNL reporting limit, but above the analytical laboratory minimum detection limit.
F Analyte found in field blank, trip blank, or equipment blank
G Quantitated using fuel calibration, but does not match typical fuel fingerprint (fuel maybe gasoline, diesel, motor oil etc.).
H Sample analyzed outside of holding time, sample results should be evaluated
J Analyte was postively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
L Spike accuracy not within control limits
O Duplicate spike or sample precision not within control limits
P Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S Analytical results for this sample are suspect
T Analyte is tentatively identified compound; result is approximate
U Compound was analyzed for, but not detected above detection limit

Table A-6. High explosives compounds in ground water and surface water (ug/L) collected from the Building 854 area. Results recorded by April 22, 2003.

HE Compounds in Water, Site 300
April 23, 2003
gemini1

s3hmx.23apr2003

Table A-6. High explosives compounds in ground water and surface water (ug/L) collected from the Building 854 area. Results recorded by April 22, 2003.

Location Date	Lab	Note	Val.	HMX	RDX	TNT
W-854-01						
24-may-1999	CN	a	V	<1 U	<1 U	-
W-854-02						
28-jun-1999	CN	af	V	<1 U	<1 U	-
W-854-03						
28-jun-1999	CN	af	V	<1 U	<1 U	-
W-854-05						
28-jun-1999	CN	af	V	<1 U	<1 U	-
W-854-06						
28-jun-1999	CN	a	V	<1 U	<1 U	-
W-854-07						
28-jun-1999	CN	a	V	<1 U	<1 U	-
W-854-08						
28-jun-1999	CN	a	V	<1 U	<1 U	-
W-854-09						
28-jun-1999	CN	aeh	V	<1 U	<1 U	-
28-jun-1999	CN	ah	V	<1 U	<1 U	-
W-854-10						
28-jun-1999	CN	a	V	<1 U	<1 U	-
W-854-11						
28-jun-1999	BB	ag	V	<5 U	<5 LOU	-
28-jun-1999	CN	ag	V	<1 U	<1 U	-
W-854-13						
22-mar-1999	CS	a	N	<5 U	<5 U	-
W-854-15						
29-jun-2000	CN	af	V	<1 U	<1 U	-
W-854-17						
30-jun-2000	CN	af	V	<1 U	<1 U	-
29-aug-2000	CN	af	V	<1 U	<1 U	-
W-854-18A						
30-jun-2000	CN	af	V	<1 U	<1 U	-
W-854-45						
10-jul-2001	CN	af	V	<1 U	<1 U	-
W-854-1701						
11-jul-2001	CN	af	V	<2 U	<2 U	-
W-854-1707						
09-jul-2001	CN	af	V	<1 U	<1 U	-
W-854-1731						
27-sep-2002	CN	af	V	<1 U	<1 U	-
W-854-1822						
11-mar-2003	CN	a	N	<1 U	<1 U	-
W-854-1823						
20-mar-2003	CN	a	N	<1 U	<1 U	-
W-854-1902						
20-mar-2003	CN	a	N	<1 U	<1 U	-

Table A-6. High explosives compounds in ground water and surface water (ug/L) collected from the Building 854 area. Results recorded by April 22, 2003.

Location Date	Lab	Note	Val.	HMX	RDX	TNT
WELL13						
21-oct-1991	MS	a	U	<20 P	<30 P	<30 P
15-oct-1992	MS	a	U	<20 P	<30 P	<30 P
SPRING10						
14-nov-1991	MS	a	U	<20 P	<30 P	<30 P
22-sep-1993	MS	a	N	<20 U	<30 U	<30 U
28-apr-1994	CS	a	V	<10 U	<10 U	<5 U
20-oct-1995	CS	a	V	<5 U	<5 U	-
18-jun-1996	CS	a	V	<5 U	<5 U	-
SPRING11						
14-nov-1991	MS	a	U	<20 P	<30 P	<30 P
22-sep-1993	MS	a	N	<20 U	<30 U	<30 U
28-apr-1994	CS	a	V	<10 U	<10 U	<5 U
20-oct-1995	CS	a	V	<5 U	<5 U	-
17-jun-1996	CS	a	V	<5 U	<5 U	-
SPRING16						
19-nov-1991	MS	a	U	<20 P	<30 P	<30 P
22-sep-1993	MS	a	N	<20 U	<30 U	<30 U
16-may-1994	CS	a	V	<10 U	<10 U	<5 U
20-oct-1995	CS	a	V	<5 U	<5 U	-
18-jun-1996	CS	a	V	<5 U	<5 U	-
11-may-2000	BB	a	V	<5 U	<5 U	-

See following page for notes

Table A-6. High explosives compounds in ground water and surface water (ug/L) collected from the Building 854 area. Results recorded by April 22, 2003.

Notes:

- Indicates no analysis performed for this compound

Val. = Validation code

Footnotes:

a ERD data
b ORAD WGMG data
c Analytical results for this sample are suspect
d Sample collected during hydraulic testing
e Blind sample, sent to lab without location identity
f Sample dilution necessary for analysis; detection limits increased
g Interlaboratory collocated sample
h Intralaboratory collocated sample
i Sample collected as part of pilot study
j Note field may contain important information regarding this sample
k Pre-development sample
l Norm month, norm quarter or norm year inconsistent with sample date
m Confirmation sample
n Sample analyzed after standard holding time
o Sample comprised of partial composite
p Alpha spectroscopy analysis of uranium isotopes
q Gamma spectroscopy analysis of uranium isotopes
r Tritium data represents non-detect with activity calc'd for 100 percent error.

Lab Codes:

BB	BC Laboratories, Inc.	Bakersfield, CA
CN	Caltest Analytical Laboratory	1885 N. Kelly Rd, Napa, CA 94558
CS	California Laboratory Services	3249 Fitzgerald Rd. Rancho Cordova, CA 95742
MS	C & MS-Gas Chromatography	

Validation Codes:

V Validated
N Not validated (default value)
U Undeclared
H Historical comparison only

CLP flags: (follow result)

B Analyte found in method blank
D Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E The analyte was detected below the LLNL reporting limit, but above the analytical laboratory minimum detection limit.
F Analyte found in field blank, trip blank, or equipment blank
G Quantitated using fuel calibration, but does not match typical fuel fingerprint (fuel maybe gasoline, diesel, motor oil etc.).
H Sample analyzed outside of holding time, sample results should be evaluated
J Analyte was postively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
L Spike accuracy not within control limits
O Duplicate spike or sample precision not within control limits
P Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S Analytical results for this sample are suspect
T Analyte is tentatively identified compound; result is approximate
U Compound was analyzed for, but not detected above detection limit

Table A-7. High explosives compounds in soil and rock (mg/kg) collected from the Building 854 area. Results recorded by March 20, 2003.

Site 300 HMX Compounds in Soil
March 21, 2003
gemini2

s3hmxso.21mar2003

Table A-7. High explosives compounds in soil and rock (mg/kg) collected from the Building 854 area. Results recorded by March 20, 2003.

Location Date	Lab	Val. Note	Depth (ft)	HMX	RDX	TNT
854-27						
27-aug-1996	CS a	V	1.0	<0.2 U	<0.15 U	-
27-aug-1996	CS a	V	6.0	<0.2 U	<0.15 U	-
27-aug-1996	CS a	V	12.0	<0.2 U	<0.15 U	-
27-aug-1996	CS a	V	18.0	0.37	<0.15 U	-
854-27A						
27-aug-1996	CS a	V	1.0	<0.2 U	<0.15 U	-
27-aug-1996	CS a	V	6.0	<0.2 U	<0.15 U	-
28-aug-1996	CS a	V	12.0	<0.2 U	<0.15 U	-
28-aug-1996	CS a	V	18.0	<0.2 U	<0.15 U	-
W-854-01						
21-nov-1995	CS a	V	0.5	<0.1 U	<0.1 U	<0.1 U
21-nov-1995	CS ag	V	5.0	<0.1 U	<0.1 U	<0.1 U
21-nov-1995	CS ag	V	10.0	<0.1 U	<0.1 U	<0.1 U
21-nov-1995	FS ag	V	10.0	<0.26 U	<0.26 U	-
W-854-03						
14-feb-1996	CS ag	V	0.5	<0.2 U	<0.15 U	-
14-feb-1996	CS ag	V	5.0	<0.2 U	<0.15 U	-
14-feb-1996	CS a	V	20.0	<0.2 U	<0.15 U	-
14-feb-1996	FS a	V	20.0	<0.1 U	<0.1 U	-
15-feb-1996	CS a	V	41.0	<0.2 U	<0.15 U	-
15-feb-1996	CS a	V	61.0	<0.2 U	<0.15 U	-
15-feb-1996	CS a	V	76.0	<0.2 U	<0.15 U	-
15-feb-1996	CS ag	V	87.0	<0.2 U	<0.15 U	-
15-feb-1996	CS a	V	94.0	<0.2 U	<0.15 U	-
20-feb-1996	CS a	V	115.0	<0.2 U	<0.15 U	-
20-feb-1996	CS a	V	121.0	<0.2 U	<0.15 U	-
20-feb-1996	CS a	V	125.0	<0.2 U	<0.15 U	-
21-feb-1996	CS a	V	133.0	<0.2 U	<0.15 U	-
21-feb-1996	CS a	V	152.0	<0.2 U	<0.15 U	-
21-feb-1996	CS a	V	157.0	<0.2 U	<0.15 U	-
21-feb-1996	CS a	V	162.0	<0.2 U	<0.15 U	-
W-854-04						
28-feb-1996	CS a	V	0.5	<0.2 U	<0.15 U	-
W-854-05						
04-apr-1996	CS a	V	5.0	<0.2 U	<0.15 ULO	-
W-854-08						
19-jun-1996	CS a	V	11.0	<0.2 U	<0.15 U	-
W-854-12						
21-jan-1998	CS a	V	22.3	<0.2 U	<0.15 ULO	-
3SS-854-019						
22-nov-1995	CS a	V	0.0	<0.1 U	<0.1 U	<0.1 U
3SS-854-020						
22-nov-1995	CS a	V	0.0	<0.1 U	<0.1 U	<0.1 U
3SS-854-021						
29-nov-1995	CS a	V	0.0	150 DHLO	<1.5 DHULO	-
29-nov-1995	FS a	V	0.0	<0.26 U	<0.26 U	-
3SS-854-022						
22-nov-1995	CS a	V	0.0	<0.1 U	<0.1 U	<0.1 U
3SS-854-025						
22-nov-1995	CS a	V	0.0	<0.1 U	<0.1 U	<0.1 U
3SS-854-026						
22-nov-1995	CS a	V	0.0	<0.1 U	<0.1 U	<0.1 U

Table A-7. High explosives compounds in soil and rock (mg/kg) collected from the Building 854 area. Results recorded by March 20, 2003.

Location Date	Lab	Val. Note	Depth (ft)	HMX	RDX	TNT
3SS-854-027 29-nov-1995	CS a	V	0.0	<2 DHU	<1.5 DHU	-
3SS-854-028 29-nov-1995	CS a	V	0.0	<2 DHU	<1.5 DHU	-
3SS-854-029 29-nov-1995	CS a	V	0.0	<2 DHU	<1.5 DHU	-
3SS-854-030 29-nov-1995	CS a	V	0.0	<2 DHU	<1.5 DHU	-

See following page for notes

Table A-7. High explosives compounds in soil and rock (mg/kg) collected from the Building 854 area. Results recorded by March 20, 2003.

Notes:

\- Indicates no analysis performed for this compound

Val. = Validation code

Footnotes:

a ERD data
b ORAD WGMG data
c Analytical results for this sample are suspect
d Sample collected during hydraulic testing
e Blind sample, sent to lab without location identity
f Sample dilution necessary for analysis; detection limits increased
g Interlaboratory collocated sample
h Intralaboratory collocated sample
i Sample collected as part of pilot study
j Note field may contain important information regarding this sample
k Pre-development sample
l Norm month, norm quarter or norm year inconsistent with sample date
m Confirmation sample
n Sample analyzed after standard holding time
o Sample comprised of partial composite
p Alpha spectroscopy analysis of uranium isotopes
q Gamma spectroscopy analysis of uranium isotopes
r Tritium data represents non-detect with activity calc'd for 100 percent error.

Lab Codes:

CS California Laboratory Services 3249 Fitzgerald Rd. Rancho Cordova, CA 95742
FS FruitGrowers Environmental Lab 2500 Stagecoach Rd., Stockton, CA 95215

Validation Codes:

V Validated
N Not validated (default value)
U Undeclared
H Historical comparison only

CLP flags: (follow result)

B Analyte found in method blank
D Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E The analyte was detected below the LLNL reporting limit, but above the analytical laboratory minimum detection limit.
F Analyte found in field blank, trip blank, or equipment blank
G Quantitated using fuel calibration, but does not match typical fuel fingerprint (fuel maybe gasoline, diesel, motor oil etc.).
H Sample analyzed outside of holding time, sample results should be evaluated
J Analyte was postively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
L Spike accuracy not within control limits
O Duplicate spike or sample precision not within control limits
P Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S Analytical results for this sample are suspect
T Analyte is tentatively identified compound; result is approximate
U Compound was analyzed for, but not detected above detection limit

Table A-8. Tritium in ground water and surface water (pCi/L) collected from the Building 854 area. Results recorded by April 22, 2003.

Tritium in Ground Water, Site 300
April 23, 2003
gemini1

s3trit.23apr2003

Table A-8. Tritium in ground water and surface water (pCi/L) collected from the Building 854 area. Results recorded by April 22, 2003.

Location Date	Lab	Note	Val.	Tritium Activity
W-854-01				
27-jun-1996	LH	a	V	100 +/- 49J
15-aug-1996	LH	a	V	410 +/- 860
26-dec-1996	LH	a	V	<94 +/- 580U
29-dec-1998	QU	a	V	<116 +/- 67.4U
W-854-02				
15-aug-1996	LH	a	V	<110 +/- 570U
26-dec-1996	LH	aeh	V	<93 +/- 540U
26-dec-1996	LH	ah	V	<93 +/- 560U
29-dec-1998	QU	a	V	<116 +/- 67.6U
W-854-03				
17-sep-1996	LH	a	V	<100 +/- 580U
13-dec-1996	LH	a	V	<97 +/- 55U
29-dec-1998	QU	a	V	<116 +/- 67U
W-854-04				
16-aug-1996	LH	a	V	<100 +/- 550U
13-dec-1996	LH	a	V	<96 +/- 57U
W-854-05				
16-aug-1996	LH	a	V	<100 +/- 570U
12-dec-1996	LH	a	V	<95 +/- 54U
29-dec-1998	QU	a	V	<116 +/- 67.3U
W-854-06				
10-sep-1996	LH	a	V	<100 +/- 60LOU
26-dec-1996	LH	a	V	<94 +/- 520U
W-854-07				
10-sep-1996	LH	a	V	<100 +/- 62LOU
26-dec-1996	LH	a	V	<91 +/- 520U
W-854-08				
10-sep-1996	LH	a	V	<100 +/- 56LOU
13-dec-1996	LH	a	V	<93 +/- 54U
W-854-09				
29-dec-1998	QU	a	V	<117 +/- 67.8U
W-854-10				
06-feb-1997	LH	a	V	108 +/- 64
29-dec-1998	QU	a	V	<116 +/- 67.3U
W-854-11				
19-feb-1997	LH	a	V	<90 +/- 54BU
29-dec-1998	QU	a	V	<119 +/- 68.2U
W-854-13				
22-mar-1999	QU	a	N	<96.7 +/- 56U
W-854-14				
31-mar-1999	GE	a	V	<100 +/- 62U
W-854-15				
29-jun-2000	TN	a	V	<100 +/- 54U
W-854-17				
29-aug-2000	TN	a	V	<100 +/- 53U
W-854-18A				
30-jun-2000	TN	a	V	<100 +/- 54U
W-854-45				
10-jul-2001	TN	a	V	<100 +/- 57LU

Table A-8. Tritium in ground water and surface water (pCi/L) collected from the Building 854 area. Results recorded by April 22, 2003.

Location Date	Lab	Note	Val.	Tritium Activity
W-854-1701				
11-jul-2001	TN	a	V	<100 +/- 57U
W-854-1707				
09-jul-2001	TN	a	V	<100 +/- 57U
W-854-1731				
27-sep-2002	TN	a	V	<100 +/- 58U
20-dec-2002	TN	a	V	<108 +/- 64U
W-854-1822				
11-mar-2003	TN	a	N	<100 +/- 59U
WELL13				
09-aug-1990	TM	a	U	<270 P
25-nov-1992	NW	ag	U	418 +/- 383P
25-nov-1992	TM	ag	V	<188 +/- 188P
27-apr-1993	IT	a	U	<170 +/- 50U
13-jul-1993	IT	ah	U	<89 +/- 27U
13-jul-1993	IT	ah	U	<93 +/- 28U
09-feb-1994	IT	a	V	<95.9 +/- 29.8U
24-feb-1995	IT	a	V	<90.7 +/- 26.8U
29-feb-1996	IT	a	V	123 +/- 25
SPRING10				
19-nov-1991	TM	ap	U	<200 +/- 200P
22-sep-1993	IT	a	V	130 +/- 31
28-apr-1994	IT	ap	V	<83 +/- 25.3U
13-oct-1995	IT	a	V	<77.4 +/- 23.3U
17-jun-1996	LH	a	V	<80 +/- 45LOU
11-may-2000	TN	a	V	<100 +/- 54U
08-may-2001	GE	a	V	<100 +/- 52.4U
08-may-2001	TN	a	V	<108 +/- 65U
SPRING11				
14-nov-1991	TM	ap	U	<200 +/- 200P
22-sep-1993	IT	a	V	<93.7 +/- 28.2U
28-apr-1994	IT	ap	V	163 +/- 28B
13-oct-1995	IT	a	V	<82.9 +/- 25.3U
17-jun-1996	LH	a	V	<78 +/- 47LOU
17-may-2000	TN	a	V	<100 +/- 52U
08-may-2001	TN	a	V	<108 +/- 65U
21-jun-2002	TN	a	V	<100 +/- 58U
SPRING16				
19-nov-1991	TM	ap	U	<200 +/- 200P
22-sep-1993	IT	a	V	<93.7 +/- 28.6U
16-may-1994	IT	ap	V	<82.1 +/- 25U
13-oct-1995	IT	a	V	<77.4 +/- 23U
18-jun-1996	LH	a	V	<80 +/- 45LOU
11-may-2000	TN	a	V	<100 +/- 53U

See following page for notes

Table A-8. Tritium in ground water and surface water (pCi/L) collected from the Building 854 area. Results recorded by April 22, 2003.

Notes:

- Indicates no analysis performed for this compound

Val. = Validation code

Footnotes:

a ERD data
b ORAD WGMG data
c Analytical results for this sample are suspect
d Sample collected during hydraulic testing
e Blind sample, sent to lab without location identity
f Sample dilution necessary for analysis; detection limits increased
g Interlaboratory collocated sample
h Intralaboratory collocated sample
i Sample collected as part of pilot study
j Note field may contain important information regarding this sample
k Pre-development sample
l Norm month, norm quarter or norm year inconsistent with sample date
m Confirmation sample
n Sample analyzed after standard holding time
o Sample comprised of partial composite
p Alpha spectroscopy analysis of uranium isotopes
q Gamma spectroscopy analysis of uranium isotopes
r Tritium data represents non-detect with activity calc'd for 100 percent error.

Lab Codes:

GE	General Engineering Laboratori	PO 30712, Charleston, SC 29417
IT	International Technology Corp.	IS was used for short time.
LH	LAS-formerly Lockheed<1jan97	975 Kelly Johnson Las Vegas NV 89119
NW	New World Tech Anal&Cnslt Serv	
QU	Quanterra Env. Serv.,St.Louis	13715 Rider Trail North, Earth City, MO 63045
TM	Thermo Analytical Inc.	
TN	Eberline Services	2030 Wright Ave, Richmond, CA 94804

Validation Codes:

V Validated
N Not validated (default value)
U Undeclared
H Historical comparison only

CLP flags: (follow result)

B Analyte found in method blank
D Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E The analyte was detected below the LLNL reporting limit, but above the analytical laboratory minimum detection limit.
F Analyte found in field blank, trip blank, or equipment blank
G Quantitated using fuel calibration, but does not match typical fuel fingerprint (fuel maybe gasoline, diesel, motor oil etc.).
H Sample analyzed outside of holding time, sample results should be evaluated
J Analyte was postively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
L Spike accuracy not within control limits
O Duplicate spike or sample precision not within control limits
P Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S Analytical results for this sample are suspect
T Analyte is tentatively identified compound; result is approximate
U Compound was analyzed for, but not detected above detection limit

Table A-9. Tritium in soil and rock moisture (pCi/L) collected from the Building 854 area. Results recorded by March 20, 2003.

Tritium in Soil, Site 300 at 854
March 21, 2003
gemini2

s3tritso854.21mar2003

Table A-9. Tritium in soil and rock moisture (pCi/L) collected from the Building 854 area. Results recorded by March 20, 2003.

Location Date	Lab	Val. Note	Depth (ft)	Tritium (pCi/L)	Moisture by Weight (percent)
W-854-01					
21-nov-1995	IT a	V	0.5	<129 +/- 39U	10
21-nov-1995	IT a	V	5.0	<124 +/- 37U	17
21-nov-1995	IT ag	V	10.0	<168 +/- 49U	17
21-nov-1995	IT a	V	20.0	<129 +/- 39U	11
21-nov-1995	IT a	V	25.0	<120 +/- 36U	10
27-nov-1995	IT a	V	100.0	<129 +/- 39U	15
27-nov-1995	IT a	V	121.0	<193 +/- 59U	8
04-jan-1996	IT a	V	193.3	<126 +/- 38U	19.9
04-jan-1996	IT a	V	223.1	<121 +/- 37U	19
04-jan-1996	IT a	V	236.0	<121 +/- 37U	15.9
05-jan-1996	IT a	V	246.0	<117 +/- 36U	15.5
05-jan-1996	IT a	V	256.0	<117 +/- 36U	14.9
05-jan-1996	IT a	V	264.0	<117 +/- 35U	10
08-jan-1996	IT a	V	301.1	<117 +/- 35U	24
09-jan-1996	IT a	V	350.8	<117 +/- 36U	11.4
09-jan-1996	IT a	V	391.0	<121 +/- 37U	15.5
09-jan-1996	LH a	V	391.0	<180 +/- 130U	18
W-854-03					
14-feb-1996	IT ag	V	0.5	317 +/- 49	19
14-feb-1996	IT ag	V	5.0	<158 +/- 48U	10.5
14-feb-1996	IT a	V	10.0	<152 +/- 47U	15
14-feb-1996	LH a	V	10.0	<180 +/- 130U	16
3SS-854-021					
29-nov-1995	IT a	V	0.0	<200 +/- 62U	4
3SS-854-022					
22-nov-1995	IT a	V	0.0	<160 +/- 49U	5
3SS-854-025					
22-nov-1995	IT a	V	0.0	<91.5 +/- 27.2U	12
3SS-854-026					
22-nov-1995	IT a	V	0.0	<203 +/- 62U	4
3SS-854-027					
29-nov-1995	IT a	V	0.0	<152 +/- 46U	5
3SS-854-028					
29-nov-1995	IT a	V	0.0	<129 +/- 39U	12
3SS-854-029					
29-nov-1995	IT a	V	0.0	<133 +/- 41U	9
3SS-854-030					
29-nov-1995	IT a	V	0.0	211 +/- 54	4

See following page for notes

Table A-9. Tritium in soil and rock moisture (pCi/L) collected from the Building 854 area. Results recorded by March 20, 2003.

Notes:

- Indicates no analysis performed for this compound

Val. = Validation code

Footnotes:

a ERD data
b ORAD WGMG data
c Analytical results for this sample are suspect
d Sample collected during hydraulic testing
e Blind sample, sent to lab without location identity
f Sample dilution necessary for analysis; detection limits increased
g Interlaboratory collocated sample
h Intralaboratory collocated sample
i Sample collected as part of pilot study
j Note field may contain important information regarding this sample
k Pre-development sample
l Norm month, norm quarter or norm year inconsistent with sample date
m Confirmation sample
n Sample analyzed after standard holding time
o Sample comprised of partial composite
p Alpha spectroscopy analysis of uranium isotopes
q Gamma spectroscopy analysis of uranium isotopes
r Tritium data represents non-detect with activity calc'd for 100 percent error.

Lab Codes:

IT International Technology Corp. IS was used for short time.
LH LAS-formerly Lockheed<1jan97 975 Kelly Johnson Las Vegas NV 89119

Validation Codes:

V Validated
N Not validated (default value)
U Undeclared
H Historical comparison only

CLP flags: (follow result)

B Analyte found in method blank
D Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E The analyte was detected below the LLNL reporting limit, but above the analytical laboratory minimum detection limit.
F Analyte found in field blank, trip blank, or equipment blank
G Quantitated using fuel calibration, but does not match typical fuel fingerprint (fuel maybe gasoline, diesel, motor oil etc.).
H Sample analyzed outside of holding time, sample results should be evaluated
J Analyte was postively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
L Spike accuracy not within control limits
O Duplicate spike or sample precision not within control limits
P Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S Analytical results for this sample are suspect
T Analyte is tentatively identified compound; result is approximate
U Compound was analyzed for, but not detected above detection limit

Table A-10. Gross alpha and beta radioactivity (pCi/L) in ground water and surface water collected from the Building 854 area. Results recorded by April 22, 2003.

Gross Alpha and Gross Beta, Site 300
April 23, 2003
gemini1

s3rads.23apr2003

Table A-10. Gross alpha and beta radioactivity (pCi/L) in ground water and surface water collected from the Building 854 area. Results recorded by April 22, 2003.

Location Date	Lab	Note	Val.	Gross Alpha	Gross Beta
W-854-01					
27-jun-1996	LH	a	V	<5.1 +/- 2.6UO	11.3 +/- 3.4
15-aug-1996	LH	a	V	<6.7 +/- 2.8UOL	14.6 +/- 4.3
26-dec-1996	LH	a	V	<2.6 +/- 1.6U	6.7 +/- 1.8B
W-854-02					
27-jun-1996	LH	a	V	7.5 +/- 3.8O	8.5 +/- 3.1
15-aug-1996	LH	a	V	9.8 +/- 5OL	10.1 +/- 3.6
26-dec-1996	LH	a	V	11.1 +/- 2.5	8 +/- 1.8B
W-854-03					
17-sep-1996	LH	a	V	21.2 +/- 4.4O	10.9 +/- 2.4
13-dec-1996	LH	a	V	19 +/- 4.5	14.5 +/- 2.9
W-854-04					
16-aug-1996	LH	a	V	<9.2 +/- 4.1UOL	9.9 +/- 5.1
13-dec-1996	LH	a	V	<6 +/- 3.2U	10.9 +/- 4.1
W-854-05					
16-aug-1996	LH	a	V	<5.4 +/- 3.2UOL	7.8 +/- 2.6
12-dec-1996	LH	a	V	5.8 +/- 2.2	7 +/- 1.7
W-854-06					
10-sep-1996	LH	a	V	<4.3 +/- 2.1OU	35.5 +/- 3.8
26-dec-1996	LH	a	V	<2.2 +/- 1.2U	25.3 +/- 2.4B
W-854-07					
10-sep-1996	LH	a	V	<2.7 +/- 1.5OU	7.6 +/- 1.7
26-dec-1996	LH	a	V	6 +/- 1.8	7.7 +/- 1.5B
W-854-08					
10-sep-1996	LH	a	V	6.5 +/- 2.9O	11.1 +/- 2.2
13-dec-1996	LH	a	V	8.7 +/- 3.4	8.9 +/- 2.5
W-854-10					
06-feb-1997	LH	a	V	23.7 +/- 3.4	10.8 +/- 1.7
W-854-11					
19-feb-1997	LH	a	V	16 +/- 4.7	7.8 +/- 3.1L
W-854-13					
22-mar-1999	QU	a	N	4.75 +/- 1.15	8.86 +/- 1.21
W-854-14					
31-mar-1999	GE	a	V	24.9 +/- 7.4	15.1 +/- 4.29
W-854-15					
29-jun-2000	TN	a	V	30.2 +/- 7.5	24 +/- 4.1
W-854-17					
29-aug-2000	TN	a	V	<2.78 +/- 1.5U	<3 +/- 1.1U
W-854-18A					
30-jun-2000	TN	a	V	12.7 +/- 3.1	16.2 +/- 2.7
W-854-45					
10-jul-2001	TN	a	V	26 +/- 6.7L	19.4 +/- 3.4L
W-854-1701					
11-jul-2001	TN	a	V	<2.04 +/- 1.5U	5.1 +/- 1.8
W-854-1707					
09-jul-2001	TN	a	V	<2.59 +/- 1.7U	5 +/- 1.9
W-854-1731					
27-sep-2002	TN	a	V	19.7 +/- 5.7	13.4 +/- 3.1

Table A-10. Gross alpha and beta radioactivity (pCi/L) in ground water and surface water collected from the Building 854 area. Results recorded by April 22, 2003.

Location Date	Lab	Note	Val.	Gross Alpha	Gross Beta
W-854-1822					
11-mar-2003	TN	a	N	<2 +/- 1.7U	7.75 +/- 2.8
WELL13					
21-oct-1991	TM	ap	U	3 +/- 7P	7 +/- 6P
29-feb-1996	LH	a	V	<15 +/- 10U	17.4 +/- 9.1
SPRING10					
19-nov-1991	TM	ap	U	3 +/- 3P	7 +/- 3P
28-apr-1994	IT	ap	V	14.7 +/- 0.7	14.2 +/- 0.7
13-oct-1995	IT	a	V	19.7 +/- 0.8	6.51 +/- 0.4
18-jun-1996	LH	a	V	12.1 +/- 5.9LO	<6.3 +/- 4ULO
11-may-2000	TN	a	V	7.02 +/- 2.1L	6.3 +/- 1.9
08-may-2001	GE	a	V	6.28 +/- 1.98	8.34 +/- 2.08
08-may-2001	TN	a	V	3.82 +/- 2	7.86 +/- 2.5
SPRING11					
14-nov-1991	TM	ap	U	2 +/- 6P	6 +/- 4P
22-sep-1993	IT	ap	V	18.4 +/- 1.7	10.1 +/- 0.8
28-apr-1994	IT	ap	V	20.9 +/- 1.2	18.9 +/- 1.1
13-oct-1995	IT	a	V	50.2 +/- 2	12.3 +/- 0.8
17-jun-1996	LH	a	V	37 +/- 15LO	<14 +/- 8.9ULO
17-may-2000	TN	a	V	46.8 +/- 11	15.8 +/- 4.2
08-may-2001	TN	a	V	19.4 +/- 6.1	26.1 +/- 5.1
21-jun-2002	TN	a	V	25.2 +/- 7.4	12 +/- 3.8
SPRING16					
19-nov-1991	TM	ap	U	13 +/- 7P	8 +/- 2P
22-sep-1993	IT	ap	V	15.1 +/- 1.2	9.2 +/- 0.6
16-may-1994	IT	ap	V	11.3 +/- 0.7	12.4 +/- 0.7
13-oct-1995	IT	a	V	14.5 +/- 1.2	15.2 +/- 0.6
18-jun-1996	LH	a	V	12.4 +/- 7.5LO	<9.2 +/- 5.6ULO
11-may-2000	TN	a	V	15.7 +/- 4.1L	11.3 +/- 2.3

See following page for notes

Table A-10. Gross alpha and beta radioactivity (pCi/L) in ground water and surface water collected from the Building 854 area. Results recorded by April 22, 2003.

Notes:

- Indicates no analysis performed for this compound

Val. = Validation code

Footnotes:

a ERD data
b ORAD WGMG data
c Analytical results for this sample are suspect
d Sample collected during hydraulic testing
e Blind sample, sent to lab without location identity
f Sample dilution necessary for analysis; detection limits increased
g Interlaboratory collocated sample
h Intralaboratory collocated sample
i Sample collected as part of pilot study
j Note field may contain important information regarding this sample
k Pre-development sample
l Norm month, norm quarter or norm year inconsistent with sample date
m Confirmation sample
n Sample analyzed after standard holding time
o Sample comprised of partial composite
p Alpha spectroscopy analysis of uranium isotopes
q Gamma spectroscopy analysis of uranium isotopes
r Tritium data represents non-detect with activity calc'd for 100 percent error.

Lab Codes:

GE	General Engineering Laboratori	PO 30712, Charleston, SC 29417
IT	International Technology Corp.	IS was used for short time.
LH	LAS-formerly Lockheed<1jan97	975 Kelly Johnson Las Vegas NV 89119
QU	Quanterra Env. Serv.,St.Louis	13715 Rider Trail North, Earth City, MO 63045
TM	Thermo Analytical Inc.	
TN	Eberline Services	2030 Wright Ave, Richmond, CA 94804

Validation Codes:

V Validated
N Not validated (default value)
U Undeclared
H Historical comparison only

CLP flags: (follow result)

B Analyte found in method blank
D Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E The analyte was detected below the LLNL reporting limit, but above the analytical laboratory minimum detection limit.
F Analyte found in field blank, trip blank, or equipment blank
G Quantitated using fuel calibration, but does not match typical fuel fingerprint (fuel maybe gasoline, diesel, motor oil etc.).
H Sample analyzed outside of holding time, sample results should be evaluated
J Analyte was postively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
L Spike accuracy not within control limits
O Duplicate spike or sample precision not within control limits
P Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S Analytical results for this sample are suspect
T Analyte is tentatively identified compound; result is approximate
U Compound was analyzed for, but not detected above detection limit

Table A-11. Gross alpha and beta radioactivity in soil and rock (pCi/g) collected from the Building 854 area. Results recorded by March 20, 2003.

Rads in soil, Site 300
March 21, 2003
gemini2

s3-stdrads-SO.21mar2003

Table A-11. Gross alpha and beta radioactivity in soil and rock (pCi/g) collected from the Building 854 area. Results recorded by March 20, 2003.

Location Date	Lab	Val. Note	Depth (ft)	Gross Alpha	Gross Beta
W-854-01					
21-nov-1995	IT a	V	0.5	12.3 +/- 0.9	15.9 +/- 0.6
21-nov-1995	IT a	V	5.0	10.8 +/- 0.9	15.8 +/- 0.7
21-nov-1995	IT ag	V	10.0	9.57 +/- 0.9	15.5 +/- 0.6
21-nov-1995	IT a	V	20.0	6.81 +/- 0.86	19.1 +/- 0.6
21-nov-1995	IT a	V	25.0	<2.07 +/- 0.7U	19.4 +/- 0.7
27-nov-1995	IT a	V	100.0	9.49 +/- 0.87	19.3 +/- 0.6
27-nov-1995	IT a	V	121.0	39.4 +/- 1.4	27.2 +/- 0.8
W-854-03					
14-feb-1996	IT ag	V	0.5	11.3 +/- 1.3	17.8 +/- 0.9
14-feb-1996	IT ag	V	5.0	6.31 +/- 1.16	15.7 +/- 0.9
14-feb-1996	IT a	V	10.0	7.06 +/- 1.15	17.1 +/- 0.9
14-feb-1996	LH a	V	10.0	13.9 +/- 6.1L	22.1 +/- 4.5
3SS-854-021					
29-nov-1995	IT a	V	0.0	8.36 +/- 0.98	17.7 +/- 0.7
3SS-854-022					
22-nov-1995	IT a	V	0.0	7.09 +/- 0.84	18.1 +/- 0.6
3SS-854-025					
22-nov-1995	IT a	V	0.0	7.7 +/- 0.96	14.3 +/- 0.6
3SS-854-026					
22-nov-1995	IT a	V	0.0	5.16 +/- 0.82	16.6 +/- 0.6
3SS-854-027					
29-nov-1995	IT a	V	0.0	10.4 +/- 1	15.6 +/- 0.6
3SS-854-028					
29-nov-1995	IT a	V	0.0	10.2 +/- 0.9	16.3 +/- 0.6
3SS-854-029					
29-nov-1995	IT a	V	0.0	11.4 +/- 1	16.3 +/- 0.6
3SS-854-030					
29-nov-1995	IT a	V	0.0	7.51 +/- 0.88	17.7 +/- 0.7

See following page for notes

Table A-11. Gross alpha and beta radioactivity in soil and rock (pCi/g) collected from the Building 854 area. Results recorded by March 20, 2003.

Notes:

- Indicates no analysis performed for this compound

Val. = Validation code

Footnotes:

a ERD data
b ORAD WGMG data
c Analytical results for this sample are suspect
d Sample collected during hydraulic testing
e Blind sample, sent to lab without location identity
f Sample dilution necessary for analysis; detection limits increased
g Interlaboratory collocated sample
h Intralaboratory collocated sample
i Sample collected as part of pilot study
j Note field may contain important information regarding this sample
k Pre-development sample
l Norm month, norm quarter or norm year inconsistent with sample date
m Confirmation sample
n Sample analyzed after standard holding time
o Sample comprised of partial composite
p Alpha spectroscopy analysis of uranium isotopes
q Gamma spectroscopy analysis of uranium isotopes
r Tritium data represents non-detect with activity calc'd for 100 percent error.

Lab Codes:

IT International Technology Corp. IS was used for short time.
LH LAS-formerly Lockheed<1jan97 975 Kelly Johnson Las Vegas NV 89119

Validation Codes:

V Validated
N Not validated (default value)
U Undeclared
H Historical comparison only

CLP flags: (follow result)

B Analyte found in method blank
D Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E The analyte was detected below the LLNL reporting limit, but above the analytical laboratory minimum detection limit.
F Analyte found in field blank, trip blank, or equipment blank
G Quantitated using fuel calibration, but does not match typical fuel fingerprint (fuel maybe gasoline, diesel, motor oil etc.).
H Sample analyzed outside of holding time, sample results should be evaluated
J Analyte was postively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
L Spike accuracy not within control limits
O Duplicate spike or sample precision not within control limits
P Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S Analytical results for this sample are suspect
T Analyte is tentatively identified compound; result is approximate
U Compound was analyzed for, but not detected above detection limit

Table A-12. Uranium isotopes in ground water and surface water (pCi/L) collected from the Building 854 area. Results recorded by April 22, 2003.

Uranium Isotopes in Ground Water, Site 300
April 23, 2003
gemini1

s3uraniumL.23apr2003
s3uraniumR.23apr2003

Table A-12. Uranium isotopes in ground water and surface water (pCi/L) collected from

Location Date	Lab	Note	Val.	Uranium 233+234	Uranium 235+236	Uranium 238	Uranium 233 by mass measurement
W-854-01							
27-jun-1996	IC	a	V	-	-	-	-
15-aug-1996	LH	a	V	0.45 +/- 0.15B	0.11 +/- 0.073B	0.3 +/- 0.11B	-
29-dec-1998	IC	a	N	-	-	-	-
W-854-02							
27-jun-1996	IC	a	V	-	-	-	-
15-aug-1996	LH	a	V	6.11 +/- 0.56B	0.4 +/- 0.13B	4.48 +/- 0.47B	-
29-dec-1998	IC	a	N	-	-	-	-
W-854-03							
17-sep-1996	LH	a	V	-	-	-	<9600 U
29-dec-1998	IC	a	N	-	-	-	-
W-854-04							
16-aug-1996	IC	a	V	-	-	-	-
W-854-05							
16-aug-1996	IC	a	V	-	-	-	-
29-dec-1998	IC	a	N	-	-	-	-
W-854-06							
10-sep-1996	LH	a	V	-	-	-	<9600 U
W-854-07							
10-sep-1996	LH	a	V	-	-	-	<9600 U
W-854-08							
10-sep-1996	LH	a	V	-	-	-	<9600 U
13-dec-1996	IC	a	V	-	-	-	-
W-854-09							
29-dec-1998	IC	a	N	-	-	-	-
W-854-10							
06-feb-1997	IC	a	V	-	-	-	-
29-dec-1998	IC	a	N	-	-	-	-
W-854-11							
19-feb-1997	IC	a	V	-	-	-	-
29-dec-1998	IC	a	N	-	-	-	-
W-854-13							
22-mar-1999	QU	a	N	0.18 +/- 0.06	<0.023 +/- 0.011U	0.091 +/- 0.035	-
W-854-14							
31-mar-1999	GE	a	V	12.4 +/- 1.23	0.46 +/- 0.0917	10.9 +/- 1.09B	-
W-854-15							
29-jun-2000	TN	a	V	17.7 +/- 1.9	0.871 +/- 0.15	13.7 +/- 1.5	-
29-jun-2000	IC	a	N	-	-	-	-
W-854-17							
29-aug-2000	TN	a	V	8.29 +/- 0.92	0.432 +/- 0.086	4.2 +/- 0.49	-
08-may-2001	IC	a	N	-	-	-	-
W-854-18A							
30-jun-2000	TN	a	V	20.2 +/- 2.2	0.72 +/- 0.14	8.08 +/- 0.94	-
30-jun-2000	IC	a j	N	-	-	-	-
W-854-45							
10-jul-2001	TN	a	V	32.4 +/- 3.6L	1.95 +/- 0.28L	26.3 +/- 2.9L	-
W-854-1701							
11-jul-2001	TN	a	V	0.175 +/- 0.047	<0.1 +/- 0.018U	<0.1 +/- 0.03EU	-

the Building 854 area. Results recorded by April 22, 2003.

Uranium 234 by mass measurement	Uranium 235 by mass measurement	Uranium 236 by mass measurement	Uranium 238 by mass measurement	Location Date
				W-854-01
0.29 +/- 0.04	0.00599 +/- 7e-05	<0.0007 U	0.1288 +/- 0.0006	27-jun-1996
-	-	-	-	15-aug-1996
<0.3 HU	0.00661 +/- 0.00012H	<0.003 HU	0.141 +/- 0.002H	29-dec-1998
				W-854-02
5.3 +/- 0.3	0.182 +/- 0.004	<0.0007 U	3.78 +/- 0.04	27-jun-1996
-	-	-	-	15-aug-1996
7.8 +/- 0.3H	0.204 +/- 0.002H	<0.02 HU	4.37 +/- 0.02H	29-dec-1998
				W-854-03
<6200 U	0.34	<65 U	8	17-sep-1996
13 +/- 0.4H	0.35 +/- 0.003H	<0.02 HU	7.51 +/- 0.03H	29-dec-1998
				W-854-04
0.103 +/- 0.21	0.014 +/- 0.001	<0.0007 U	0.261 +/- 0.006	16-aug-1996
				W-854-05
3.41 +/- 0.38	0.116 +/- 0.001	<0.0007 U	2.58 +/- 0.02	16-aug-1996
7 +/- 0.2H	0.151 +/- 0.002H	<0.02 HU	3.177 +/- 0.014H	29-dec-1998
				W-854-06
<6200 U	<0.22 U	<65 U	<0.34 U	10-sep-1996
				W-854-07
<6200 U	<0.22 U	<65 U	1.1	10-sep-1996
				W-854-08
<6200 U	<0.22 U	<65 U	4.7	10-sep-1996
6.61 +/- 0.66	0.189 +/- 0.004	<0.0007 U	3.89 +/- 0.06	13-dec-1996
				W-854-09
13.1 +/- 0.4H	0.484 +/- 0.004H	<0.02 HU	10.39 +/- 0.05H	29-dec-1998
				W-854-10
31.9 +/- 3.1	0.501 +/- 0.014	<0.0007 U	10.6 +/- 0.3	06-feb-1997
28.7 +/- 0.9H	0.511 +/- 0.003H	<0.02 HU	10.84 +/- 0.04H	29-dec-1998
				W-854-11
5.2 +/- 0.3	0.16 +/- 0.002	<0.0007 U	3.43 +/- 0.04	19-feb-1997
9 +/- 0.3H	0.212 +/- 0.002H	<0.03 HU	4.51 +/- 0.02H	29-dec-1998
				W-854-13
-	-	-	-	22-mar-1999
				W-854-14
-	-	-	-	31-mar-1999
				W-854-15
-	-	-	-	29-jun-2000
22.4456 +/- 0.88	0.7953 +/- 0.011	<0.002 +/- 0.002U	17.17 +/- 0.17	29-jun-2000
				W-854-17
-	-	-	-	29-aug-2000
16.3856 +/- 0.799	0.545 +/- 0.0077	<0.006 +/- 0.0063U	11.798 +/- 0.118	08-may-2001
				W-854-18A
-	-	-	-	30-jun-2000
21.0741 +/- 0.63	0.368 +/- 0.005	<0.002 +/- 0.002U	7.93 +/- 0.0793	30-jun-2000
				W-854-45
-	-	-	-	10-jul-2001
				W-854-1701
-	-	-	-	11-jul-2001

Table A-12. Uranium isotopes in ground water and surface water (pCi/L) collected from

Location Date	Lab	Note	Val.	Uranium 233+234	Uranium 235+236	Uranium 238	Uranium 233 by mass measurement
W-854-1707							
09-jul-2001	TN	a	V	0.715 +/- 0.12	<0.1 +/- 0.015U	0.27 +/- 0.063	-
W-854-1731							
27-sep-2002	TN	a	V	8.65 +/- 0.93	0.464 +/- 0.089	7.97 +/- 0.86	-
W-854-1822							
11-mar-2003	TN	a	N	1.53 +/- 0.21	<0.1 +/- 0.034U	0.743 +/- 0.13	-
WELL13							
21-oct-1991	TM	ap	U	0.9 +/- 0.2P	<0.1 +/- 0.1P	0.9 +/- 0.2P	-
20-jun-1994	IC	a	V	-	-	-	-
19-dec-1994	IT	ap	V	1.29 +/- 0.21BJ	0.13 +/- 0.04BJ	0.8 +/- 0.14BJ	-
24-feb-1995	IT	ap	V	1.25 +/- 0.43	<0.117 +/- 0.069U	1.26 +/- 0.43	-
SPRING10							
19-nov-1991	TM	ap	U	3.7 +/- 0.5P	<0.2 +/- 0.2P	2.3 +/- 0.4P	-
28-apr-1994	IT	ap	V	6.55 +/- 0.23	0.46 +/- 0.07	4.33 +/- 0.19	-
13-oct-1995	IT	a	V	9.42 +/- 3.15B	1.62 +/- 0.78	6 +/- 2.1	-
18-jun-1996	LH	a	V	4.2 +/- 0.35BLO	0.245 +/- 0.072LO	3.27 +/- 0.3BLO	-
11-may-2000	TN	a	V	4.36 +/- 0.55	0.13 +/- 0.061	3.03 +/- 0.39	-
08-may-2001	GE	a	V	3.14 +/- 0.423	<0.1 +/- 0.0497EU	2.23 +/- 0.324	-
08-may-2001	TN	a	V	3.42 +/- 0.41	0.202 +/- 0.053	2.38 +/- 0.29	-
SPRING11							
14-nov-1991	TM	ap	U	1.2 +/- 0.2P	<0.1 +/- 0.1P	1 +/- 0.2P	-
22-sep-1993	IT	ap	V	13.3 +/- 0.4	0.61 +/- 0.09	11.8 +/- 0.4	-
28-apr-1994	IT	ap	V	16.7 +/- 0.4	2.41 +/- 0.15	15 +/- 0.4	-
13-oct-1995	IT	a	V	19.9 +/- 7.3B	7.6 +/- 3.05	18.2 +/- 6.7	-
17-jun-1996	LH	a	V	17.5 +/- 1BLO	0.82 +/- 0.13LO	14.97 +/- 0.91BLO	-
17-may-2000	TN	a	V	18.1 +/- 2	0.832 +/- 0.15	15.9 +/- 1.8	-
08-may-2001	TN	a	V	23.1 +/- 2.9	1.1 +/- 0.26	20.8 +/- 2.6	-
21-jun-2002	TN	a	V	15.4 +/- 1.7	0.69 +/- 0.12	13.1 +/- 1.4	-
SPRING16							
19-nov-1991	TM	ap	U	8.9 +/- 1P	0.3 +/- 0.1P	8 +/- 0.9P	-
22-sep-1993	IT	ap	V	11 +/- 0.3	0.48 +/- 0.07	9.06 +/- 0.28	-
16-may-1994	IT	ap	V	13 +/- 0.3	0.68 +/- 0.08	9.28 +/- 0.29	-
13-oct-1995	IT	a	V	12.5 +/- 3.9B	1.79 +/- 0.79	7.64 +/- 2.46	-
18-jun-1996	LH	a	V	4.69 +/- 0.41BLO	0.261 +/- 0.083LO	4.14 +/- 0.38BLO	-
11-may-2000	TN	a	V	11.6 +/- 1.3	0.587 +/- 0.12	9.22 +/- 1.1	-

the Building 854 area. Results recorded by April 22, 2003.

Uranium 234 by mass measurement	Uranium 235 by mass measurement	Uranium 236 by mass measurement	Uranium 238 by mass measurement	Location Date
				W-854-1707
-	-	-	-	09-jul-2001
				W-854-1731
-	-	-	-	27-sep-2002
				W-854-1822
-	-	-	-	11-mar-2003
				WELL13
-	-	-	-	21-oct-1991
0.68 +/- 0.33	0.035 +/- 0.001	-	0.74 +/- 0.01	20-jun-1994
-	-	-	-	19-dec-1994
-	-	-	-	24-feb-1995
				SPRING10
-	-	-	-	19-nov-1991
-	-	-	-	28-apr-1994
-	-	-	-	13-oct-1995
-	-	-	-	18-jun-1996
-	-	-	-	11-may-2000
-	-	-	-	08-may-2001
-	-	-	-	08-may-2001
				SPRING11
-	-	-	-	14-nov-1991
-	-	-	-	22-sep-1993
-	-	-	-	28-apr-1994
-	-	-	-	13-oct-1995
-	-	-	-	17-jun-1996
-	-	-	-	17-may-2000
-	-	-	-	08-may-2001
-	-	-	-	21-jun-2002
				SPRING16
-	-	-	-	19-nov-1991
-	-	-	-	22-sep-1993
-	-	-	-	16-may-1994
-	-	-	-	13-oct-1995
-	-	-	-	18-jun-1996
-	-	-	-	11-may-2000

See following page for notes

Table A-12. Uranium isotopes in ground water and surface water (pCi/L) collected from the Building 854 area. Results recorded by April 22, 2003.

Notes:

- Indicates no analysis performed for this compound

Val. = Validation code

Footnotes:

a ERD data
b ORAD WGMG data
c Analytical results for this sample are suspect
d Sample collected during hydraulic testing
e Blind sample, sent to lab without location identity
f Sample dilution necessary for analysis; detection limits increased
g Interlaboratory collocated sample
h Intralaboratory collocated sample
i Sample collected as part of pilot study
j Note field may contain important information regarding this sample
k Pre-development sample
l Norm month, norm quarter or norm year inconsistent with sample date
m Confirmation sample
n Sample analyzed after standard holding time
o Sample comprised of partial composite
p Alpha spectroscopy analysis of uranium isotopes
q Gamma spectroscopy analysis of uranium isotopes
r Tritium data represents non-detect with activity calc'd for 100 percent error.

Lab Codes:

GE	General Engineering Laboratori	PO 30712, Charleston, SC 29417
IC	ICP MS Facility	
IT	International Technology Corp.	IS was used for short time.
LH	LAS-formerly Lockheed<1jan97	975 Kelly Johnson Las Vegas NV 89119
QU	Quanterra Env. Serv.,St.Louis	13715 Rider Trail North, Earth City, MO 63045
TM	Thermo Analytical Inc.	
TN	Eberline Services	2030 Wright Ave, Richmond, CA 94804

Validation Codes:

V Validated
N Not validated (default value)
U Undeclared
H Historical comparison only

CLP flags: (follow result)

B Analyte found in method blank
D Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E The analyte was detected below the LLNL reporting limit, but above the analytical laboratory minimum detection limit.
F Analyte found in field blank, trip blank, or equipment blank
G Quantitated using fuel calibration, but does not match typical fuel fingerprint (fuel maybe gasoline, diesel, motor oil etc.).
H Sample analyzed outside of holding time, sample results should be evaluated
J Analyte was postively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
L Spike accuracy not within control limits
O Duplicate spike or sample precision not within control limits
P Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S Analytical results for this sample are suspect
T Analyte is tentatively identified compound; result is approximate
U Compound was analyzed for, but not detected above detection limit

Table A-13. Uranium isotopes in soil and rock (pCi/g) collected from the Building 854 area. Results recorded by March 20, 2003.

Uranium Isotopes in Soil, Site 300
March 21, 2003
gemini2

s3uraniumsoL.21mar2003
s3uraniumsoR.21mar2003

Table A-13. Uranium isotopes in soil and rock (pCi/g) collected from the Building 854

Location Date	Lab	Val. Note	Depth (ft)	Uranium 233+234	Uranium 235+236	Uranium 238	Uranium 233 by mass measurement
W-854-01							
21-nov-1995	IC a	V	0.5	-	-	-	-
21-nov-1995	IC a	V	5.0	-	-	-	-
21-nov-1995	IC ag	V	10.0	-	-	-	-
21-nov-1995	IC a	V	20.0	-	-	-	-
W-854-03							
14-feb-1996	IT ag	V	0.5	1.01 +/- 0.19B	0.28 +/- 0.08B	1.08 +/- 0.2B	-
14-feb-1996	IT ag	V	5.0	1.15 +/- 0.21B	0.34 +/- 0.09B	1.06 +/- 0.2B	-
14-feb-1996	IT a	V	10.0	1.24 +/- 0.22B	0.42 +/- 0.12B	1.25 +/- 0.23B	-
14-feb-1996	LH a	V	10.0	1.52 +/- 0.29	0.23 +/- 0.11	1.8 +/- 0.320	-
3SS-854-021							
29-nov-1995	IC a	V	0.0	-	-	-	-
3SS-854-022							
22-nov-1995	IC a	V	0.0	-	-	-	-
3SS-854-025							
22-nov-1995	IC a	V	0.0	-	-	-	-
3SS-854-026							
22-nov-1995	IC a	V	0.0	-	-	-	-
3SS-854-027							
29-nov-1995	IC a	V	0.0	-	-	-	-
3SS-854-028							
29-nov-1995	IC a	V	0.0	-	-	-	-
3SS-854-029							
29-nov-1995	IC a	V	0.0	-	-	-	-
29-nov-1995	IC a	V	0.0	-	-	-	-
3SS-854-030							
29-nov-1995	IC a	V	0.0	-	-	-	-
29-nov-1995	IC a	V	0.0	-	-	-	-
29-nov-1995	IC a	V	0.0	-	-	-	-
29-nov-1995	IC a	V	0.0	-	-	-	-

area. Results recorded by March 20, 2003.

Uranium 234 by mass measurement	Uranium 235 by mass measurement	Uranium 236 by mass measurement	Uranium 238 by mass measurement	Location Date
				W-854-01
-	0.009 H	-	0.24 +/- 0.01H	21-nov-1995
-	0.01 H	-	0.21 +/- 0.01H	21-nov-1995
-	0.007 H	-	0.16 +/- 0.003H	21-nov-1995
-	0.01 H	-	0.21 +/- 0.004H	21-nov-1995
				W-854-03
-	-	-	-	14-feb-1996
-	-	-	-	14-feb-1996
-	-	-	-	14-feb-1996
-	-	-	-	14-feb-1996
				3SS-854-021
-	0.024 H	-	0.93 +/- 0.01H	29-nov-1995
				3SS-854-022
-	0.016 H	-	0.34 +/- 0.01H	22-nov-1995
				3SS-854-025
-	0.014 H	-	0.39 +/- 0.01H	22-nov-1995
				3SS-854-026
-	0.014 H	-	0.32 +/- 0.01H	22-nov-1995
				3SS-854-027
-	0.015 H	-	0.43 +/- 0.01H	29-nov-1995
				3SS-854-028
-	0.012 H	-	0.31 +/- 0.01H	29-nov-1995
				3SS-854-029
-	0.009 H	-	0.27 +/- 0.01H	29-nov-1995
-	0.009 H	-	0.22 +/- 0.01H	29-nov-1995
				3SS-854-030
-	0.009 H	-	0.31 +/- 0.01H	29-nov-1995
-	0.008 H	-	0.23 +/- 0.01H	29-nov-1995
-	0.008 H	-	0.23 +/- 0.01H	29-nov-1995
-	0.011 H	-	0.43 +/- 0.01H	29-nov-1995

See following page for notes

Table A-13. Uranium isotopes in soil and rock (pCi/g) collected from the Building 854 area. Results recorded by March 20, 2003.

Notes:

\- Indicates no analysis performed for this compound

Val. = Validation code

Footnotes:

a ERD data
b ORAD WGMG data
c Analytical results for this sample are suspect
d Sample collected during hydraulic testing
e Blind sample, sent to lab without location identity
f Sample dilution necessary for analysis; detection limits increased
g Interlaboratory collocated sample
h Intralaboratory collocated sample
i Sample collected as part of pilot study
j Note field may contain important information regarding this sample
k Pre-development sample
l Norm month, norm quarter or norm year inconsistent with sample date
m Confirmation sample
n Sample analyzed after standard holding time
o Sample comprised of partial composite
p Alpha spectroscopy analysis of uranium isotopes
q Gamma spectroscopy analysis of uranium isotopes
r Tritium data represents non-detect with activity calc'd for 100 percent error.

Lab Codes:

IC ICP MS Facility
IT International Technology Corp. IS was used for short time.
LH LAS-formerly Lockheed<1jan97 975 Kelly Johnson Las Vegas NV 89119

Validation Codes:

V Validated
N Not validated (default value)
U Undeclared
H Historical comparison only

CLP flags: (follow result)

B Analyte found in method blank
D Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E The analyte was detected below the LLNL reporting limit, but above the analytical laboratory minimum detection limit.
F Analyte found in field blank, trip blank, or equipment blank
G Quantitated using fuel calibration, but does not match typical fuel fingerprint (fuel maybe gasoline, diesel, motor oil etc.).
H Sample analyzed outside of holding time, sample results should be evaluated
J Analyte was postively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
L Spike accuracy not within control limits
O Duplicate spike or sample precision not within control limits
P Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S Analytical results for this sample are suspect
T Analyte is tentatively identified compound; result is approximate
U Compound was analyzed for, but not detected above detection limit

Table A-14. Nitrogenous compounds in ground water and surface water samples (mg/L) collected from Building 854 area. Results recorded by April 22, 2003.

Nitrates, Nitrites, and Nitrogen in Ground Water,
April 23, 2003
gemini1

s3NL.23apr2003
s3NR.23apr2003

Table A-14. Nitrogenous compounds in ground water and surface water samples (mg/L) collected

Location Date	Lab	Note	Val.	Ammonia Nitrogen as N	Nitrate and Nitrite as N	Nitrate and Nitrite as NO3	Nitrate as N
W-854-01							
27-jun-1996	CS	a	V	-	-	-	<0.5 U
30-jul-1998	CS	af	V	-	-	-	-
26-aug-1999	BB	a	V	-	-	-	-
20-mar-2000	CN	a	V	0.8	-	-	<0.1 U
17-may-2000	CN	a	V	-	-	-	-
08-may-2001	CN	a	V	-	-	-	-
03-jul-2001	CN	a	V	-	-	-	-
29-nov-2001	CN	a	V	-	-	-	-
28-jan-2002	CN	a	V	-	-	-	-
28-aug-2002	CN	a	V	-	-	-	-
18-dec-2002	CN	a	V	-	-	-	-
W-854-02							
27-jun-1996	CS	a	V	-	-	-	9.8
30-jul-1998	CS	af	V	-	-	-	-
13-nov-1998	BB	a	V	-	-	-	-
17-feb-1999	BB	a	N	-	-	-	-
28-jun-1999	CN	af	V	-	-	-	-
04-oct-1999	CN	af	V	-	-	-	-
29-mar-2000	CN	a	V	0.4	-	-	12 D
30-jun-2000	CN	af	V	-	-	-	-
30-aug-2000	CN	af	V	-	-	-	-
26-mar-2001	BB	a	V	-	-	-	-
06-jun-2001	SE	af	V	-	-	-	-
06-jul-2001	BB	a	V	-	-	-	-
15-jan-2002	SE	af	N	-	-	-	-
14-mar-2002	SE	af	V	-	-	-	-
10-apr-2002	SE	af	V	-	-	-	-
08-may-2002	SE	af	V	-	-	-	-
18-jun-2002	SE	af	V	-	-	-	-
10-jul-2002	SE	afj	V	-	-	-	-
08-aug-2002	SE	afj	V	-	-	-	-
09-oct-2002	SE	afj	V	-	-	-	-
W-854-03							
17-sep-1996	CS	a	V	-	-	-	<30 UD
30-jul-1998	CS	afg	V	-	-	-	-
30-jul-1998	CS	af	V	-	-	-	-
23-nov-1998	BB	ag	V	-	-	-	9.1
16-feb-1999	BB	a	V	-	-	-	-
28-jun-1999	CN	af	V	-	-	-	-
29-sep-1999	CN	af	V	-	-	-	-
01-dec-1999	CN	af	V	<0.1 U	-	-	32 DS
28-feb-2000	BB	afg	V	<0.1 U	-	-	9.1 DL
28-feb-2000	CN	afg	V	<0.1 U	-	-	9.9
16-may-2000	CN	af	V	-	-	-	-
16-aug-2000	CN	af	V	-	-	-	-
26-mar-2001	BB	a	V	-	-	-	-
06-jun-2001	SE	af	V	-	-	-	-
09-jul-2001	CN	af	V	-	-	-	-
06-mar-2002	SE	af	V	-	-	-	-
10-apr-2002	SE	af	V	-	-	-	-
08-may-2002	SE	af	V	-	-	-	-
18-jun-2002	SE	af	V	-	-	-	-
10-jul-2002	SE	afj	V	-	-	-	-
08-aug-2002	SE	afj	V	-	-	-	-
09-oct-2002	SE	afj	V	-	-	-	-
W-854-04							
16-aug-1996	CS	a	V	-	-	-	<0.5 U
30-jul-1998	CS	af	V	-	-	-	-
26-aug-1999	BB	a	V	-	-	-	-
16-may-2000	CN	a	V	-	-	-	-
08-may-2001	CN	a	V	-	-	-	-
03-jul-2001	CN	a	V	-	-	-	-
29-nov-2001	CN	a	V	-	-	-	-
26-feb-2002	CN	a	V	-	-	-	-

from Building 854 area. Results recorded by April 22, 2003.

Nitrite as N	Nitrite as NO2	Nitrate as NO3	Total Kjeldahl Nitrogen	Location Date
				W-854-01
<0.5 ULO	-	<0.5 U	-	27-jun-1996
-	-	<0.5 DU	-	30-jul-1998
-	-	<0.4 U	-	26-aug-1999
<0.1 U	<0.1 U	0.4	0.8	20-mar-2000
-	-	0.2	-	17-may-2000
-	-	0.4 H	-	08-may-2001
-	-	<0.4 U	-	03-jul-2001
-	-	<0.4 LOU	-	29-nov-2001
-	-	9.9	-	28-jan-2002
-	-	13	-	28-aug-2002
-	-	<0.1 U	-	18-dec-2002
				W-854-02
<5 DULO	-	43	-	27-jun-1996
-	-	46 D	-	30-jul-1998
-	-	48	-	13-nov-1998
-	-	51	-	17-feb-1999
-	-	<0.5 SU	-	28-jun-1999
-	-	24 DL	-	04-oct-1999
<0.1 U	<0.1 U	53 D	<0.2 U	29-mar-2000
-	-	36 D	-	30-jun-2000
-	-	51 D	-	30-aug-2000
-	-	59.4	-	26-mar-2001
-	-	55 D	-	06-jun-2001
-	-	59.9	-	06-jul-2001
-	-	55 D	-	15-jan-2002
-	-	52 D	-	14-mar-2002
-	-	52 D	-	10-apr-2002
-	-	54 D	-	08-may-2002
-	-	50 D	-	18-jun-2002
-	-	49 D	-	10-jul-2002
-	-	56 D	-	08-aug-2002
-	-	55 D	-	09-oct-2002
				W-854-03
<5 DULO	-	<30 DLOU	-	17-sep-1996
-	-	39 D	-	30-jul-1998
-	-	38 D	-	30-jul-1998
-	-	-	-	23-nov-1998
-	-	43	-	16-feb-1999
-	-	<0.5 SU	-	28-jun-1999
-	-	130 DLS	-	29-sep-1999
<0.5 U	<0.5 U	140 DS	0.2	01-dec-1999
<0.5 U	<0.5 U	40 DL	0.3	28-feb-2000
<0.1 U	<0.1 U	44	0.2	28-feb-2000
-	-	40 DL	-	16-may-2000
-	-	44	-	16-aug-2000
-	-	47.8	-	26-mar-2001
-	-	42 D	-	06-jun-2001
-	-	27 DLO	-	09-jul-2001
-	-	43 D	-	06-mar-2002
-	-	42 D	-	10-apr-2002
-	-	44 D	-	08-may-2002
-	-	43 D	-	18-jun-2002
-	-	47 D	-	10-jul-2002
-	-	47 D	-	08-aug-2002
-	-	45 D	-	09-oct-2002
				W-854-04
<5 DUL	-	<0.5 U	-	16-aug-1996
-	-	1 D	-	30-jul-1998
-	-	<0.4 U	-	26-aug-1999
-	-	0.4 L	-	16-may-2000
-	-	<0.4 HU	-	08-may-2001
-	-	<0.4 U	-	03-jul-2001
-	-	<0.4 LOU	-	29-nov-2001
-	-	<0.1 U	-	26-feb-2002

Table A-14. Nitrogenous compounds in ground water and surface water samples (mg/L) collected

Location Date	Lab	Note	Val.	Ammonia Nitrogen as N	Nitrate and Nitrite as N	Nitrate and Nitrite as NO3	Nitrate as N
W-854-04 (continued)							
28-aug-2002	CN	a	V	-	-	-	-
18-dec-2002	CN	a	V	-	-	-	-
W-854-05							
16-aug-1996	CS	a	V	-	-	-	12 D
30-jul-1998	CS	af	V	-	-	-	-
13-nov-1998	BB	a	V	-	-	-	-
26-jan-1999	BB	a	V	-	-	-	-
28-jun-1999	CN	af	V	-	-	-	-
01-dec-1999	CN	af	V	<0.1 U	-	-	22 DS
29-feb-2000	CN	a	V	<0.1 U	-	-	11 D
16-may-2000	CN	af	V	-	-	-	-
09-may-2001	CN	af	V	-	-	-	-
03-jul-2001	CN	af	V	-	-	-	-
29-nov-2001	CN	a	V	-	-	-	-
30-jan-2002	CN	af	V	-	-	-	-
21-jun-2002	CN	af	V	-	-	-	-
13-aug-2002	CN	af	V	-	-	-	-
13-dec-2002	CN	a	N	-	-	-	-
W-854-06							
10-sep-1996	CS	a	V	-	-	-	<0.5 U
30-jul-1998	CS	af	V	-	-	-	-
01-sep-1999	BB	a	V	-	-	-	-
20-mar-2000	CN	a	V	1.6	-	-	<0.1 U
17-may-2000	BB	ag	V	-	-	-	-
17-may-2000	CN	ag	V	-	-	-	-
09-may-2001	CN	a	V	-	-	-	-
03-jul-2001	CN	ah	V	-	-	-	-
03-jul-2001	CN	aeh	V	-	-	-	-
13-dec-2001	CN	a	V	-	-	-	-
26-feb-2002	CN	a	V	-	-	-	-
21-jun-2002	CN	a	V	-	-	-	-
10-sep-2002	CN	aeh	V	-	-	-	-
10-sep-2002	CN	ah	V	-	-	-	-
19-dec-2002	BB	ag	V	-	-	-	-
19-dec-2002	CN	a	V	-	-	-	-
W-854-07							
10-sep-1996	CS	a	V	-	-	-	7.5
24-sep-1999	BB	a	V	-	-	-	-
20-mar-2000	CN	a	V	<0.1 U	-	-	8.6
17-may-2000	CN	af	V	-	-	-	-
14-dec-2000	CN	af	V	-	-	-	-
11-jun-2001	CN	af	V	-	-	-	-
09-jul-2001	BB	ag	V	-	-	-	-
09-jul-2001	CN	agf	V	-	-	-	-
13-dec-2001	CN	af	V	-	-	-	-
29-jan-2002	CN	afh	V	-	-	-	-
29-jan-2002	CN	aefh	V	-	-	-	-
20-jun-2002	CN	a	V	-	-	-	-
13-aug-2002	CN	af	V	-	-	-	-
19-dec-2002	CN	af	V	-	-	-	-
W-854-08							
10-sep-1996	CS	a	V	-	-	-	41 D
13-dec-1996	CS	a	V	-	-	-	<25 DU
31-jul-1998	BB	ag	V	-	-	-	-
13-nov-1998	BB	a	V	-	-	-	-
26-jan-1999	BB	aeh	V	-	-	-	-
26-jan-1999	BB	ah	V	-	-	-	-
28-jun-1999	CN	a	V	-	-	-	-
01-dec-1999	CN	af	V	<0.1 U	-	-	11 DS
28-feb-2000	CN	af	V	<0.1 U	-	-	12 D
08-may-2001	CN	af	V	-	-	-	-
10-jul-2001	CN	af	V	-	-	-	-
21-jun-2002	CN	af	V	-	-	-	-
10-sep-2002	CN	af	V	-	-	-	-

from Building 854 area. Results recorded by April 22, 2003.

Nitrite as N	Nitrite as NO2	Nitrate as NO3	Total Kjeldahl Nitrogen	Location Date
				(continued) W-854-04
-	-	12	-	28-aug-2002
-	-	<0.1 U	-	18-dec-2002
				W-854-05
<5 DUL	-	54 D	-	16-aug-1996
-	-	59 D	-	30-jul-1998
-	-	55	-	13-nov-1998
-	-	55	-	26-jan-1999
-	-	62 DS	-	28-jun-1999
<0.5 U	<0.5 U	96 DS	0.2	01-dec-1999
<0.1 U	<0.1 HU	50 D	<0.2 U	29-feb-2000
-	-	46 DL	-	16-may-2000
-	-	14 DH	-	09-may-2001
-	-	4 D	-	03-jul-2001
-	-	42	-	29-nov-2001
-	-	48 D	-	30-jan-2002
-	-	57 D	-	21-jun-2002
-	-	63 D	-	13-aug-2002
-	-	52 D	-	13-dec-2002
				W-854-06
<2.5 DLOU	-	<0.5 LOU	-	10-sep-1996
-	-	<0.5 DU	-	30-jul-1998
-	-	<0.4 U	-	01-sep-1999
<0.1 U	<0.1 U	0.3	1.7	20-mar-2000
-	-	<0.44 U	-	17-may-2000
-	-	0.5	-	17-may-2000
-	-	<0.4 HU	-	09-may-2001
-	-	<0.4 U	-	03-jul-2001
-	-	<0.4 U	-	03-jul-2001
-	-	<0.4 U	-	13-dec-2001
-	-	6.8	-	26-feb-2002
-	-	4	-	21-jun-2002
-	-	4.6	-	10-sep-2002
-	-	4.8	-	10-sep-2002
-	-	<0.44 U	-	19-dec-2002
-	-	<0.1 U	-	19-dec-2002
				W-854-07
<5 DLOU	-	33 LO	-	10-sep-1996
-	-	42	-	24-sep-1999
<0.1 U	<0.1 U	38	<0.2 U	20-mar-2000
-	-	38 D	-	17-may-2000
-	-	22 DL	-	14-dec-2000
-	-	21 DL	-	11-jun-2001
-	-	43	-	09-jul-2001
-	-	25 DLO	-	09-jul-2001
-	-	35 D	-	13-dec-2001
-	-	40 D	-	29-jan-2002
-	-	39 D	-	29-jan-2002
-	-	41	-	20-jun-2002
-	-	40 D	-	13-aug-2002
-	-	36 D	-	19-dec-2002
				W-854-08
<5 DLOU	-	180 DLO	-	10-sep-1996
<0.5 U	-	62 D	-	13-dec-1996
-	-	81	-	31-jul-1998
-	-	69	-	13-nov-1998
-	-	64	-	26-jan-1999
-	-	65	-	26-jan-1999
-	-	<0.5 SU	-	28-jun-1999
<0.5 U	<0.5 U	48 DS	<0.2 U	01-dec-1999
<0.1 U	<0.1 U	57 D	<0.2 U	28-feb-2000
-	-	10 DH	-	08-may-2001
-	-	11 D	-	10-jul-2001
-	-	53 D	-	21-jun-2002
-	-	48 D	-	10-sep-2002

Table A-14. Nitrogenous compounds in ground water and surface water samples (mg/L) collected

Location Date	Lab	Note	Val.	Ammonia Nitrogen as N	Nitrate and Nitrite as N	Nitrate and Nitrite as NO3	Nitrate as N
W-854-09							
31-jul-1998	BB	ag	V	-	-	-	-
23-nov-1998	BB	a	V	-	-	-	8.9
05-mar-1999	BB	a	N	-	-	-	-
28-jun-1999	CN	aeh	V	-	-	-	-
28-jun-1999	CN	ah	V	-	-	-	-
24-sep-1999	CN	af	V	-	-	-	-
07-dec-1999	CN	af	V	<0.1 U	-	-	8.6 D
20-mar-2000	CN	a	V	<0.1 U	-	-	8.6
17-may-2000	CN	af	V	-	-	-	-
09-may-2001	CN	af	V	-	-	-	-
05-jul-2001	CN	af	V	-	-	-	7.7
13-dec-2001	CN	af	V	-	-	-	9.2
07-jun-2002	CN	af	V	-	-	-	-
10-sep-2002	CN	af	V	-	-	-	-
W-854-10							
06-feb-1997	CS	a	V	-	-	-	0.79
17-aug-1998	BB	ag	N	-	-	-	-
28-jun-1999	CN	a	V	-	-	-	-
24-sep-1999	BB	a	V	-	-	-	-
29-feb-2000	CN	aeh	V	<0.1 U	-	-	2.1
29-feb-2000	CN	ah	V	<0.1 U	-	-	2.1
17-may-2000	CN	a	V	-	-	-	-
09-may-2001	BB	ag	V	-	-	-	-
09-may-2001	CN	afg	V	-	-	-	-
05-jul-2001	CN	a	V	-	-	-	-
29-nov-2001	CN	a	V	-	-	-	-
29-jan-2002	CN	a	V	-	-	-	-
07-jun-2002	CN	a	V	-	-	-	-
10-sep-2002	CN	a	V	-	-	-	-
13-dec-2002	CN	ah	N	-	-	-	-
13-dec-2002	CN	aeh	N	-	-	-	-
W-854-11							
19-feb-1997	CS	a	V	-	-	-	9.9 D
17-aug-1998	BB	ag	N	-	-	-	-
13-nov-1998	BB	a	V	-	-	-	-
17-feb-1999	BB	a	N	-	-	-	-
28-jun-1999	BB	ag	V	-	-	-	-
28-jun-1999	CN	ag	V	-	-	-	-
24-sep-1999	CN	af	V	-	-	-	-
02-dec-1999	CN	af	V	0.2	-	-	12
29-feb-2000	CN	a	V	1.6	-	-	12 D
10-may-2001	CN	af	V	-	-	-	-
W-854-13							
22-mar-1999	CS	af	N	-	-	-	<0.5 U
25-may-1999	CN	a	V	-	-	-	-
26-aug-1999	CN	a	V	-	-	-	-
02-dec-1999	CN	af	V	0.1	-	-	<0.5 DU
28-feb-2000	CN	a	V	0.1	-	-	0.3
16-may-2000	CN	a	V	-	-	-	-
08-may-2001	CN	a	V	-	-	-	-
03-jul-2001	CN	a	V	-	-	-	-
13-dec-2001	BB	a	V	-	-	-	-
28-jan-2002	CN	a	V	-	-	-	-
28-aug-2002	BB	a	V	-	-	-	-
17-dec-2002	CN	a	N	-	-	-	-
W-854-14							
31-mar-1999	BB	a	V	-	-	-	4.7
24-may-1999	CN	af	V	-	-	-	-
01-sep-1999	CN	a	V	-	-	-	-
07-dec-1999	CN	afh	V	<0.1 U	-	-	46 D
07-dec-1999	CN	aefh	V	<0.1 U	-	-	45 D
28-feb-2000	CN	af	V	<0.1 U	-	-	42 D
17-may-2000	CN	af	V	-	-	-	-
08-may-2001	CN	af	V	-	-	-	-

from Building 854 area. Results recorded by April 22, 2003.

Nitrite as N	Nitrite as NO2	Nitrate as NO3	Total Kjeldahl Nitrogen	Location Date
				W-854-09
-	-	42	-	31-jul-1998
-	-	-	-	23-nov-1998
-	-	40	-	05-mar-1999
-	-	<0.5 SU	-	28-jun-1999
-	-	<0.5 SU	-	28-jun-1999
-	-	47 DL	-	24-sep-1999
<0.5 U	<0.5 U	38 D	0.3	07-dec-1999
<0.1 U	<0.1 U	38	<0.2 U	20-mar-2000
-	-	36 D	-	17-may-2000
-	-	9 DH	-	09-may-2001
<0.1 U	-	34	-	05-jul-2001
<0.1 U	-	41	-	13-dec-2001
-	-	56 DH	-	07-jun-2002
-	-	50 D	-	10-sep-2002
				W-854-10
<0.5 U	-	3.5	-	06-feb-1997
-	-	5.9	-	17-aug-1998
-	-	<0.5 SU	-	28-jun-1999
-	-	12	-	24-sep-1999
<0.1 U	<0.1 HU	9.2	<0.2 U	29-feb-2000
<0.1 U	<0.1 HU	9.5	0.2	29-feb-2000
-	-	9	-	17-may-2000
-	-	5.14	-	09-may-2001
-	-	1.4 DH	-	09-may-2001
-	-	4.4	-	05-jul-2001
-	-	3.9	-	29-nov-2001
-	-	7.4	-	29-jan-2002
-	-	26 H	-	07-jun-2002
-	-	23	-	10-sep-2002
-	-	10	-	13-dec-2002
-	-	9	-	13-dec-2002
				W-854-11
<0.5 U	-	44 L	-	19-feb-1997
-	-	41	-	17-aug-1998
-	-	43	-	13-nov-1998
-	-	58	-	17-feb-1999
-	-	<0.4 U	-	28-jun-1999
-	-	<0.5 SU	-	28-jun-1999
-	-	160 DL	-	24-sep-1999
<0.5 U	<0.5 HU	55 D	0.6	02-dec-1999
<0.1 U	<0.1 HU	54 D	15	29-feb-2000
-	-	14 DH	-	10-may-2001
				W-854-13
<0.5 U	-	<0.5 U	-	22-mar-1999
-	-	<0.5 SU	-	25-may-1999
-	-	<0.5 SU	-	26-aug-1999
<0.5 U	<0.5 HU	<0.5 DU	<0.2 U	02-dec-1999
<0.1 U	<0.1 U	1.2	0.2	28-feb-2000
-	-	1.3 L	-	16-may-2000
-	-	<0.4 HU	-	08-may-2001
-	-	0.6	-	03-jul-2001
-	-	0.73	-	13-dec-2001
-	-	12	-	28-jan-2002
-	-	0.82	-	28-aug-2002
-	-	0.9	-	17-dec-2002
				W-854-14
<0.02 U	-	21	-	31-mar-1999
-	-	180 DS	-	24-may-1999
-	-	<0.5 SU	-	01-sep-1999
<0.5 U	<0.5 U	200 D	<0.2 U	07-dec-1999
<0.5 U	<0.5 U	200 D	<0.2 U	07-dec-1999
<0.1 U	<0.1 U	190 D	<0.2 U	28-feb-2000
-	-	150 D	-	17-may-2000
-	-	52 DH	-	08-may-2001

Table A-14. Nitrogenous compounds in ground water and surface water samples (mg/L) collected

Location Date	Lab	Note	Val.	Ammonia Nitrogen as N	Nitrate and Nitrite as N	Nitrate and Nitrite as NO3	Nitrate as N
W-854-14 (continued)							
05-jul-2001	CN	af	V	-	-	-	-
W-854-15							
29-jun-2000	CN	af	V	-	-	-	0.2
09-may-2001	CN	af	V	-	-	-	-
06-jul-2001	BB	a	V	-	-	-	-
14-dec-2001	CN	a	V	-	-	-	-
29-jan-2002	CN	a	V	-	-	-	-
20-jun-2002	CN	a	V	-	-	-	-
10-sep-2002	CN	a	V	-	-	-	-
17-dec-2002	CN	a	N	-	-	-	-
W-854-17							
30-jun-2000	CN	af	V	-	-	-	2
29-aug-2000	CN	af	V	-	-	-	1.1
09-may-2001	BB	ag	V	-	-	-	-
09-may-2001	CN	ag	V	-	-	-	-
05-jul-2001	CN	a	V	-	-	-	-
14-dec-2001	CN	a	V	-	-	-	-
29-jan-2002	CN	aeh	V	-	-	-	-
29-jan-2002	CN	ah	V	-	-	-	-
07-jun-2002	BB	aefg	V	-	-	-	-
07-jun-2002	CN	ag	V	-	-	-	-
10-sep-2002	BB	ag	V	-	-	-	-
10-sep-2002	CN	ag	V	-	-	-	-
17-dec-2002	CN	aeh	N	-	-	-	-
17-dec-2002	CN	ah	N	-	-	-	-
W-854-18A							
30-jun-2000	CN	af	V	-	-	-	2.4
10-may-2001	CN	af	V	-	-	-	-
05-jul-2001	CN	a	V	-	-	-	-
13-dec-2001	CN	ah	V	-	-	-	-
13-dec-2001	CN	aeh	V	-	-	-	-
28-jan-2002	CN	a	V	-	-	-	-
28-aug-2002	CN	a	V	-	-	-	-
17-dec-2002	CN	a	N	-	-	-	-
W-854-45							
10-jul-2001	CN	af	V	-	-	-	4.2 L
14-dec-2001	CN	af	V	-	-	-	-
28-jan-2002	CN	a	V	-	-	-	-
07-jun-2002	CN	a	V	-	-	-	-
13-aug-2002	CN	a	V	-	-	-	-
18-dec-2002	CN	af	V	-	-	-	-
W-854-1701							
11-jul-2001	CN	af	V	-	-	-	<0.1 U
26-feb-2002	CN	a	V	-	-	-	-
21-jun-2002	CN	a	V	-	-	-	-
10-sep-2002	CN	a	V	-	-	-	-
W-854-1707							
09-jul-2001	CN	af	V	-	-	-	<0.1 LOU
12-dec-2001	CN	a	V	-	-	-	-
30-jan-2002	CN	a	V	-	-	-	-
21-jun-2002	CN	a	V	-	-	-	-
10-sep-2002	CN	a	V	-	-	-	-
W-854-1731							
27-sep-2002	CN	af	V	-	-	-	3.1
W-854-1822							
11-mar-2003	CN	a	N	-	-	-	1
W-854-1823							
07-mar-2003	BB	a	V	-	-	-	-
20-mar-2003	CN	a	N	-	-	-	6.5

from Building 854 area. Results recorded by April 22, 2003.

Nitrite as N	Nitrite as NO2	Nitrate as NO3	Total Kjeldahl Nitrogen	Location Date
				(continued) W-854-14
-	-	160 D	-	05-jul-2001
				W-854-15
<0.1 U	-	0.7	-	29-jun-2000
-	-	1.6 DH	-	09-may-2001
-	-	6.43	-	06-jul-2001
-	-	6.2	-	14-dec-2001
-	-	7	-	29-jan-2002
-	-	13	-	20-jun-2002
-	-	12	-	10-sep-2002
-	-	8.4	-	17-dec-2002
				W-854-17
<0.1 U	-	8.9	-	30-jun-2000
<0.1 U	-	4.9	-	29-aug-2000
-	-	0.82	-	09-may-2001
-	-	0.7 H	-	09-may-2001
-	-	1.7	-	05-jul-2001
-	-	0.7	-	14-dec-2001
-	-	<0.1 U	-	29-jan-2002
-	-	<0.1 U	-	29-jan-2002
-	-	<0.88 DU	-	07-jun-2002
-	-	11 H	-	07-jun-2002
-	-	1.3	-	10-sep-2002
-	-	0.4	-	10-sep-2002
-	-	0.9	-	17-dec-2002
-	-	0.9	-	17-dec-2002
				W-854-18A
0.2	-	11	-	30-jun-2000
-	-	4 DH	-	10-may-2001
-	-	14	-	05-jul-2001
-	-	16	-	13-dec-2001
-	-	17	-	13-dec-2001
-	-	29	-	28-jan-2002
-	-	37	-	28-aug-2002
-	-	17 D	-	17-dec-2002
				W-854-45
<0.1 U	-	19	-	10-jul-2001
-	-	26 D	-	14-dec-2001
-	-	37	-	28-jan-2002
-	-	30 H	-	07-jun-2002
-	-	39	-	13-aug-2002
-	-	16 D	-	18-dec-2002
				W-854-1701
<0.1 U	-	<0.4 U	-	11-jul-2001
-	-	12	-	26-feb-2002
-	-	<0.1 U	-	21-jun-2002
-	-	13	-	10-sep-2002
				W-854-1707
<1 DU	-	<0.4 LOU	-	09-jul-2001
-	-	0.5	-	12-dec-2001
-	-	3.6	-	30-jan-2002
-	-	8	-	21-jun-2002
-	-	16	-	10-sep-2002
				W-854-1731
<0.1 U	-	14	-	27-sep-2002
				W-854-1822
0.2	-	4.4	-	11-mar-2003
				W-854-1823
-	-	28.7	-	07-mar-2003
<0.1 HU	-	29	-	20-mar-2003

Table A-14. Nitrogenous compounds in ground water and surface water samples (mg/L) collected

Location Date	Lab	Note	Val.	Ammonia Nitrogen as N	Nitrate and Nitrite as N	Nitrate and Nitrite as NO3	Nitrate as N
W-854-1902							
07-mar-2003	BB	a	V	-	-	-	-
20-mar-2003	CN	a	N	-	-	-	2.8
WELL13							
09-aug-1990	BC	a	U	-	3.6 P	16 P	-
21-oct-1991	BC	ag	U	-	1 P	4.4 P	-
29-feb-1996	CS	a	V	-	-	-	-
SPRING10							
19-nov-1991	BC	a	U	-	5.8 P	26 P	-
28-apr-1994	CS	a	V	-	-	-	<5 DU
SPRING11							
14-nov-1991	BC	a	U	-	<0.1 P	<0.4 P	-
22-sep-1993	CS	a	V	-	-	-	0.54
28-apr-1994	CS	a	V	-	-	-	<5 DU
21-jun-2002	CN	a	V	-	-	-	-
SPRING16							
19-nov-1991	BC	a	U	-	1.3 P	5.8 P	-
22-sep-1993	CS	a	V	-	-	-	2
16-may-1994	CS	a	V	-	-	-	1000 D

from Building 854 area. Results recorded by April 22, 2003.

Nitrite as N	Nitrite as NO2	Nitrate as NO3	Total Kjeldahl Nitrogen	Location Date
				W-854-1902
-	-	16.8	-	07-mar-2003
<0.1 U	-	12	-	20-mar-2003
				WELL13
-	-	-	-	09-aug-1990
-	-	-	-	21-oct-1991
-	-	5.3	-	29-feb-1996
				SPRING10
-	-	-	-	19-nov-1991
-	-	<22.15 DU	-	28-apr-1994
				SPRING11
-	-	-	-	14-nov-1991
-	-	2.3922	-	22-sep-1993
-	-	<22.15 DU	-	28-apr-1994
-	-	<0.1 U	-	21-jun-2002
				SPRING16
-	-	-	-	19-nov-1991
-	-	8.6	-	22-sep-1993
-	-	4600 D	-	16-may-1994

See following page for notes

Table A-14. Nitrogenous compounds in ground water and surface water samples (mg/L) collected from Building 854 area. Results recorded by April 22, 2003.

Notes:

\- Indicates no analysis performed for this compound

Val. = Validation code

Footnotes:

a ERD data
b ORAD WGMG data
c Analytical results for this sample are suspect
d Sample collected during hydraulic testing
e Blind sample, sent to lab without location identity
f Sample dilution necessary for analysis; detection limits increased
g Interlaboratory collocated sample
h Intralaboratory collocated sample
i Sample collected as part of pilot study
j Note field may contain important information regarding this sample
k Pre-development sample
l Norm month, norm quarter or norm year inconsistent with sample date
m Confirmation sample
n Sample analyzed after standard holding time
o Sample comprised of partial composite
p Alpha spectroscopy analysis of uranium isotopes
q Gamma spectroscopy analysis of uranium isotopes
r Tritium data represents non-detect with activity calc'd for 100 percent error.

Lab Codes:

BB	BC Laboratories, Inc.	Bakersfield, CA
BC	Brown & Caldwell Emeryville	
CN	Caltest Analytical Laboratory	1885 N. Kelly Rd, Napa, CA 94558
CS	California Laboratory Services	3249 Fitzgerald Rd. Rancho Cordova, CA 95742
SE	Sequoia Analytical	1551 Industrial Road, San Carlos, CA 94070

Validation Codes:

V Validated
N Not validated (default value)
U Undeclared
H Historical comparison only

CLP flags: (follow result)

B Analyte found in method blank
D Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E The analyte was detected below the LLNL reporting limit, but above the analytical laboratory minimum detection limit.
F Analyte found in field blank, trip blank, or equipment blank
G Quantitated using fuel calibration, but does not match typical fuel fingerprint (fuel maybe gasoline, diesel, motor oil etc.).
H Sample analyzed outside of holding time, sample results should be evaluated
J Analyte was postively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
L Spike accuracy not within control limits
O Duplicate spike or sample precision not within control limits
P Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S Analytical results for this sample are suspect
T Analyte is tentatively identified compound; result is approximate
U Compound was analyzed for, but not detected above detection limit

Table A-15. Metals in ground water and surface water (mg/L) collected from the Building 854 area. Results recorded by April 22, 2003.

Site 300 Metals Report
April 23, 2003
gemini1

s3metsplusL.23apr2003
s3metsplusR.23apr2003

Table A-15. Metals in ground water and surface water (mg/L) collected from the Building

Location Date	Lab	Note	Val.	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
W-854-01										
27-jun-1996	CS	a	V	–	0.0049	0.027	–	<0.0005 U	0.0019 L	–
27-jun-1996	CS	a	V	–	–	–	–	–	–	–
W-854-02										
27-jun-1996	CS	a	V	–	0.029	0.04	–	<0.0005 U	0.003 L	–
27-jun-1996	CS	a	V	–	–	–	–	–	–	–
W-854-03										
17-sep-1996	CS	a	V	–	0.053	<0.025 U	–	<0.0005 U	<0.001 U	–
17-sep-1996	CS	a	V	–	–	–	–	–	–	–
W-854-04										
16-aug-1996	CS	a	V	–	0.04	<0.025 U	–	<0.0005 U	<0.001 U	–
16-aug-1996	CS	a	V	–	–	–	–	–	–	–
W-854-05										
16-aug-1996	CS	a	V	–	0.041	0.04	–	<0.0005 U	0.0011	–
16-aug-1996	CS	a	V	–	–	–	–	–	–	–
W-854-06										
10-sep-1996	CS	a	V	–	<0.002 U	<0.025 U	–	<0.0005 U	<0.001 U	–
10-sep-1996	CS	a	V	–	–	–	–	–	–	–
W-854-07										
10-sep-1996	CS	a	V	–	0.042	<0.025 U	–	<0.0005 U	0.0025	–
10-sep-1996	CS	a	V	–	–	–	–	–	–	–
W-854-08										
10-sep-1996	CS	a	V	–	0.032	<0.025 U	–	<0.0005 U	<0.001 U	–
10-sep-1996	CS	a	V	–	–	–	–	–	–	–
13-dec-1996	CS	a	V	–	0.026	0.038	0.092	<0.0005 U	0.0023	–
13-dec-1996	CS	a	V	–	–	–	–	–	–	–
W-854-09										
05-jul-2001	CN	af	V	–	–	–	–	–	–	–
13-dec-2001	CN	af	V	–	–	–	–	–	–	–
W-854-10										
06-feb-1997	CS	a	V	–	0.043	0.043	–	<0.0005 U	<0.001 U	–
06-feb-1997	CS	a	V	–	–	–	–	–	–	–
W-854-11										
19-feb-1997	CS	a	V	–	0.026	0.097	–	<0.0005 U	0.0016	–
19-feb-1997	CS	a	V	–	–	–	–	–	–	–
W-854-13										
22-mar-1999	CS	a	N	–	<0.002 U	<0.025 U	–	<0.0005 U	0.019	–
22-mar-1999	CS	af	N	–	–	–	–	–	–	–
W-854-14										
31-mar-1999	BB	a	V	–	<0.002 U	0.035	–	<0.0005 U	0.002	–
31-mar-1999	BB	a	V	–	–	–	–	–	–	–
W-854-15										
29-jun-2000	CN	af	V	–	0.006	<0.025 U	–	<0.0005 U	0.007	–
29-jun-2000	CN	af	V	–	–	–	–	–	–	–
W-854-17										
30-jun-2000	CN	af	V	–	0.033	<0.025 U	–	<0.0005 U	<0.001 U	–
30-jun-2000	CN	af	V	–	–	–	–	–	–	–
29-aug-2000	CN	af	V	–	0.037	0.11	–	<0.0005 U	0.042 D	–
29-aug-2000	CN	af	V	–	–	–	–	–	–	–
W-854-18A										
30-jun-2000	CN	af	V	–	0.11 D	<0.025 U	–	<0.0005 U	0.016 D	–
30-jun-2000	CN	af	V	–	–	–	–	–	–	–

854 area. Results recorded by April 22, 2003.

Copper	Iron	Lead	Mercury	Nickel	Selenium	Silver	Zinc	Location Date
								W-854-01
–	–	<0.002 U	<0.0002 U	–	<0.002 UL	<0.001 U	–	27-jun-1996
0.53	1.1	–	–	<0.1 U	–	–	<0.05 U	27-jun-1996
								W-854-02
–	–	<0.002 U	<0.0002 U	–	0.009 L	<0.001 U	–	27-jun-1996
<0.05 U	0.14	–	–	<0.1 U	–	–	<0.05 U	27-jun-1996
								W-854-03
–	–	0.0058	0.0004	–	0.0054	<0.001 U	–	17-sep-1996
<0.05 U	<0.1 U	–	–	<0.1 U	–	–	<0.05 U	17-sep-1996
								W-854-04
–	–	<0.002 U	<0.0002 U	–	<0.002 LU	<0.001 U	–	16-aug-1996
<0.05 U	0.14	–	–	<0.1 U	–	–	<0.05 U	16-aug-1996
								W-854-05
–	–	<0.002 U	<0.0002 U	–	0.0024 L	<0.001 U	–	16-aug-1996
<0.05 U	<0.1 U	–	–	<0.1 U	–	–	<0.05 U	16-aug-1996
								W-854-06
–	–	<0.002 U	<0.0002 U	–	0.003	<0.001 U	–	10-sep-1996
<0.05 U	<0.1 U	–	–	<0.1 U	–	–	<0.05 U	10-sep-1996
								W-854-07
–	–	<0.002 U	<0.0002 U	–	0.012	<0.001 U	–	10-sep-1996
<0.05 U	<0.1 U	–	–	<0.1 U	–	–	<0.05 U	10-sep-1996
								W-854-08
–	–	<0.002 U	<0.0002 U	–	0.0077	<0.001 U	–	10-sep-1996
<0.05 U	<0.1 U	–	–	<0.1 U	–	–	<0.05 U	10-sep-1996
–	–	0.003	<0.0002 U	–	0.0081	<0.001 U	–	13-dec-1996
<0.05 U	<0.1 U	–	–	<0.1 U	–	–	<0.05 U	13-dec-1996
								W-854-09
<0.05 U	<0.1 U	–	–	<0.1 U	–	–	<0.05 U	05-jul-2001
<0.05 HU	24 H	–	–	<0.1 HU	–	–	0.07 H	13-dec-2001
								W-854-10
–	–	<0.002 U	<0.0002 U	–	<0.002 LU	<0.001 U	–	06-feb-1997
<0.05 U	<0.1 U	–	–	<0.1 U	–	–	<0.05 U	06-feb-1997
								W-854-11
–	–	<0.002 U	<0.0002 U	–	0.012	<0.001 LU	–	19-feb-1997
<0.05 U	0.16	–	–	<0.1 U	–	–	0.13	19-feb-1997
								W-854-13
–	–	<0.002 U	<0.0002 U	–	<0.002 U	<0.001 U	–	22-mar-1999
<0.05 U	0.65	–	–	<0.1 U	–	–	<0.05 U	22-mar-1999
								W-854-14
–	–	<0.005 U	<0.0002 U	–	0.0021	<0.001 U	–	31-mar-1999
<0.01 U	<0.05 U	–	–	<0.05 U	–	–	<0.01 U	31-mar-1999
								W-854-15
–	–	<0.005 U	<0.0002 U	–	0.031 D	<0.001 U	–	29-jun-2000
<0.05 U	0.8	–	–	<0.1 U	–	–	<0.05 LU	29-jun-2000
								W-854-17
–	–	<0.005 U	<0.0002 U	–	0.002	<0.001 U	–	30-jun-2000
<0.05 U	<0.1 U	–	–	<0.1 U	–	–	<0.05 U	30-jun-2000
–	–	0.006	<0.0002 U	–	0.002	<0.001 U	–	29-aug-2000
<0.05 U	26	–	–	<0.1 U	–	–	0.13	29-aug-2000
								W-854-18A
–	–	<0.005 U	<0.0002 U	–	0.004	<0.001 U	–	30-jun-2000
<0.05 U	<0.1 U	–	–	<0.1 U	–	–	<0.05 U	30-jun-2000

Table A-15. Metals in ground water and surface water (mg/L) collected from the Building

Location Date	Lab	Note	Val.	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
W-854-45										
10-jul-2001	CN	af	V	–	0.012	0.031	–	<0.0005 U	0.001 L	–
10-jul-2001	CN	af	V	–	–	–	–	–	–	–
W-854-1701										
11-jul-2001	CN	af	V	–	0.003	<0.025 U	–	<0.0005 U	<0.001 LU	–
11-jul-2001	CN	af	V	–	–	–	–	–	–	–
W-854-1707										
09-jul-2001	CN	af	V	–	0.005	<0.025 U	–	<0.0005 LU	0.002 L	–
09-jul-2001	CN	af	V	–	–	–	–	–	–	–
W-854-1731										
27-sep-2002	CN	af	V	–	0.007	0.041	–	<0.0005 U	<0.001 U	–
27-sep-2002	CN	af	V	–	–	–	–	–	–	–
W-854-1822										
11-mar-2003	CN	a	N	–	0.008	<0.025 U	–	<0.0005 U	<0.001 U	–
11-mar-2003	CN	a	N	–	–	–	–	–	–	–
W-854-1823										
20-mar-2003	CN	a	N	–	0.007	<0.025 U	–	<0.0005 U	0.029	–
20-mar-2003	CN	a	N	–	–	–	–	–	–	–
W-854-1902										
20-mar-2003	CN	a	N	–	0.025	<0.025 U	–	<0.0005 U	0.032	–
20-mar-2003	CN	a	N	–	–	–	–	–	–	–
WELL13										
09-aug-1990	BC	a	U	–	–	–	–	–	–	–
21-oct-1991	BC	ag	U	–	<0.002 P	<0.05 P	–	<0.0005 P	<0.005 P	–
21-oct-1991	BC	ag	U	–	–	–	<0.0005 P	–	–	–
21-oct-1991	BC	ag	U	–	–	–	–	–	–	–
15-oct-1992	BC	a	U	–	0.012 P	<0.05 P	–	<0.0005 P	<0.005 P	–
25-aug-1993	CS	a	V	–	0.027	<0.05 U	–	<0.001 U	<0.01 DU	–
25-aug-1993	CS	a	V	–	–	–	<0.0005 U	–	–	–
09-feb-1994	CS	a	V	–	–	–	0.0008	–	–	–
20-jun-1994	IC	a	V	–	0.001	0.0251	<0.0001 U	<0.0001 U	0.00037	0.00095
24-feb-1995	CS	a	V	–	–	–	<0.0005 U	–	–	–
25-jul-1995	CS	a	V	–	0.0051	<0.025 U	–	<0.0005 U	<0.01 U	–
25-jul-1995	CS	a	V	–	–	–	<0.0005 U	–	–	–
29-feb-1996	CS	a	V	–	<0.002 U	0.037	<0.0005 U	<0.0005 U	<0.01 U	–
29-feb-1996	CS	a	V	–	–	–	–	–	–	–
SPRING10										
19-nov-1991	BC	a	U	–	0.059 P	<0.05 P	–	<0.0005 P	<0.005 P	–
19-nov-1991	BC	a	U	–	–	–	–	–	–	–
28-apr-1994	CS	a	V	–	0.063	0.13	–	0.0011	0.018	–
28-apr-1994	CS	a	V	–	–	–	0.00055	–	–	–
28-apr-1994	CS	a	V	–	–	–	–	–	–	–
13-oct-1995	CS	a	V	–	0.048	0.051	<0.0005 U	<0.0005 U	<0.01 U	–
18-jun-1996	CS	a	V	–	0.06 L	0.042	–	<0.0005 U	<0.001 U	–
18-jun-1996	CS	a	V	–	–	–	<0.0005 U	–	–	–
SPRING11										
14-nov-1991	BC	a	U	–	0.004 P	0.06 P	–	<0.0005 P	<0.005 P	–
14-nov-1991	BC	a	U	–	–	–	–	–	–	–
22-sep-1993	CS	a	V	–	0.011	0.16	<0.001 U	<0.001 U	<0.01 U	–
22-sep-1993	CS	a	V	–	–	–	–	–	–	–
28-apr-1994	CS	a	V	–	0.0071	0.094	–	<0.0005 U	<0.01 U	–
28-apr-1994	CS	a	V	–	–	–	<0.0005 U	–	–	–
28-apr-1994	CS	a	V	–	–	–	–	–	–	–
13-oct-1995	CS	a	V	–	0.0049	0.084	<0.0005 U	<0.0005 U	<0.01 U	–
17-jun-1996	CS	a	V	–	0.0032	0.072	–	0.001	<0.001 U	–
17-jun-1996	CS	a	V	–	–	–	<0.0005 U	–	–	–
SPRING16										
19-nov-1991	BC	a	U	–	0.034 P	<0.05 P	–	0.0005 P	<0.005 P	–
19-nov-1991	BC	a	U	–	–	–	–	–	–	–

854 area. Results recorded by April 22, 2003.

Copper	Iron	Lead	Mercury	Nickel	Selenium	Silver	Zinc	Location Date
								W-854-45
–	–	<0.005 U	<0.0002 U	–	<0.002 LU	<0.001 U	–	10-jul-2001
<0.05 U	<0.1 U	–	–	<0.1 U	–	–	<0.05 U	10-jul-2001
								W-854-1701
–	–	<0.005 U	<0.0002 U	–	<0.002 LU	<0.001 U	–	11-jul-2001
<0.05 U	<0.1 U	–	–	<0.1 U	–	–	<0.05 U	11-jul-2001
								W-854-1707
–	–	<0.005 U	<0.0002 U	–	<0.002 U	<0.001 U	–	09-jul-2001
<0.05 U	0.3	–	–	<0.1 U	–	–	<0.05 U	09-jul-2001
								W-854-1731
–	–	<0.005 U	<0.0002 U	–	0.12 D	<0.001 U	–	27-sep-2002
<0.05 U	<0.1 U	–	–	<0.1 U	–	–	<0.05 U	27-sep-2002
								W-854-1822
–	–	<0.005 U	<0.0002 LU	–	<0.005 U	<0.001 U	–	11-mar-2003
<0.05 U	0.2	–	–	<0.1 U	–	–	<0.05 U	11-mar-2003
								W-854-1823
–	–	<0.005 U	<0.0002 U	–	0.018	<0.001 U	–	20-mar-2003
<0.05 U	<0.1 U	–	–	<0.1 U	–	–	<0.05 U	20-mar-2003
								W-854-1902
–	–	0.007	<0.0002 U	–	0.024	<0.001 U	–	20-mar-2003
<0.05 U	<0.1 U	–	–	<0.1 U	–	–	<0.05 U	20-mar-2003
								WELL13
<0.05 P	<0.1 P	–	–	–	–	–	<0.05 P	09-aug-1990
–	–	<0.002 P	<0.0005 P	–	<0.002 P	<0.05 P	–	21-oct-1991
–	–	–	–	–	–	–	–	21-oct-1991
<0.05 P	<0.1 P	–	–	–	–	–	<0.05 P	21-oct-1991
–	–	0.005 P	<0.0002 P	–	0.004 P	<0.05 P	–	15-oct-1992
–	–	<0.005 U	<0.0005 U	–	0.0083	<0.001 U	–	25-aug-1993
–	–	–	–	–	–	–	–	25-aug-1993
–	–	–	–	–	–	–	–	09-feb-1994
0.0064	–	0.00041	–	–	–	–	0.0066	20-jun-1994
–	–	–	–	–	–	–	–	24-feb-1995
–	–	<0.002 U	<0.0002 U	–	<0.002 U	<0.001 U	–	25-jul-1995
–	–	–	–	–	–	–	–	25-jul-1995
–	–	<0.002 U	0.00032	–	<0.002 U	<0.001 U	–	29-feb-1996
<0.05 U	0.23	–	–	<0.1 U	–	–	<0.05 U	29-feb-1996
								SPRING10
–	–	<0.002 P	<0.0005 P	–	0.014 P	<0.05 P	–	19-nov-1991
<0.05 P	<0.1 P	–	–	–	–	–	<0.05 P	19-nov-1991
–	–	0.022	<0.0002 U	–	<0.002 U	<0.001 U	–	28-apr-1994
–	–	–	–	–	–	–	–	28-apr-1994
<0.05 U	<0.1 U	–	–	<0.1 U	–	–	<0.05 U	28-apr-1994
–	–	<0.002 U	<0.0002 U	–	<0.002 U	<0.001 U	–	13-oct-1995
–	–	<0.002 U	<0.0002 U	–	0.013	<0.001 UL	–	18-jun-1996
–	–	–	–	–	–	–	–	18-jun-1996
								SPRING11
–	–	<0.002 P	<0.0005 P	–	<0.002 P	<0.05 P	–	14-nov-1991
<0.05 P	<0.1 P	–	–	–	–	–	<0.05 P	14-nov-1991
–	–	<0.005 U	<0.0005 U	–	<0.005 U	<0.001 U	–	22-sep-1993
<0.05 U	<0.1 U	–	–	<0.1 U	–	–	<0.05 U	22-sep-1993
–	–	0.023	<0.0002 U	–	<0.002 U	<0.001 U	–	28-apr-1994
–	–	–	–	–	–	–	–	28-apr-1994
<0.05 U	<0.1 U	–	–	<0.1 U	–	–	<0.05 U	28-apr-1994
–	–	<0.002 U	<0.0002 U	–	<0.002 U	<0.001 U	–	13-oct-1995
–	–	<0.002 U	<0.0002 U	–	<0.002 UL	<0.001 U	–	17-jun-1996
–	–	–	–	–	–	–	–	17-jun-1996
								SPRING16
–	–	<0.002 P	<0.0005 P	–	0.008 P	<0.05 P	–	19-nov-1991
<0.05 P	<0.1 P	–	–	–	–	–	<0.05 P	19-nov-1991

Table A-15. Metals in ground water and surface water (mg/L) collected from the Building

Location Date	Lab	Note	Val.	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
SPRING16 (continued)										
22-sep-1993	CS	a	V	-	0.046	0.058	<0.001 U	<0.001 U	<0.01 U	-
22-sep-1993	CS	a	V	-	-	-	-	-	-	-
16-may-1994	CS	a	V	-	0.043	0.045	<0.0005 U	<0.0005 U	<0.01 U	-
16-may-1994	CS	a	V	-	-	-	-	-	-	-
13-oct-1995	CS	a	V	-	0.033	0.095	<0.0005 U	<0.0005 U	<0.01 U	-
18-jun-1996	CS	a	V	-	0.016 L	0.13	-	<0.0005 U	<0.001 U	-
18-jun-1996	CS	a	V	-	-	-	<0.0005 U	-	-	-
11-may-2000	BB	a	V	-	0.035	<0.025 U	-	<0.0005 U	<0.001 U	-
11-may-2000	BB	a	V	-	-	-	<0.0002 U	-	-	-

854 area. Results recorded by April 22, 2003.

Copper	Iron	Lead	Mercury	Nickel	Selenium	Silver	Zinc	Location Date
								(continued) SPRING16
-	-	<0.005 U	<0.0005 U	-	0.01	<0.001 U	-	22-sep-1993
<0.05 U	<0.1 U	-	-	<0.1 U	-	-	<0.05 U	22-sep-1993
-	-	<0.002 U	<0.0002 U	-	0.013	<0.001 U	-	16-may-1994
<0.05 U	<0.1 U	-	-	<0.1 U	-	-	<0.05 U	16-may-1994
-	-	<0.002 U	<0.0002 U	-	<0.002 U	<0.001 U	-	13-oct-1995
-	-	<0.002 U	<0.0002 U	-	<0.002 U	<0.001 UL	-	18-jun-1996
-	-	-	-	-	-	-	-	18-jun-1996
-	-	<0.005 U	<0.0002 U	-	0.011	<0.001 U	-	11-may-2000
-	-	-	-	-	-	-	-	11-may-2000

See following page for notes

Table A-15. Metals in ground water and surface water (mg/L) collected from the Building 854 area. Results recorded by April 22, 2003.

Notes:

- Indicates no analysis performed for this compound

Val. = Validation code

Footnotes:

a ERD data
b ORAD WGMG data
c Analytical results for this sample are suspect
d Sample collected during hydraulic testing
e Blind sample, sent to lab without location identity
f Sample dilution necessary for analysis; detection limits increased
g Interlaboratory collocated sample
h Intralaboratory collocated sample
i Sample collected as part of pilot study
j Note field may contain important information regarding this sample
k Pre-development sample
l Norm month, norm quarter or norm year inconsistent with sample date
m Confirmation sample
n Sample analyzed after standard holding time
o Sample comprised of partial composite
p Alpha spectroscopy analysis of uranium isotopes
q Gamma spectroscopy analysis of uranium isotopes
r Tritium data represents non-detect with activity calc'd for 100 percent error.

Lab Codes:

BB	BC Laboratories, Inc.	Bakersfield, CA
BC	Brown & Caldwell Emeryville	
CN	Caltest Analytical Laboratory	1885 N. Kelly Rd, Napa, CA 94558
CS	California Laboratory Services	3249 Fitzgerald Rd. Rancho Cordova, CA 95742
IC	ICP MS Facility	

Validation Codes:

V Validated
N Not validated (default value)
U Undeclared
H Historical comparison only

CLP flags: (follow result)

B Analyte found in method blank
D Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E The analyte was detected below the LLNL reporting limit, but above the analytical laboratory minimum detection limit.
F Analyte found in field blank, trip blank, or equipment blank
G Quantitated using fuel calibration, but does not match typical fuel fingerprint (fuel maybe gasoline, diesel, motor oil etc.).
H Sample analyzed outside of holding time, sample results should be evaluated
J Analyte was postively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
L Spike accuracy not within control limits
O Duplicate spike or sample precision not within control limits
P Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S Analytical results for this sample are suspect
T Analyte is tentatively identified compound; result is approximate
U Compound was analyzed for, but not detected above detection limit

Table A-16. Dissolved metals in soil and rock (mg/L) collected from the Building 854 area. Results recorded by March 20, 2003.

Dissolved Metals in Soil, Site 300
March 24, 2003
gemini2

s3metstlc.soL.24mar2003
s3metstlc.soR.24mar2003

Table A-16. Dissolved metals in soil and rock (mg/L) collected from the Building 854 area.

Location Date	Lab	Val. Note	Depth (ft)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper
W-854-05											
04-apr-1996	CS a	V	0.5	<0.3 U	<0.05 UO	9.2	<0.05 U	<0.1 U	<0.5 U	0.52	<0.5 U
04-apr-1996	CS a	V	5.0	<0.3 U	<0.05 UO	7.4	<0.05 U	<0.1 U	<0.5 U	<0.5 U	<0.5 U

Results recorded by March 20, 2003.

Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Location Date
									W-854-05
<0.5 U	<0.005 U	<0.5 U	<0.5 U	<0.05 ULO	<0.5 ULO	<0.05 ULO	0.64	1.2	04-apr-1996
<0.5 U	<0.005 U	<0.5 U	<0.5 U	<0.05 ULO	<0.5 ULO	<0.05 ULO	<0.5 U	1.1	04-apr-1996

See following page for notes

Table A-16. Dissolved metals in soil and rock (mg/L) collected from the Building 854 area. Results recorded by March 20, 2003.

Notes:

- Indicates no analysis performed for this compound

Val. = Validation code

Footnotes:

a ERD data
b ORAD WGMG data
c Analytical results for this sample are suspect
d Sample collected during hydraulic testing
e Blind sample, sent to lab without location identity
f Sample dilution necessary for analysis; detection limits increased
g Interlaboratory collocated sample
h Intralaboratory collocated sample
i Sample collected as part of pilot study
j Note field may contain important information regarding this sample
k Pre-development sample
l Norm month, norm quarter or norm year inconsistent with sample date
m Confirmation sample
n Sample analyzed after standard holding time
o Sample comprised of partial composite
p Alpha spectroscopy analysis of uranium isotopes
q Gamma spectroscopy analysis of uranium isotopes
r Tritium data represents non-detect with activity calc'd for 100 percent error.

Lab Codes:

CS California Laboratory Services 3249 Fitzgerald Rd. Rancho Cordova, CA 95742

Validation Codes:

V Validated
N Not validated (default value)
U Undeclared
H Historical comparison only

CLP flags: (follow result)

B Analyte found in method blank
D Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E The analyte was detected below the LLNL reporting limit, but above the analytical laboratory minimum detection limit.
F Analyte found in field blank, trip blank, or equipment blank
G Quantitated using fuel calibration, but does not match typical fuel fingerprint (fuel maybe gasoline, diesel, motor oil etc.).
H Sample analyzed outside of holding time, sample results should be evaluated
J Analyte was postively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
L Spike accuracy not within control limits
O Duplicate spike or sample precision not within control limits
P Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S Analytical results for this sample are suspect
T Analyte is tentatively identified compound; result is approximate
U Compound was analyzed for, but not detected above detection limit

Table A-17. Total metals in soil and rock (mg/kg) collected from Building 854 area. Results recorded by March 20, 2003.

Metals in Surface Soil, Site 300
March 24, 2003
gemini2

s3metttlc.soL.24mar2003
s3metttlc.soR.24mar2003

Table A-17. Total metals in soil and rock (mg/kg) collected from Building 854 area.

Location Date	Lab	Val. Note	Depth (ft)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper
W-854-01											
21-nov-1995	CS a	V	0.5	<1 U	0.6	93	0.69	<1 U	9.8	8	16
21-nov-1995	CS ag	V	5.0	<1 U	0.8	72	0.76	<1 U	13	6.1	25
21-nov-1995	CS ag	V	5.0	<1 U	1.6	72	0.57	<1 U	12	5.6	22
21-nov-1995	CS a	V	40.0	<1 U	1.4	52	0.89	<1 U	14	15	20
22-nov-1995	CS a	V	60.0	<1 U	0.72	40	0.56	<1 U	13	6	11
22-nov-1995	CS ag	V	80.0	<1 LOU	0.73 LO	49	0.73	<1 U	12 LO	8.7	11
W-854-03											
14-feb-1996	CS ag	V	0.5	<1 LOU	2 LO	97	<0.5 U	<1 LOU	17	9	7.9
W-854-04											
28-feb-1996	CS a	V	0.5	<1 ULO	1.4	160	0.78	<1 U	24	11	14
3SS-854-001											
29-nov-1995	CS a	V	0.0	<1 LOU	2	110	<0.5 U	0.13	22	6.3	17
3SS-854-002											
29-nov-1995	CS a	V	0.0	<1 U	2.9	120	<0.5 U	<0.1 U	24	7.3	23
3SS-854-003											
21-nov-1995	CS a	V	0.0	<1 U	1.4	110	<0.5 U	0.12	18	7.8	25
3SS-854-004											
21-nov-1995	CS a	V	0.0	<1 U	2.6	130	0.59	0.2	23	10	15
3SS-854-005											
21-nov-1995	CS a	V	0.0	<1 U	3.8	120	0.66	0.11	21	11	14
3SS-854-006											
21-nov-1995	CS a	V	0.0	<1 LOU	1.1 LO	120	<0.5 U	0.93 LO	22	8.9	15
3SS-854-007											
21-nov-1995	CS a	V	0.0	<1 U	1.1	110	0.62	0.29	27	10	19
3SS-854-008											
21-nov-1995	CS a	V	0.0	<1 U	1.2	100	<0.5 U	1.4	19	8.5	17
3SS-854-009											
21-nov-1995	CS a	V	0.0	<1 U	1.2	98	<0.5 U	4	16	6.8	60
3SS-854-010											
21-nov-1995	CS a	V	0.0	<1 U	1.2	110	0.64	0.18	22	8.8	14
21-nov-1995	FS a	V	0.0	<3 LOU	<3 U	91	<0.5 U	<1 U	<3 U	<3 LOU	17
3SS-854-011											
22-nov-1995	CS a	V	0.0	<1 U	2.3	120	<0.5 U	2.4	30	9.2	22
3SS-854-012											
22-nov-1995	CS a	V	0.0	<1 U	1.8	100	0.6	0.25	20	9.3	16
3SS-854-013											
22-nov-1995	CS a	V	0.0	<1 U	2	88	<0.5 U	1.2	24	7.5	230
3SS-854-014											
22-nov-1995	CS a	V	0.0	<1 U	1.2	120	<0.5 U	0.1	22	9	11
22-nov-1995	CS a	V	0.0	<1 U	2.5	110	<0.5 U	0.1	24	6.8	11
3SS-854-015											
22-nov-1995	CS a	V	0.0	<1 U	<0.5 U	58	0.55	<1 U	6.4	<5 U	11
3SS-854-016											
22-nov-1995	CS a	V	0.0	<1 U	1.5	95	<0.5 U	0.23	15	6.2	15
3SS-854-017											
22-nov-1995	CS a	V	0.0	<1 U	0.65	130	0.75	<1 U	21	11	17

Results recorded by March 20, 2003.

Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Location Date
									W-854-01
<10 U	<0.05 U	<5 U	14	<0.5 U	<2.5 U	<1 U	30	37	21-nov-1995
<10 U	<0.05 U	<5 U	10	<0.5 U	<2.5 U	<1 U	68	34	21-nov-1995
<10 U	<0.05 HU	<5 U	10	0.81	<2.5 U	<1 U	64	33	21-nov-1995
<10 U	<0.05 U	<5 U	13	<0.5 U	<2.5 U	<1 U	51	33	21-nov-1995
<10 U	<0.05 U	<5 U	<10 U	<0.5 U	<2.5 U	<1 U	69	31	22-nov-1995
<10 U	<0.05 U	<5 U	11	<0.5 LOU	<2.5 U	<1 U	100 LO	36 LO	22-nov-1995
									W-854-03
10	<0.05 U	<5 U	13	<0.5 LOU	<2.5 U	<1 U	75	38	14-feb-1996
									W-854-04
<10 U	<0.05 U	<5 U	16	<0.5 ULO	<2.5 U	<1 U	82	50	28-feb-1996
									3SS-854-001
<10 U	<0.05 HU	<5 U	32	<0.5 LOU	<2.5 U	<1 U	35	36	29-nov-1995
									3SS-854-002
<10 U	<0.05 HU	<5 U	28	<0.5 U	<2.5 U	<1 U	37	42	29-nov-1995
									3SS-854-003
<10 U	<0.05 HU	<5 U	14	<0.5 U	<2.5 U	<1 U	75	46	21-nov-1995
									3SS-854-004
<10 U	<0.05 HU	<5 U	17	<0.5 U	<2.5 U	<1 U	82	63	21-nov-1995
									3SS-854-005
17	<0.05 HU	<5 U	17	<0.5 U	<2.5 U	<1 U	88	50	21-nov-1995
									3SS-854-006
10	<0.05 HU	<5 U	20	<0.5 LOU	<2.5 U	<1 U	60	110	21-nov-1995
									3SS-854-007
23	<0.05 HU	<5 U	24	<0.5 U	<2.5 U	<1 U	74	87	21-nov-1995
									3SS-854-008
<10 U	<0.05 HU	<5 U	15	<0.5 U	<2.5 U	<1 U	69	160	21-nov-1995
									3SS-854-009
98	0.29 H	<5 U	14	<0.5 U	<2.5 U	<1 U	41	180	21-nov-1995
									3SS-854-010
10	<0.05 HU	<5 U	16	<0.5 U	<2.5 U	<1 U	75	60	21-nov-1995
15	0.04 DU	<3 U	12	<3 U	42 LO	<3 LOU	36 U	40	21-nov-1995
									3SS-854-011
15	<0.05 HU	<5 U	21	<0.5 U	<2.5 U	<1 U	65	130	22-nov-1995
									3SS-854-012
<10 U	<0.05 HU	<5 U	16	<0.5 U	<2.5 U	<1 U	79	49	22-nov-1995
									3SS-854-013
<10 U	<0.05 HU	<5 U	19	<0.5 U	<2.5 U	<1 U	63	140	22-nov-1995
									3SS-854-014
<10 U	<0.05 HU	<5 U	22	<0.5 U	<2.5 U	<1 U	43	36	22-nov-1995
<10 U	<0.05 HU	<5 U	24	<0.5 U	<2.5 U	<1 U	49	40	22-nov-1995
									3SS-854-015
<10 U	<0.05 U	<5 U	<10 U	<0.5 U	<2.5 U	<1 U	36	26	22-nov-1995
									3SS-854-016
<10 U	<0.05 HU	<5 U	11	<0.5 U	<2.5 U	<1 U	56	140	22-nov-1995
									3SS-854-017
<10 U	<0.05 U	<5 U	22	<0.5 U	<2.5 U	<1 U	71	45	22-nov-1995

Table A-17. Total metals in soil and rock (mg/kg) collected from Building 854 area.

Location Date	Lab	Val. Note	Depth (ft)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper
3SS-854-018											
22-nov-1995	CS a	V	0.0	<1 U	0.91	100	0.71	<1 U	12	8.8	15
3SS-854-019											
22-nov-1995	CS a	V	0.0	<1 U	<0.5 U	79	0.67	<1 U	15	8.1	14
3SS-854-020											
22-nov-1995	CS a	V	0.0	<1 U	0.64	100	0.93	<1 U	18	10	18
22-nov-1995	FS a	V	0.0	<3 LOU	<3 U	64 U	0.6	<1 U	8	10 LO	16
3SS-854-021											
29-nov-1995	CS a	V	0.0	<1 U	1.1	390	0.69	1.1	17	9.9	28
3SS-854-022											
22-nov-1995	CS a	V	0.0	<1 U	3	110	0.51	0.53	22	9.6	11
3SS-854-023											
22-nov-1995	CS a	V	0.0	<1 U	<0.5 U	130	0.67	<1 U	11	8.5	13
3SS-854-024											
22-nov-1995	CS a	V	0.0	<1 U	<0.5 U	150	0.88	<1 U	16	9.7	15
3SS-854-025											
22-nov-1995	CS a	V	0.0	<1 U	0.84	100	<0.5 U	<1 U	10	6.8	12
3SS-854-026											
22-nov-1995	CS a	V	0.0	<1 U	0.8	74	<0.5 U	<1 U	22	5.9	36
3SS-854-027											
29-nov-1995	CS a	V	0.0	<1 U	<0.5 U	100	0.64	0.71	15	8.8	18
3SS-854-028											
29-nov-1995	CS a	V	0.0	<1 U	0.7	110	0.66	0.47	18	8.9	19
3SS-854-029											
29-nov-1995	CS a	V	0.0	<1 U	1.2	96	0.73	0.72	18	8.8	30
3SS-854-030											
29-nov-1995	CS a	V	0.0	<1 U	2.4	100	<0.5 U	0.29	17	7.5	15

Results recorded by March 20, 2003.

Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Location Date
<10 U	<0.05 U	<5 U	13	<0.5 U	<2.5 U	<1 U	54	35	3SS-854-018 22-nov-1995
<10 U	<0.05 U	<5 U	13	<0.5 U	<2.5 U	<1 U	51	70	3SS-854-019 22-nov-1995
<10 U	<0.05 U	<5 U	15	<0.5 U	<2.5 U	<1 U	74	41	3SS-854-020 22-nov-1995
7	0.02 DU	<3 U	12	<3 U	<3 LOU	<3 LOU	33	26	22-nov-1995
17	<0.05 HU	<5 U	18	<0.5 U	<2.5 U	<1 U	63	140	3SS-854-021 29-nov-1995
<10 U	<0.05 HU	<5 U	15	<0.5 U	<2.5 U	<1 U	95	55	3SS-854-022 22-nov-1995
<10 U	<0.05 U	<5 U	15	<0.5 U	<2.5 U	<1 U	41	33	3SS-854-023 22-nov-1995
<10 U	<0.05 U	<5 U	16	<0.5 U	<2.5 U	<1 U	55	46	3SS-854-024 22-nov-1995
<10 U	<0.05 U	<5 U	16	<0.5 U	<2.5 U	<1 U	27	25	3SS-854-025 22-nov-1995
62	<0.05 U	<5 U	16	<0.5 U	<2.5 U	<1 U	52	1400	3SS-854-026 22-nov-1995
21	<0.05 HU	<5 U	15	<0.5 U	<2.5 U	<1 U	50	510	3SS-854-027 29-nov-1995
15	<0.05 HU	<5 U	20	<0.5 U	<2.5 U	<1 U	58	330	3SS-854-028 29-nov-1995
10	<0.05 HU	<5 U	18	<0.5 U	<2.5 U	<1 U	67	180	3SS-854-029 29-nov-1995
<10 U	<0.05 HU	<5 U	18	<0.5 U	<2.5 U	<1 U	49	140	3SS-854-030 29-nov-1995

See following page for notes

Table A-17. Total metals in soil and rock (mg/kg) collected from Building 854 area. Results recorded by March 20, 2003.

Notes:

\- Indicates no analysis performed for this compound

Val. = Validation code

Footnotes:

a ERD data
b ORAD WGMG data
c Analytical results for this sample are suspect
d Sample collected during hydraulic testing
e Blind sample, sent to lab without location identity
f Sample dilution necessary for analysis; detection limits increased
g Interlaboratory collocated sample
h Intralaboratory collocated sample
i Sample collected as part of pilot study
j Note field may contain important information regarding this sample
k Pre-development sample
l Norm month, norm quarter or norm year inconsistent with sample date
m Confirmation sample
n Sample analyzed after standard holding time
o Sample comprised of partial composite
p Alpha spectroscopy analysis of uranium isotopes
q Gamma spectroscopy analysis of uranium isotopes
r Tritium data represents non-detect with activity calc'd for 100 percent error.

Lab Codes:

CS California Laboratory Services 3249 Fitzgerald Rd. Rancho Cordova, CA 95742
FS FruitGrowers Environmental Lab 2500 Stagecoach Rd., Stockton, CA 95215

Validation Codes:

V Validated
N Not validated (default value)
U Undeclared
H Historical comparison only

CLP flags: (follow result)

B Analyte found in method blank
D Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E The analyte was detected below the LLNL reporting limit, but above the analytical laboratory minimum detection limit.
F Analyte found in field blank, trip blank, or equipment blank
G Quantitated using fuel calibration, but does not match typical fuel fingerprint (fuel maybe gasoline, diesel, motor oil etc.).
H Sample analyzed outside of holding time, sample results should be evaluated
J Analyte was postively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
L Spike accuracy not within control limits
O Duplicate spike or sample precision not within control limits
P Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S Analytical results for this sample are suspect
T Analyte is tentatively identified compound; result is approximate
U Compound was analyzed for, but not detected above detection limit

Table A-18. Fuel hydrocarbons in ground water and surface water (ug/L) collected from the Building 854 area. Results recorded by April 22, 2003.

O&G, Gas Fingerprint, TPH-Diesel in ground water
April 23, 2003
gemini1

gas-oil-dsl.23apr2003

Table A-18. Fuel hydrocarbons in ground water and surface water (ug/L) collected from the Building 854 area. Results recorded by April 22, 2003.

Location Date	Lab	Note	Val.	Oil and Grease	Gasoline Fingerprint	TPH as Diesel	C12 to C25 Hydrocarbons	C25 to C35 Hydrocarbons	Tetra (2-ethylbutoxy) silane
W-854-02									
26-mar-2003	BB	a	V	-	-	-	-	-	<1 U
W-854-10									
20-feb-2003	CN	a	V	-	-	-	-	-	<56 U
26-mar-2003	BB	a	V	-	-	-	-	-	<1 U
W-854-17									
20-feb-2003	CN	a	V	-	-	-	-	-	<50 U
26-mar-2003	BB	a	V	-	-	-	-	-	<1 U
W-854-18A									
19-feb-2003	CN	a	V	-	-	-	-	-	<56 U
26-mar-2003	BB	a	V	-	-	-	-	-	<1 U
W-854-1823									
07-mar-2003	BB	a	V	-	-	-	-	-	1.2
W-854-1902									
07-mar-2003	BB	a	V	-	-	-	-	-	4.3

See following page for notes

Table A-18. Fuel hydrocarbons in ground water and surface water (ug/L) collected from the Building 854 area. Results recorded by April 22, 2003.

Notes:

- Indicates no analysis performed for this compound

Val. = Validation code

Footnotes:

a ERD data
b ORAD WGMG data
c Analytical results for this sample are suspect
d Sample collected during hydraulic testing
e Blind sample, sent to lab without location identity
f Sample dilution necessary for analysis; detection limits increased
g Interlaboratory collocated sample
h Intralaboratory collocated sample
i Sample collected as part of pilot study
j Note field may contain important information regarding this sample
k Pre-development sample
l Norm month, norm quarter or norm year inconsistent with sample date
m Confirmation sample
n Sample analyzed after standard holding time
o Sample comprised of partial composite
p Alpha spectroscopy analysis of uranium isotopes
q Gamma spectroscopy analysis of uranium isotopes
r Tritium data represents non-detect with activity calc'd for 100 percent error.

Lab Codes:

BB	BC Laboratories, Inc.	Bakersfield, CA
CN	Caltest Analytical Laboratory	1885 N. Kelly Rd, Napa, CA 94558

Validation Codes:

V Validated
N Not validated (default value)
U Undeclared
H Historical comparison only

CLP flags: (follow result)

B Analyte found in method blank
D Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E The analyte was detected below the LLNL reporting limit, but above the analytical laboratory minimum detection limit.
F Analyte found in field blank, trip blank, or equipment blank
G Quantitated using fuel calibration, but does not match typical fuel fingerprint (fuel maybe gasoline, diesel, motor oil etc.).
H Sample analyzed outside of holding time, sample results should be evaluated
J Analyte was postively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
L Spike accuracy not within control limits
O Duplicate spike or sample precision not within control limits
P Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S Analytical results for this sample are suspect
T Analyte is tentatively identified compound; result is approximate
U Compound was analyzed for, but not detected above detection limit

Table A-19. Fuel hydrocarbons in soil and rock (ug/L) collected from the Building 854 area. Results recorded by April 22, 2003.

O&G, Gas Fingerprint, TPH-Diesel in soil
April 23, 2003
gemini1

gas-oil-dsl_SO.23apr2003

Table A-19. Fuel hydrocarbons in soil and rock (ug/L) collected from the Building 854 area. Results recorded by April 22, 2003.

Location Date	Lab	Val. Note	Depth (ft)	Oil and Grease	TPH as Diesel	Tetra (2-ethylbutoxy) silane
W-854-01						
21-nov-1995	CS a	V	0.5	120	-	-
21-nov-1995	CS a	V	0.5	-	-	<2 U
21-nov-1995	CS ag	V	5.0	56	-	-
21-nov-1995	CS ag	V	5.0	-	-	<2 U
21-nov-1995	CS ag	V	10.0	62	-	-
21-nov-1995	CS ag	V	10.0	-	-	<2 U
21-nov-1995	CS a	V	20.0	98	-	-
21-nov-1995	CS a	V	20.0	-	-	<2 U
21-nov-1995	CS a	V	22.0	100	-	-
21-nov-1995	CS a	V	22.0	-	-	<2 U
21-nov-1995	CS a	V	25.0	78	-	-
21-nov-1995	CS a	V	25.0	-	-	<2 U
21-nov-1995	CS a	V	40.0	58 LO	-	-
21-nov-1995	CS a	V	40.0	-	-	<2 U
21-nov-1995	CS a	V	40.0	-	-	<2 HULO
W-854-02						
22-jan-1996	CS a	V	0.5	-	-	<2 ULO
22-jan-1996	CS a	V	5.0	-	-	<2 ULO
22-jan-1996	CS a	V	10.0	-	-	<2 ULO
23-jan-1996	CS a	V	20.1	-	-	<2 LOU
23-jan-1996	CS a	V	33.0	-	-	<2 ULO
24-jan-1996	CS a	V	42.0	-	-	<2 ULO
24-jan-1996	CS a	V	52.5	-	-	<2 ULO
24-jan-1996	CS a	V	62.0	-	-	<2 ULO
30-jan-1996	CS a	V	132.0	-	-	<2 U
W-854-03						
14-feb-1996	CS ag	V	0.5	-	<1 LOU	-
14-feb-1996	CS ag	V	5.0	-	<1 ULO	-
14-feb-1996	CS a	V	10.0	-	<1 ULO	-
W-854-04						
28-feb-1996	CS a	V	0.5	-	<1 U	-
W-854-08						
19-jun-1996	CS a	V	11.0	-	<1 U	-
W-854-12						
21-jan-1998	CS a	V	41.8	<50 U	-	-
23-jan-1998	CS a	V	136.1	<50 U	-	-
3SS-854-003						
21-nov-1995	CS a	V	0.0	-	-	<2 U
3SS-854-004						
21-nov-1995	CS a	V	0.0	-	-	<2 U
3SS-854-005						
21-nov-1995	CS a	V	0.0	-	-	<2 U
3SS-854-006						
21-nov-1995	CS a	V	0.0	-	-	<2 U
3SS-854-007						
21-nov-1995	CS a	V	0.0	-	-	<2 U
3SS-854-008						
21-nov-1995	CS a	V	0.0	-	-	<2 U
3SS-854-009						
21-nov-1995	CS a	V	0.0	-	-	<2 U
3SS-854-010						
21-nov-1995	CS a	V	0.0	-	-	<2 U
21-nov-1995	CS a	V	0.0	-	-	<2 HU

Table A-19. Fuel hydrocarbons in soil and rock (ug/L) collected from the Building 854 area. Results recorded by April 22, 2003.

Location Date	Lab	Val. Note	Depth (ft)	Oil and Grease	TPH as Diesel	Tetra (2-ethylbutoxy) silane
3SS-854-011						
22-nov-1995	CS a	V	0.0	-	-	<20 DU
3SS-854-012						
22-nov-1995	CS a	V	0.0	-	-	<2 U
3SS-854-013						
22-nov-1995	CS a	V	0.0	360	-	-
22-nov-1995	CS a	V	0.0	-	-	<20 DU
3SS-854-014						
22-nov-1995	CS a	V	0.0	340	-	-
22-nov-1995	CS a	V	0.0	640	-	-
22-nov-1995	CS a	V	0.0	1800	-	-
22-nov-1995	CS a	V	0.0	-	-	<20 DU
3SS-854-015						
22-nov-1995	CS a	V	0.0	-	-	<2 U
3SS-854-016						
22-nov-1995	CS a	V	0.0	-	-	<2 U
3SS-854-017						
22-nov-1995	CS a	V	0.0	120	-	-
3SS-854-018						
22-nov-1995	CS a	V	0.0	58	-	-
3SS-854-020						
21-nov-1995	CS a	V	0.0	-	-	<2 HU
3SS-854-021						
29-nov-1995	CS a	V	0.0	1000	-	-
3SS-854-022						
22-nov-1995	CS a	V	0.0	110	-	-
3SS-854-023						
22-nov-1995	CS a	V	0.0	-	-	<2 U
3SS-854-024						
22-nov-1995	CS a	V	0.0	-	-	<2 U
3SS-854-027						
29-nov-1995	CS a	V	0.0	1200	-	-
29-nov-1995	CS a	V	0.0	-	-	<200 DU
3SS-854-028						
29-nov-1995	CS a	V	0.0	1200	-	-
29-nov-1995	CS a	V	0.0	-	-	<200 DU
3SS-854-029						
29-nov-1995	CS a	V	0.0	86	-	-
29-nov-1995	CS a	V	0.0	-	-	<20 DU
29-nov-1995	CS a	V	0.0	-	-	<20 DU
3SS-854-030						
29-nov-1995	CS a	V	0.0	2100	-	-
29-nov-1995	CS a	V	0.0	-	-	<200 DU
29-nov-1995	CS a	V	0.0	-	-	<200 DU

See following page for notes

Table A-19. Fuel hydrocarbons in soil and rock (ug/L) collected from the Building 854 area. Results recorded by April 22, 2003.

Notes:

- Indicates no analysis performed for this compound

Val. = Validation code

Footnotes:

a ERD data
b ORAD WGMG data
c Analytical results for this sample are suspect
d Sample collected during hydraulic testing
e Blind sample, sent to lab without location identity
f Sample dilution necessary for analysis; detection limits increased
g Interlaboratory collocated sample
h Intralaboratory collocated sample
i Sample collected as part of pilot study
j Note field may contain important information regarding this sample
k Pre-development sample
l Norm month, norm quarter or norm year inconsistent with sample date
m Confirmation sample
n Sample analyzed after standard holding time
o Sample comprised of partial composite
p Alpha spectroscopy analysis of uranium isotopes
q Gamma spectroscopy analysis of uranium isotopes
r Tritium data represents non-detect with activity calc'd for 100 percent error.

Lab Codes:

CS California Laboratory Services 3249 Fitzgerald Rd. Rancho Cordova, CA 95742

Validation Codes:

V Validated
N Not validated (default value)
U Undeclared
H Historical comparison only

CLP flags: (follow result)

B Analyte found in method blank
D Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E The analyte was detected below the LLNL reporting limit, but above the analytical laboratory minimum detection limit.
F Analyte found in field blank, trip blank, or equipment blank
G Quantitated using fuel calibration, but does not match typical fuel fingerprint (fuel maybe gasoline, diesel, motor oil etc.).
H Sample analyzed outside of holding time, sample results should be evaluated
J Analyte was postively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
L Spike accuracy not within control limits
O Duplicate spike or sample precision not within control limits
P Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S Analytical results for this sample are suspect
T Analyte is tentatively identified compound; result is approximate
U Compound was analyzed for, but not detected above detection limit

Table A-20. Anions, TDS, specific conductivity, and pH in ground water and surface water collected from the Building 854 area. Results recorded by April 22, 2003.

Anions in Ground Water, Site 300
April 23, 2003
gemini1

s3anionsL.23apr2003
s3anionsR.23apr2003

Table A-20. Anions, TDS, specific conductivity, and pH in ground water and surface

Location Date	Lab	Note	Val.	Fluoride (mg/L)	Silica (mg/L)	Nitrate as (NO3) (mg/L)	Chloride (mg/L)	Sulfate (mg/L)
W-854-01								
27-jun-1996	CS	a	V	–	15	–	–	–
27-jun-1996	CS	a	V	73 L	–	<0.5 U	120 D	240 D
30-jul-1998	CS	af	V	–	–	<0.5 DU	–	–
26-aug-1999	BB	a	V	–	–	<0.4 U	–	–
20-mar-2000	CN	a	V	–	–	0.4	–	–
17-may-2000	CN	a	V	–	–	0.2	–	–
08-may-2001	CN	a	V	–	–	0.4 H	–	–
03-jul-2001	CN	a	V	–	–	<0.4 U	–	–
29-nov-2001	CN	a	V	–	–	<0.4 LOU	–	–
28-jan-2002	CN	a	V	–	–	9.9	–	–
28-aug-2002	CN	a	V	–	–	13	–	–
18-dec-2002	CN	a	V	–	–	<0.1 U	–	–
W-854-02								
27-jun-1996	CS	a	V	–	26	–	–	–
27-jun-1996	CS	a	V	0.49 L	–	43	170 D	88 D
30-jul-1998	CS	af	V	–	–	46 D	–	–
13-nov-1998	BB	a	V	–	–	48	–	–
17-feb-1999	BB	a	N	–	–	51	–	–
28-jun-1999	CN	af	V	–	–	<0.5 SU	–	–
04-oct-1999	CN	af	V	–	–	24 DL	–	–
29-mar-2000	CN	a	V	–	–	53 D	–	–
30-jun-2000	CN	af	V	–	–	36 D	–	–
30-aug-2000	CN	af	V	–	–	51 D	–	–
26-mar-2001	BB	a	V	–	–	59.4	–	–
06-jun-2001	SE	af	V	–	–	–	–	–
06-jun-2001	SE	af	V	–	–	55 D	–	–
06-jul-2001	BB	a	V	–	–	59.9	–	–
15-jan-2002	SE	af	N	–	–	–	–	–
15-jan-2002	SE	af	N	–	–	55 D	–	–
14-mar-2002	SE	af	V	–	–	–	–	–
14-mar-2002	SE	af	V	–	–	52 D	–	–
10-apr-2002	SE	af	V	–	–	–	–	–
10-apr-2002	SE	af	V	–	–	52 D	–	–
08-may-2002	SE	af	V	–	–	–	–	–
08-may-2002	SE	af	V	–	–	54 D	–	–
18-jun-2002	SE	af	V	–	–	–	–	–
18-jun-2002	SE	af	V	–	–	50 D	–	–
10-jul-2002	SE	afj	V	–	–	–	–	–
10-jul-2002	SE	afj	V	–	–	49 D	–	–
08-aug-2002	SE	afj	V	–	–	–	–	–
08-aug-2002	SE	afj	V	–	–	56 D	–	–
09-oct-2002	SE	afj	V	–	–	55 D	–	–
W-854-03								
17-sep-1996	CS	a	V	–	57	–	–	–
17-sep-1996	CS	a	V	0.48 L	–	<30 DLOU	230 LO	20 LO
30-jul-1998	CS	afg	V	–	–	39 D	–	–
30-jul-1998	CS	af	V	–	–	38 D	–	–
16-feb-1999	BB	a	V	–	–	43	–	–
28-jun-1999	CN	af	V	–	–	<0.5 SU	–	–
29-sep-1999	CN	af	V	–	–	130 DLS	–	–
01-dec-1999	CN	af	V	–	–	140 DS	–	–
28-feb-2000	BB	afg	V	–	–	40 DL	–	–
28-feb-2000	CN	afg	V	–	–	44	–	–
16-may-2000	CN	af	V	–	–	40 DL	–	–
16-aug-2000	CN	af	V	–	–	44	–	–
26-mar-2001	BB	a	V	–	–	47.8	–	–
06-jun-2001	SE	af	V	–	–	–	–	–
06-jun-2001	SE	af	V	–	–	42 D	–	–
09-jul-2001	CN	af	V	–	–	27 DLO	–	–
06-mar-2002	SE	af	V	–	–	–	–	–
06-mar-2002	SE	af	V	–	–	43 D	–	–
10-apr-2002	SE	af	V	–	–	–	–	–

water collected from the Building 854 area. Results recorded by April 22, 2003.

Carbonate (mg/L)	Bicar-bonate** (mg/L)	TDS (mg/L)	Spec Cond (umhos/cm)	pH	Location Date
					W-854-01
-	-	-	-	-	27-jun-1996
33	110	740	960	8.5	27-jun-1996
-	-	-	-	-	30-jul-1998
-	-	-	-	-	26-aug-1999
-	-	-	-	-	20-mar-2000
-	-	-	-	-	17-may-2000
-	-	-	-	-	08-may-2001
-	-	-	-	-	03-jul-2001
-	-	-	-	-	29-nov-2001
-	-	-	-	-	28-jan-2002
-	-	-	-	-	28-aug-2002
-	-	-	-	-	18-dec-2002
					W-854-02
-	-	-	-	-	27-jun-1996
<1 U	150	630	830	8.2	27-jun-1996
-	-	-	-	-	30-jul-1998
-	-	-	-	-	13-nov-1998
-	-	-	-	-	17-feb-1999
-	-	-	-	-	28-jun-1999
-	-	-	-	-	04-oct-1999
-	-	-	-	-	29-mar-2000
-	-	-	-	-	30-jun-2000
-	-	-	-	-	30-aug-2000
-	-	-	-	-	26-mar-2001
-	-	700	-	-	06-jun-2001
-	-	-	1200	-	06-jun-2001
-	-	-	-	-	06-jul-2001
-	-	680	-	-	15-jan-2002
-	-	-	1100	-	15-jan-2002
-	-	690	-	-	14-mar-2002
-	-	-	1000 L	-	14-mar-2002
-	-	680	-	-	10-apr-2002
-	-	-	1100	-	10-apr-2002
-	-	660	-	-	08-may-2002
-	-	-	1000	-	08-may-2002
-	-	690 L	-	-	18-jun-2002
-	-	-	1000	-	18-jun-2002
-	-	650	-	-	10-jul-2002
-	-	-	1100	-	10-jul-2002
-	-	650	-	-	08-aug-2002
-	-	-	1100	-	08-aug-2002
-	-	-	1100	-	09-oct-2002
					W-854-03
-	-	-	-	-	17-sep-1996
<1 U	240	750	820	7.6	17-sep-1996
-	-	-	-	-	30-jul-1998
-	-	-	-	-	30-jul-1998
-	-	-	-	-	16-feb-1999
-	-	-	-	-	28-jun-1999
-	-	-	-	-	29-sep-1999
-	-	-	-	-	01-dec-1999
-	-	-	-	-	28-feb-2000
-	-	-	-	-	28-feb-2000
-	-	-	-	-	16-may-2000
-	-	-	-	-	16-aug-2000
-	-	-	-	-	26-mar-2001
-	-	730	-	-	06-jun-2001
-	-	-	1300	-	06-jun-2001
-	-	-	-	-	09-jul-2001
-	-	730	-	-	06-mar-2002
-	-	-	1100	-	06-mar-2002
-	-	740	-	-	10-apr-2002

Table A-20. Anions, TDS, specific conductivity, and pH in ground water and surface

Location Date	Lab	Note	Val.	Fluoride (mg/L)	Silica (mg/L)	Nitrate as (NO3) (mg/L)	Chloride (mg/L)	Sulfate (mg/L)
W-854-03 (continued)								
10-apr-2002	SE	af	V	–	–	42 D	–	–
08-may-2002	SE	af	V	–	–	–	–	–
08-may-2002	SE	af	V	–	–	44 D	–	–
18-jun-2002	SE	af	V	–	–	–	–	–
18-jun-2002	SE	af	V	–	–	43 D	–	–
10-jul-2002	SE	afj	V	–	–	–	–	–
10-jul-2002	SE	afj	V	–	–	47 D	–	–
08-aug-2002	SE	afj	V	–	–	–	–	–
08-aug-2002	SE	afj	V	–	–	47 D	–	–
09-oct-2002	SE	afj	V	–	–	45 D	–	–
W-854-04								
16-aug-1996	CS	a	V	–	82	–	–	–
16-aug-1996	CS	a	V	0.72	–	<0.5 U	120 D	370 D
30-jul-1998	CS	af	V	–	–	1 D	–	–
26-aug-1999	BB	a	V	–	–	<0.4 U	–	–
16-may-2000	CN	a	V	–	–	0.4 L	–	–
08-may-2001	CN	a	V	–	–	<0.4 HU	–	–
03-jul-2001	CN	a	V	–	–	<0.4 U	–	–
29-nov-2001	CN	a	V	–	–	<0.4 LOU	–	–
26-feb-2002	CN	a	V	–	–	<0.1 U	–	–
28-aug-2002	CN	a	V	–	–	12	–	–
18-dec-2002	CN	a	V	–	–	<0.1 U	–	–
W-854-05								
16-aug-1996	CS	a	V	–	50	–	–	–
16-aug-1996	CS	a	V	0.38	–	54 D	100 D	29
30-jul-1998	CS	af	V	–	–	59 D	–	–
13-nov-1998	BB	a	V	–	–	55	–	–
26-jan-1999	BB	a	V	–	–	55	–	–
28-jun-1999	CN	af	V	–	–	62 DS	–	–
01-dec-1999	CN	af	V	–	–	96 DS	–	–
29-feb-2000	CN	a	V	–	–	50 D	–	–
16-may-2000	CN	af	V	–	–	46 DL	–	–
09-may-2001	CN	af	V	–	–	14 DH	–	–
03-jul-2001	CN	af	V	–	–	4 D	–	–
29-nov-2001	CN	a	V	–	–	42	–	–
30-jan-2002	CN	af	V	–	–	48 D	–	–
21-jun-2002	CN	af	V	–	–	57 D	–	–
13-aug-2002	CN	af	V	–	–	63 D	–	–
13-dec-2002	CN	a	N	–	–	52 D	–	–
W-854-06								
10-sep-1996	CS	a	V	–	30	–	–	–
10-sep-1996	CS	a	V	0.6	–	<0.5 LOU	120 DLO	110 D
30-jul-1998	CS	af	V	–	–	<0.5 DU	–	–
01-sep-1999	BB	a	V	–	–	<0.4 U	–	–
20-mar-2000	CN	a	V	–	–	0.3	–	–
17-may-2000	BB	ag	V	–	–	<0.44 U	–	–
17-may-2000	CN	ag	V	–	–	0.5	–	–
09-may-2001	CN	a	V	–	–	<0.4 HU	–	–
03-jul-2001	CN	ah	V	–	–	<0.4 U	–	–
03-jul-2001	CN	aeh	V	–	–	<0.4 U	–	–
13-dec-2001	CN	a	V	–	–	<0.4 U	–	–
26-feb-2002	CN	a	V	–	–	6.8	–	–
21-jun-2002	CN	a	V	–	–	4	–	–
10-sep-2002	CN	aeh	V	–	–	4.6	–	–
10-sep-2002	CN	ah	V	–	–	4.8	–	–
19-dec-2002	BB	ag	V	–	–	<0.44 U	–	–
19-dec-2002	CN	a	V	–	–	<0.1 U	–	–
W-854-07								
10-sep-1996	CS	a	V	–	31	–	–	–
10-sep-1996	CS	a	V	0.33	–	33 LO	190 DLO	90 D
24-sep-1999	BB	a	V	–	–	42	–	–

water collected from the Building 854 area. Results recorded by April 22, 2003.

Carbonate (mg/L)	Bicar-bonate** (mg/L)	TDS (mg/L)	Spec Cond (umhos/cm)	pH	Location Date
					(continued) W-854-03
-	-	-	1100	-	10-apr-2002
-	-	710	-	-	08-may-2002
-	-	-	1100	-	08-may-2002
-	-	750 L	-	-	18-jun-2002
-	-	-	1100	-	18-jun-2002
-	-	720	-	-	10-jul-2002
-	-	-	1200	-	10-jul-2002
-	-	700	-	-	08-aug-2002
-	-	-	1100	-	08-aug-2002
-	-	-	1200	-	09-oct-2002
					W-854-04
-	-	-	-	-	16-aug-1996
<1 U	140	1000	1400	11	16-aug-1996
-	-	-	-	-	30-jul-1998
-	-	-	-	-	26-aug-1999
-	-	-	-	-	16-may-2000
-	-	-	-	-	08-may-2001
-	-	-	-	-	03-jul-2001
-	-	-	-	-	29-nov-2001
-	-	-	-	-	26-feb-2002
-	-	-	-	-	28-aug-2002
-	-	-	-	-	18-dec-2002
					W-854-05
-	-	-	-	-	16-aug-1996
<1 U	140	470	700	7.6	16-aug-1996
-	-	-	-	-	30-jul-1998
-	-	-	-	-	13-nov-1998
-	-	-	-	-	26-jan-1999
-	-	-	-	-	28-jun-1999
-	-	-	-	-	01-dec-1999
-	-	-	-	-	29-feb-2000
-	-	-	-	-	16-may-2000
-	-	-	-	-	09-may-2001
-	-	-	-	-	03-jul-2001
-	-	-	-	-	29-nov-2001
-	-	-	-	-	30-jan-2002
-	-	-	-	-	21-jun-2002
-	-	-	-	-	13-aug-2002
-	-	-	-	-	13-dec-2002
					W-854-06
-	-	-	-	-	10-sep-1996
<1 U	360	750	1800	11	10-sep-1996
-	-	-	-	-	30-jul-1998
-	-	-	-	-	01-sep-1999
-	-	-	-	-	20-mar-2000
-	-	-	-	-	17-may-2000
-	-	-	-	-	17-may-2000
-	-	-	-	-	09-may-2001
-	-	-	-	-	03-jul-2001
-	-	-	-	-	03-jul-2001
-	-	-	-	-	13-dec-2001
-	-	-	-	-	26-feb-2002
-	-	-	-	-	21-jun-2002
-	-	-	-	-	10-sep-2002
-	-	-	-	-	10-sep-2002
-	-	-	-	-	19-dec-2002
-	-	-	-	-	19-dec-2002
					W-854-07
-	-	-	-	-	10-sep-1996
<1 U	130	560	680	7.7	10-sep-1996
-	-	-	-	-	24-sep-1999

Table A-20. Anions, TDS, specific conductivity, and pH in ground water and surface

Location Date	Lab	Note	Val.	Fluoride (mg/L)	Silica (mg/L)	Nitrate as (NO3) (mg/L)	Chloride (mg/L)	Sulfate (mg/L)
W-854-07 (continued)								
20-mar-2000	CN	a	V	–	–	38	–	–
17-may-2000	CN	af	V	–	–	38 D	–	–
14-dec-2000	CN	af	V	–	–	22 DL	–	–
11-jun-2001	CN	af	V	–	–	21 DL	–	–
09-jul-2001	BB	ag	V	–	–	43	–	–
09-jul-2001	CN	agf	V	–	–	25 DLO	–	–
13-dec-2001	CN	af	V	–	–	35 D	–	–
29-jan-2002	CN	afh	V	–	–	40 D	–	–
29-jan-2002	CN	aefh	V	–	–	39 D	–	–
20-jun-2002	CN	a	V	–	–	41	–	–
13-aug-2002	CN	af	V	–	–	40 D	–	–
19-dec-2002	CN	af	V	–	–	36 D	–	–
W-854-08								
10-sep-1996	CS	a	V	–	55	–	–	–
10-sep-1996	CS	a	V	0.41	–	180 DLO	490 DLO	23
13-dec-1996	CS	a	V	–	57	–	–	–
13-dec-1996	CS	a	V	0.38	–	62 D	160 DLO	25 LO
31-jul-1998	BB	ag	V	–	–	81	–	–
13-nov-1998	BB	a	V	–	–	69	–	–
26-jan-1999	BB	aeh	V	–	–	64	–	–
26-jan-1999	BB	ah	V	–	–	65	–	–
28-jun-1999	CN	a	V	–	–	<0.5 SU	–	–
01-dec-1999	CN	af	V	–	–	48 DS	–	–
28-feb-2000	CN	af	V	–	–	57 D	–	–
08-may-2001	CN	af	V	–	–	10 DH	–	–
10-jul-2001	CN	af	V	–	–	11 D	–	–
21-jun-2002	CN	af	V	–	–	53 D	–	–
10-sep-2002	CN	af	V	–	–	48 D	–	–
W-854-09								
31-jul-1998	BB	ag	V	–	–	42	–	–
05-mar-1999	BB	a	N	–	–	40	–	–
28-jun-1999	CN	aeh	V	–	–	<0.5 SU	–	–
28-jun-1999	CN	ah	V	–	–	<0.5 SU	–	–
24-sep-1999	CN	af	V	–	–	47 DL	–	–
07-dec-1999	CN	af	V	–	–	38 D	–	–
20-mar-2000	CN	a	V	–	–	38	–	–
17-may-2000	CN	af	V	–	–	36 D	–	–
09-may-2001	CN	af	V	–	–	9 DH	–	–
05-jul-2001	CN	af	V	–	<1 U	–	–	–
05-jul-2001	CN	af	V	1.1	–	34	52 D	30 D
13-dec-2001	CN	af	V	–	<1 U	–	–	–
13-dec-2001	CN	af	V	1	–	41	60 D	40 D
07-jun-2002	CN	af	V	–	–	56 DH	–	–
10-sep-2002	CN	af	V	–	–	50 D	–	–
W-854-10								
06-feb-1997	CS	a	V	–	73 D	–	–	–
06-feb-1997	CS	a	V	0.29	–	3.5	100 D	220 D
17-aug-1998	BB	ag	N	–	–	5.9	–	–
28-jun-1999	CN	a	V	–	–	<0.5 SU	–	–
24-sep-1999	BB	a	V	–	–	12	–	–
29-feb-2000	CN	aeh	V	–	–	9.2	–	–
29-feb-2000	CN	ah	V	–	–	9.5	–	–
17-may-2000	CN	a	V	–	–	9	–	–
09-may-2001	BB	ag	V	–	–	5.14	–	–
09-may-2001	CN	afg	V	–	–	1.4 DH	–	–
05-jul-2001	CN	a	V	–	–	4.4	–	–
29-nov-2001	CN	a	V	–	–	3.9	–	–
29-jan-2002	CN	a	V	–	–	7.4	–	–
07-jun-2002	CN	a	V	–	–	26 H	–	–
10-sep-2002	CN	a	V	–	–	23	–	–
13-dec-2002	CN	ah	N	–	–	10	–	–
13-dec-2002	CN	aeh	N	–	–	9	–	–

water collected from the Building 854 area. Results recorded by April 22, 2003.

Carbonate (mg/L)	Bicar-bonate** (mg/L)	TDS (mg/L)	Spec Cond (umhos/cm)	pH	Location Date
					(continued) W-854-07
-	-	-	-	-	20-mar-2000
-	-	-	-	-	17-may-2000
-	-	-	-	-	14-dec-2000
-	-	-	-	-	11-jun-2001
-	-	-	-	-	09-jul-2001
-	-	-	-	-	09-jul-2001
-	-	-	-	-	13-dec-2001
-	-	-	-	-	29-jan-2002
-	-	-	-	-	29-jan-2002
-	-	-	-	-	20-jun-2002
-	-	-	-	-	13-aug-2002
-	-	-	-	-	19-dec-2002
					W-854-08
-	-	-	-	-	10-sep-1996
<1 U	200	690	880	7.6	10-sep-1996
-	-	-	-	-	13-dec-1996
<1 U	180	660	1100	7.6	13-dec-1996
-	-	-	-	-	31-jul-1998
-	-	-	-	-	13-nov-1998
-	-	-	-	-	26-jan-1999
-	-	-	-	-	26-jan-1999
-	-	-	-	-	28-jun-1999
-	-	-	-	-	01-dec-1999
-	-	-	-	-	28-feb-2000
-	-	-	-	-	08-may-2001
-	-	-	-	-	10-jul-2001
-	-	-	-	-	21-jun-2002
-	-	-	-	-	10-sep-2002
					W-854-09
-	-	-	-	-	31-jul-1998
-	-	-	-	-	05-mar-1999
-	-	-	-	-	28-jun-1999
-	-	-	-	-	28-jun-1999
-	-	-	-	-	24-sep-1999
-	-	-	-	-	07-dec-1999
-	-	-	-	-	20-mar-2000
-	-	-	-	-	17-may-2000
-	-	-	-	-	09-may-2001
-	-	-	-	-	05-jul-2001
<1 HU	200 H	420 DH	750 H	8.1	05-jul-2001
-	-	-	-	-	13-dec-2001
-	-	220 DH	770 DH	8.1	13-dec-2001
-	-	-	-	-	07-jun-2002
-	-	-	-	-	10-sep-2002
					W-854-10
-	-	-	-	-	06-feb-1997
<1 U	260	760	1200	7.8	06-feb-1997
-	-	-	-	-	17-aug-1998
-	-	-	-	-	28-jun-1999
-	-	-	-	-	24-sep-1999
-	-	-	-	-	29-feb-2000
-	-	-	-	-	29-feb-2000
-	-	-	-	-	17-may-2000
-	-	-	-	-	09-may-2001
-	-	-	-	-	09-may-2001
-	-	-	-	-	05-jul-2001
-	-	-	-	-	29-nov-2001
-	-	-	-	-	29-jan-2002
-	-	-	-	-	07-jun-2002
-	-	-	-	-	10-sep-2002
-	-	-	-	-	13-dec-2002
-	-	-	-	-	13-dec-2002

Table A-20. Anions, TDS, specific conductivity, and pH in ground water and surface

Location Date	Lab	Note	Val.	Fluoride (mg/L)	Silica (mg/L)	Nitrate as (NO3) (mg/L)	Chloride (mg/L)	Sulfate (mg/L)
W-854-11								
19-feb-1997	CS	a	V	-	24	-	-	-
19-feb-1997	CS	a	V	0.51	-	44 L	160 DLO	42 D
17-aug-1998	BB	ag	N	-	-	41	-	-
13-nov-1998	BB	a	V	-	-	43	-	-
17-feb-1999	BB	a	N	-	-	58	-	-
28-jun-1999	BB	ag	V	-	-	<0.4 U	-	-
28-jun-1999	CN	ag	V	-	-	<0.5 SU	-	-
24-sep-1999	CN	af	V	-	-	160 DL	-	-
02-dec-1999	CN	af	V	-	-	55 D	-	-
29-feb-2000	CN	a	V	-	-	54 D	-	-
10-may-2001	CN	af	V	-	-	14 DH	-	-
W-854-13								
22-mar-1999	CS	af	N	0.76	-	<0.5 U	87 D	110 D
25-may-1999	CN	a	V	-	-	<0.5 SU	-	-
26-aug-1999	CN	a	V	-	-	<0.5 SU	-	-
02-dec-1999	CN	af	V	-	-	<0.5 DU	-	-
28-feb-2000	CN	a	V	-	-	1.2	-	-
16-may-2000	CN	a	V	-	-	1.3 L	-	-
08-may-2001	CN	a	V	-	-	<0.4 HU	-	-
03-jul-2001	CN	a	V	-	-	0.6	-	-
13-dec-2001	BB	a	V	-	-	0.73	-	-
28-jan-2002	CN	a	V	-	-	12	-	-
28-aug-2002	BB	a	V	-	-	0.82	-	-
17-dec-2002	CN	a	N	-	-	0.9	-	-
W-854-14								
31-mar-1999	BB	a	V	0.41	-	21	48	55
24-may-1999	CN	af	V	-	-	180 DS	-	-
01-sep-1999	CN	a	V	-	-	<0.5 SU	-	-
07-dec-1999	CN	afh	V	-	-	200 D	-	-
07-dec-1999	CN	aefh	V	-	-	200 D	-	-
28-feb-2000	CN	af	V	-	-	190 D	-	-
17-may-2000	CN	af	V	-	-	150 D	-	-
08-may-2001	CN	af	V	-	-	52 DH	-	-
05-jul-2001	CN	af	V	-	-	160 D	-	-
W-854-15								
29-jun-2000	CN	af	V	0.4	-	0.7	230	370 D
09-may-2001	CN	af	V	-	-	1.6 DH	-	-
06-jul-2001	BB	a	V	-	-	6.43	-	-
14-dec-2001	CN	a	V	-	-	6.2	-	-
29-jan-2002	CN	a	V	-	-	7	-	-
20-jun-2002	CN	a	V	-	-	13	-	-
10-sep-2002	CN	a	V	-	-	12	-	-
17-dec-2002	CN	a	N	-	-	8.4	-	-
W-854-17								
30-jun-2000	CN	af	V	0.4	-	8.9	170	220 D
29-aug-2000	CN	af	V	0.46	-	4.9	150 D	320 D
09-may-2001	BB	ag	V	-	-	0.82	-	-
09-may-2001	CN	ag	V	-	-	0.7 H	-	-
05-jul-2001	CN	a	V	-	-	1.7	-	-
14-dec-2001	CN	a	V	-	-	0.7	-	-
29-jan-2002	CN	aeh	V	-	-	<0.1 U	-	-
29-jan-2002	CN	ah	V	-	-	<0.1 U	-	-
07-jun-2002	BB	aefg	V	-	-	<0.88 DU	-	-
07-jun-2002	CN	ag	V	-	-	11 H	-	-
10-sep-2002	BB	ag	V	-	-	1.3	-	-
10-sep-2002	CN	ag	V	-	-	0.4	-	-
17-dec-2002	CN	aeh	N	-	-	0.9	-	-
17-dec-2002	CN	ah	N	-	-	0.9	-	-

water collected from the Building 854 area. Results recorded by April 22, 2003.

Carbonate (mg/L)	Bicar-bonate** (mg/L)	TDS (mg/L)	Spec Cond (umhos/cm)	pH	Location Date
					W-854-11
-	-	-	-	-	19-feb-1997
<1 U	160	600	970	7.9	19-feb-1997
-	-	-	-	-	17-aug-1998
-	-	-	-	-	13-nov-1998
-	-	-	-	-	17-feb-1999
-	-	-	-	-	28-jun-1999
-	-	-	-	-	28-jun-1999
-	-	-	-	-	24-sep-1999
-	-	-	-	-	02-dec-1999
-	-	-	-	-	29-feb-2000
-	-	-	-	-	10-may-2001
					W-854-13
<1 U	210	520	750	8.2	22-mar-1999
-	-	-	-	-	25-may-1999
-	-	-	-	-	26-aug-1999
-	-	-	-	-	02-dec-1999
-	-	-	-	-	28-feb-2000
-	-	-	-	-	16-may-2000
-	-	-	-	-	08-may-2001
-	-	-	-	-	03-jul-2001
-	-	-	-	-	13-dec-2001
-	-	-	-	-	28-jan-2002
-	-	-	-	-	28-aug-2002
-	-	-	-	-	17-dec-2002
					W-854-14
<5 U	336	760	1140	7.55	31-mar-1999
-	-	-	-	-	24-may-1999
-	-	-	-	-	01-sep-1999
-	-	-	-	-	07-dec-1999
-	-	-	-	-	07-dec-1999
-	-	-	-	-	28-feb-2000
-	-	-	-	-	17-may-2000
-	-	-	-	-	08-may-2001
-	-	-	-	-	05-jul-2001
					W-854-15
<1 U	243	1300	1700	7.6	29-jun-2000
-	-	-	-	-	09-may-2001
-	-	-	-	-	06-jul-2001
-	-	-	-	-	14-dec-2001
-	-	-	-	-	29-jan-2002
-	-	-	-	-	20-jun-2002
-	-	-	-	-	10-sep-2002
-	-	-	-	-	17-dec-2002
					W-854-17
<1 U	180	980	1400	8	30-jun-2000
<1 U	160	1100 D	1500	7.9	29-aug-2000
-	-	-	-	-	09-may-2001
-	-	-	-	-	09-may-2001
-	-	-	-	-	05-jul-2001
-	-	-	-	-	14-dec-2001
-	-	-	-	-	29-jan-2002
-	-	-	-	-	29-jan-2002
-	-	-	-	-	07-jun-2002
-	-	-	-	-	07-jun-2002
-	-	-	-	-	10-sep-2002
-	-	-	-	-	10-sep-2002
-	-	-	-	-	17-dec-2002
-	-	-	-	-	17-dec-2002

Table A-20. Anions, TDS, specific conductivity, and pH in ground water and surface

Location Date	Lab	Note	Val.	Fluoride (mg/L)	Silica (mg/L)	Nitrate as (NO3) (mg/L)	Chloride (mg/L)	Sulfate (mg/L)
W-854-18A								
30-jun-2000	CN	af	V	0.3	-	11	61	22
10-may-2001	CN	af	V	-	-	4 DH	-	-
05-jul-2001	CN	a	V	-	-	14	-	-
13-dec-2001	CN	ah	V	-	-	16	-	-
13-dec-2001	CN	aeh	V	-	-	17	-	-
28-jan-2002	CN	a	V	-	-	29	-	-
28-aug-2002	CN	a	V	-	-	37	-	-
17-dec-2002	CN	a	N	-	-	17 D	-	-
W-854-45								
10-jul-2001	CN	af	V	-	<0.2 U	-	-	-
10-jul-2001	CN	af	V	0.34 L	-	19	140 DL	320 DL
14-dec-2001	CN	af	V	-	66	-	-	-
14-dec-2001	CN	af	V	-	-	26 D	-	-
28-jan-2002	CN	a	V	-	57	-	-	-
28-jan-2002	CN	a	V	-	-	37	-	-
07-jun-2002	CN	a	V	-	-	30 H	-	-
13-aug-2002	CN	a	V	-	-	39	-	-
18-dec-2002	CN	af	V	-	-	16 D	-	-
W-854-1701								
11-jul-2001	CN	af	V	-	<0.2 U	-	-	-
11-jul-2001	CN	af	V	0.44	-	<0.4 U	120 DL	290 D
26-feb-2002	CN	a	V	-	-	12	-	-
21-jun-2002	CN	a	V	-	-	<0.1 U	-	-
10-sep-2002	CN	a	V	-	-	13	-	-
W-854-1707								
09-jul-2001	CN	af	V	-	0.5	-	-	-
09-jul-2001	CN	af	V	0.2	-	<0.4 LOU	81 D	260 D
12-dec-2001	CN	a	V	-	-	0.5	-	-
30-jan-2002	CN	a	V	-	-	3.6	-	-
21-jun-2002	CN	a	V	-	-	8	-	-
10-sep-2002	CN	a	V	-	-	16	-	-
W-854-1731								
27-sep-2002	CN	af	V	0.59	-	14	240 D	320 D
W-854-1822								
11-mar-2003	CN	a	N	0.8	-	4.4	300 D	160 D
W-854-1823								
07-mar-2003	BB	a	V	-	-	28.7	-	-
20-mar-2003	CN	a	N	0.56	-	29	280 D	28
W-854-1902								
07-mar-2003	BB	a	V	-	-	16.8	-	-
20-mar-2003	CN	a	N	0.84	-	12	140 D	120 D
WELL13								
09-aug-1990	BC	a	U	-	-	-	140 P	250 P
21-oct-1991	BC	ag	U	-	-	-	130 P	1100 P
21-oct-1991	BC	ag	U	-	34 P	-	-	-
29-feb-1996	CS	a	V	0.25	-	5.3	150 LO	950 D
SPRING10								
19-nov-1991	BC	a	U	-	-	-	140 P	110 P
28-apr-1994	CS	a	V	0.7	-	<22.15 DU	140 D	110 D
SPRING11								
14-nov-1991	BC	a	U	-	-	-	280 P	290 P
22-sep-1993	CS	a	V	0.81	-	2.3922	330	330
22-sep-1993	CS	a	V	-	54	-	-	-
28-apr-1994	CS	a	V	0.74	-	<22.15 DU	390 D	300 D
21-jun-2002	CN	a	V	-	-	<0.1 U	-	-

water collected from the Building 854 area. Results recorded by April 22, 2003.

Carbonate (mg/L)	Bicar-bonate** (mg/L)	TDS (mg/L)	Spec Cond (umhos/cm)	pH	Location Date
					W-854-18A
70	290	420	690	9.6	30-jun-2000
-	-	-	-	-	10-may-2001
-	-	-	-	-	05-jul-2001
-	-	-	-	-	13-dec-2001
-	-	-	-	-	13-dec-2001
-	-	-	-	-	28-jan-2002
-	-	-	-	-	28-aug-2002
-	-	-	-	-	17-dec-2002
					W-854-45
-	-	-	-	-	10-jul-2001
<1 HU	260 H	1400 H	2000 H	7.9 H	10-jul-2001
-	-	-	-	-	14-dec-2001
-	-	-	-	-	14-dec-2001
-	-	-	-	-	28-jan-2002
-	-	-	-	-	28-jan-2002
-	-	-	-	-	07-jun-2002
-	-	-	-	-	13-aug-2002
-	-	-	-	-	18-dec-2002
					W-854-1701
-	-	-	-	-	11-jul-2001
<1 U	140	910	1400 H	8.1	11-jul-2001
-	-	-	-	-	26-feb-2002
-	-	-	-	-	21-jun-2002
-	-	-	-	-	10-sep-2002
					W-854-1707
-	-	-	-	-	09-jul-2001
<1 HU	150 H	990	1200 H	7.4	09-jul-2001
-	-	-	-	-	12-dec-2001
-	-	-	-	-	30-jan-2002
-	-	-	-	-	21-jun-2002
-	-	-	-	-	10-sep-2002
					W-854-1731
<1 HU	190 H	1100 H	1700 H	7.8 H	27-sep-2002
					W-854-1822
<1 HU	90 H	790	1300 H	8.2	11-mar-2003
					W-854-1823
-	-	-	-	-	07-mar-2003
<1 HU	190 H	700 H	1200 H	7.8	20-mar-2003
					W-854-1902
-	-	-	-	-	07-mar-2003
<1 HU	120 H	600 H	980 H	8.8	20-mar-2003
					WELL13
<1 P	88 P	670 P	890 P	7.4 P	09-aug-1990
<1 P	250 P	1900 P	2450 P	7.2 P	21-oct-1991
-	-	-	-	-	21-oct-1991
<1 U	240	1800	2100	6.8	29-feb-1996
					SPRING10
<1 P	140 P	580 P	800 P	8.3 P	19-nov-1991
<1 U	160	570	840	7.8	28-apr-1994
					SPRING11
<1 P	260 P	1200 P	1770 P	8.1 P	14-nov-1991
<1 U	530	1500	2100	8.1	22-sep-1993
-	-	-	-	-	22-sep-1993
<1 U	370	1400	2000	8	28-apr-1994
-	-	-	-	-	21-jun-2002

Table A-20. Anions, TDS, specific conductivity, and pH in ground water and surface

Location Date	Lab	Note	Val.	Fluoride (mg/L)	Silica (mg/L)	Nitrate as (NO3) (mg/L)	Chloride (mg/L)	Sulfate (mg/L)
SPRING16								
19-nov-1991	BC	a	U	-	-	-	170 P	270 P
22-sep-1993	CS	a	V	0.66	-	8.6	160	240
22-sep-1993	CS	a	V	-	68	-	-	-
16-may-1994	CS	a	V	0.62	-	4600 D	150 D	250 D

water collected from the Building 854 area. Results recorded by April 22, 2003.

Carbonate (mg/L)	Bicar-bonate** (mg/L)	TDS (mg/L)	Spec Cond (umhos/cm)	pH	Location Date
					SPRING16
<1 P	220 P	930 P	1260 P	8.1 P	19-nov-1991
<1 U	240	930	1200	8.4	22-sep-1993
-	-	-	-	-	22-sep-1993
<1 U	66	930	1300	8.1	16-may-1994

See following page for notes

Table A-20. Anions, TDS, specific conductivity, and pH in ground water and surface water collected from the Building 854 area. Results recorded by April 22, 2003.

Notes:

- Indicates no analysis performed for this compound

Val. = Validation code

Footnotes:

a ERD data
b ORAD WGMG data
c Analytical results for this sample are suspect
d Sample collected during hydraulic testing
e Blind sample, sent to lab without location identity
f Sample dilution necessary for analysis; detection limits increased
g Interlaboratory collocated sample
h Intralaboratory collocated sample
i Sample collected as part of pilot study
j Note field may contain important information regarding this sample
k Pre-development sample
l Norm month, norm quarter or norm year inconsistent with sample date
m Confirmation sample
n Sample analyzed after standard holding time
o Sample comprised of partial composite
p Alpha spectroscopy analysis of uranium isotopes
q Gamma spectroscopy analysis of uranium isotopes
r Tritium data represents non-detect with activity calc'd for 100 percent error.

Lab Codes:

BB	BC Laboratories, Inc.	Bakersfield, CA
BC	Brown & Caldwell Emeryville	
CN	Caltest Analytical Laboratory	1885 N. Kelly Rd, Napa, CA 94558
CS	California Laboratory Services	3249 Fitzgerald Rd. Rancho Cordova, CA 95742
SE	Sequoia Analytical	1551 Industrial Road, San Carlos, CA 94070

Validation Codes:

V Validated
N Not validated (default value)
U Undeclared
H Historical comparison only

CLP flags: (follow result)

B Analyte found in method blank
D Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E The analyte was detected below the LLNL reporting limit, but above the analytical laboratory minimum detection limit.
F Analyte found in field blank, trip blank, or equipment blank
G Quantitated using fuel calibration, but does not match typical fuel fingerprint (fuel maybe gasoline, diesel, motor oil etc.).
H Sample analyzed outside of holding time, sample results should be evaluated
J Analyte was postively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
L Spike accuracy not within control limits
O Duplicate spike or sample precision not within control limits
P Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S Analytical results for this sample are suspect
T Analyte is tentatively identified compound; result is approximate
U Compound was analyzed for, but not detected above detection limit

Table A-21. Cations in ground water and surface water (mg/L) collected from the Building 854 area. Results recorded by April 22, 2003.

Site 300 Cations Report
April 23, 2003
gemini1

s3cationL.23apr2003
s3cationR.23apr2003

Table A-21. Cations in ground water and surface water (mg/L) collected from the Building

Location Date	Lab	Note	Val.	Sodium	Potassium	Calcium	Magnesium	Iron
W-854-01								
27-jun-1996	CS	a	V	230	13	27	<0.5 U	1.1
W-854-02								
27-jun-1996	CS	a	V	140	7.6	40	21	0.14
W-854-03								
17-sep-1996	CS	a	V	180 L	7.8	45 D	26	<0.1 U
W-854-04								
16-aug-1996	CS	a	V	320 L	15	24	<0.5 U	0.14
W-854-05								
16-aug-1996	CS	a	V	87 L	6.8	43	19	<0.1 U
W-854-06								
10-sep-1996	CS	a	V	230 LO	44	9.2	<0.5 U	<0.1 U
W-854-07								
10-sep-1996	CS	a	V	85 LO	8.4	54	35	<0.1 U
W-854-08								
10-sep-1996	CS	a	V	180 LO	6.9	33	22	<0.1 U
13-dec-1996	CS	a	V	-	6	25	18	<0.1 U
W-854-09								
05-jul-2001	CN	af	V	94	8	24	16	<0.1 U
13-dec-2001	CN	af	V	98 HL	11 HL	36 H	17 H	24 H
W-854-10								
06-feb-1997	CS	a	V	140 LO	8.8	51 LO	46	<0.1 U
W-854-11								
19-feb-1997	CS	a	V	130 LO	7.5	33	21 O	0.16
W-854-13								
22-mar-1999	CS	af	N	160	5.2	19	6.8	0.65
W-854-14								
31-mar-1999	BB	a	V	161	7.3	57	19	<0.05 U
W-854-15								
29-jun-2000	CN	af	V	230 D	27	77 L	24	0.8
W-854-17								
30-jun-2000	CN	af	V	180 D	16 L	68	45	<0.1 U
29-aug-2000	CN	af	V	190 D	18	82	56	26
W-854-18A								
30-jun-2000	CN	af	V	130 D	25 L	9.7	1.6	<0.1 U
W-854-45								
10-jul-2001	CN	af	V	200 D	21	160 D	42	<0.1 U
W-854-1701								
11-jul-2001	CN	af	V	210 D	11	44	5.6	<0.1 U
W-854-1707								
09-jul-2001	CN	af	V	240 D	10 L	22	9.4	0.3
W-854-1731								
27-sep-2002	CN	af	V	220 D	15 L	98	19	<0.1 U
W-854-1822								
11-mar-2003	CN	a	N	200 LD	14 L	53	18	0.2

854 area. Results recorded by April 22, 2003.

Manganese	Copper	Zinc	Boron	Strontium	Aluminum	Location Date
						W-854-01
<0.03 U	0.53	<0.05 U	-	-	<0.2 U	27-jun-1996
						W-854-02
<0.03 U	<0.05 U	<0.05 U	-	-	0.38	27-jun-1996
						W-854-03
<0.03 U	<0.05 U	<0.05 U	-	-	<0.2 U	17-sep-1996
						W-854-04
<0.03 U	<0.05 U	<0.05 U	-	-	0.21	16-aug-1996
						W-854-05
<0.03 U	<0.05 U	<0.05 U	-	-	<0.2 U	16-aug-1996
						W-854-06
<0.03 U	<0.05 U	<0.05 U	-	-	0.51	10-sep-1996
						W-854-07
<0.03 U	<0.05 U	<0.05 U	-	-	<0.2 U	10-sep-1996
						W-854-08
<0.03 U	<0.05 U	<0.05 U	-	-	<0.2 U	10-sep-1996
<0.03 U	<0.05 U	<0.05 U	-	-	<0.2 U	13-dec-1996
						W-854-09
<0.03 U	<0.05 U	<0.05 U	-	-	<0.2 U	05-jul-2001
0.24 H	<0.05 HU	0.07 H	-	-	21 H	13-dec-2001
						W-854-10
<0.03 U	<0.05 U	<0.05 U	-	-	<0.2 U	06-feb-1997
						W-854-11
<0.03 U	<0.05 U	0.13	-	-	0.23	19-feb-1997
						W-854-13
<0.03 U	<0.05 U	<0.05 U	-	-	0.88	22-mar-1999
						W-854-14
<0.01 U	<0.01 U	<0.01 U	-	-	<0.05 U	31-mar-1999
						W-854-15
<0.03 LU	<0.05 U	<0.05 LU	-	-	0.9	29-jun-2000
						W-854-17
<0.03 U	<0.05 U	<0.05 U	-	-	<0.2 U	30-jun-2000
0.33	<0.05 U	0.13	-	-	18	29-aug-2000
						W-854-18A
<0.03 U	<0.05 U	<0.05 U	-	-	<0.2 U	30-jun-2000
						W-854-45
<0.03 U	<0.05 U	<0.05 U	-	-	<0.2 U	10-jul-2001
						W-854-1701
<0.03 U	<0.05 U	<0.05 U	-	-	<0.2 U	11-jul-2001
						W-854-1707
0.45	<0.05 U	<0.05 U	-	-	0.2	09-jul-2001
						W-854-1731
<0.03 U	<0.05 U	<0.05 U	-	-	<0.2 U	27-sep-2002
						W-854-1822
<0.03 U	<0.05 U	<0.05 U	-	-	0.4	11-mar-2003

Table A-21. Cations in ground water and surface water (mg/L) collected from the Building

Location Date	Lab	Note	Val.	Sodium	Potassium	Calcium	Magnesium	Iron
W-854-1823								
20-mar-2003	CN	a	N	160 D	16 L	49	24	<0.1 U
W-854-1902								
20-mar-2003	CN	a	N	150 D	16 L	30	4.7	<0.1 U
WELL13								
09-aug-1990	BC	a	U	120 P	7 P	47 P	19 P	<0.1 P
21-oct-1991	BC	ag	U	250 P	12 P	280 P	75 P	<0.1 P
20-jun-1994	IC	a	V	-	-	-	-	-
29-feb-1996	CS	a	V	230	9.2	220	65	0.23
SPRING10								
19-nov-1991	BC	a	U	110 P	6 P	30 P	22 P	<0.1 P
28-apr-1994	CS	a	V	130	6.6	35	22	<0.1 U
SPRING11								
14-nov-1991	BC	a	U	280 P	8 P	100 P	25 P	<0.1 P
22-sep-1993	CS	a	V	380	7.1	120	34	<0.1 U
28-apr-1994	CS	a	V	340	7.3	110	37	<0.1 U
SPRING16								
19-nov-1991	BC	a	U	140 P	7 P	82 P	38 P	<0.1 P
22-sep-1993	CS	a	V	170	7.1	81	38	<0.1 U
16-may-1994	CS	a	V	160	5.9	85	38	<0.1 U

854 area. Results recorded by April 22, 2003.

Manganese	Copper	Zinc	Boron	Strontium	Aluminum	Location Date
						W-854-1823
<0.03 U	<0.05 U	<0.05 U	-	-	<0.2 U	20-mar-2003
						W-854-1902
<0.03 U	<0.05 U	<0.05 U	-	-	<0.2 U	20-mar-2003
						WELL13
<0.04 P	<0.05 P	<0.05 P	-	-	-	09-aug-1990
0.87 P	<0.05 P	<0.05 P	-	-	-	21-oct-1991
-	0.0064	0.0066	-	-	-	20-jun-1994
0.61	<0.05 U	<0.05 U	-	-	<0.2 U	29-feb-1996
						SPRING10
<0.05 P	<0.05 P	<0.05 P	-	-	-	19-nov-1991
<0.03 U	<0.05 U	<0.05 U	-	-	<0.2 U	28-apr-1994
						SPRING11
<0.05 P	<0.05 P	<0.05 P	-	-	-	14-nov-1991
<0.03 U	<0.05 U	<0.05 U	-	-	<0.2 U	22-sep-1993
<0.03 U	<0.05 U	<0.05 U	-	-	<0.2 U	28-apr-1994
						SPRING16
<0.05 P	<0.05 P	<0.05 P	-	-	-	19-nov-1991
<0.03 U	<0.05 U	<0.05 U	-	-	<0.2 U	22-sep-1993
<0.03 U	<0.05 U	<0.05 U	-	-	<0.2 U	16-may-1994

See following page for notes

Table A-21. Cations in ground water and surface water (mg/L) collected from the Building 854 area. Results recorded by April 22, 2003.

Notes:

- Indicates no analysis performed for this compound

Val. = Validation

Footnotes:

a ERD data
b ORAD WGMG data
c Analytical results for this sample are suspect
d Sample collected during hydraulic testing
e Blind sample, sent to lab without location identity
f Sample dilution necessary for analysis; detection limits increased
g Interlaboratory collocated sample
h Intralaboratory collocated sample
i Sample collected as part of pilot study
j Note field may contain important information regarding this sample
k Pre-development sample
l Norm month, norm quarter or norm year inconsistent with sample date
m Confirmation sample
n Sample analyzed after standard holding time
o Sample comprised of partial composite
p Alpha spectroscopy analysis of uranium isotopes
q Gamma spectroscopy analysis of uranium isotopes
r Tritium data represents non-detect with activity calc'd for 100 percent error.

Lab Codes:

BB	BC Laboratories, Inc.	Bakersfield, CA
BC	Brown & Caldwell Emeryville	
CN	Caltest Analytical Laboratory	1885 N. Kelly Rd, Napa, CA 94558
CS	California Laboratory Services	3249 Fitzgerald Rd. Rancho Cordova, CA 95742
IC	ICP MS Facility	

Validation Codes:

V Validated
N Not validated (default value)
U Undeclared
H Historical comparison only

CLP flags: (follow result)

B Analyte found in method blank
D Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E The analyte was detected below the LLNL reporting limit, but above the analytical laboratory minimum detection limit.
F Analyte found in field blank, trip blank, or equipment blank
G Quantitated using fuel calibration, but does not match typical fuel fingerprint (fuel maybe gasoline, diesel, motor oil etc.).
H Sample analyzed outside of holding time, sample results should be evaluated
J Analyte was postively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
L Spike accuracy not within control limits
O Duplicate spike or sample precision not within control limits
P Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S Analytical results for this sample are suspect
T Analyte is tentatively identified compound; result is approximate
U Compound was analyzed for, but not detected above detection limit

Table A-22. PCBs in ground water and surface water (ug/L) collected from the Building 854 area. Results recorded by March 20, 2003.

PCBs in Ground Water, Site 300
March 24, 2003
gemini2

s3pcbL.24mar2003
s3pcbR.24mar2003

Table A-22. PCBs in ground water and surface water (ug/L) collected from the Building

Location Date	Lab	Note	Val.	PCB 1016	PCB 1221	PCB 1232	PCB 1242	PCB 1248
W-854-01								
27-jun-1996	CS	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
W-854-02								
27-jun-1996	CS	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
W-854-03								
13-dec-1996	CS	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
W-854-04								
16-aug-1996	CS	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
W-854-05								
16-aug-1996	CS	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
W-854-06								
10-sep-1996	CS	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
W-854-07								
10-sep-1996	CS	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
W-854-08								
10-sep-1996	CS	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
13-dec-1996	CS	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
W-854-10								
06-feb-1997	CS	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
W-854-11								
19-feb-1997	CS	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

854 area. Results recorded by March 20, 2003.

PCB 1254	PCB 1260	PCB 1262	PCB 1268	Total PCBs	Location Date
<0.5 U	<0.5 U	-	-	-	W-854-01 27-jun-1996
<0.5 U	<0.5 U	-	-	-	W-854-02 27-jun-1996
<0.5 U	<0.5 U	-	-	-	W-854-03 13-dec-1996
<0.5 U	<0.5 UO	-	-	-	W-854-04 16-aug-1996
<0.5 U	<0.5 UO	-	-	-	W-854-05 16-aug-1996
<0.5 U	<0.5 U	-	-	-	W-854-06 10-sep-1996
<0.5 U	<0.5 U	-	-	-	W-854-07 10-sep-1996
<0.5 U	<0.5 U	-	-	-	W-854-08 10-sep-1996
<0.5 U	<0.5 U	-	-	-	13-dec-1996
<0.5 LOU	<0.5 U	-	-	-	W-854-10 06-feb-1997
<0.5 U	<0.5 U	-	-	-	W-854-11 19-feb-1997

See following page for notes

Table A-22. PCBs in ground water and surface water (ug/L) collected from the Building 854 area. Results recorded by March 20, 2003.

Notes:

\- Indicates no analysis performed for this compound

Val. = Validation code

Footnotes:

a ERD data
b ORAD WGMG data
c Analytical results for this sample are suspect
d Sample collected during hydraulic testing
e Blind sample, sent to lab without location identity
f Sample dilution necessary for analysis; detection limits increased
g Interlaboratory collocated sample
h Intralaboratory collocated sample
i Sample collected as part of pilot study
j Note field may contain important information regarding this sample
k Pre-development sample
l Norm month, norm quarter or norm year inconsistent with sample date
m Confirmation sample
n Sample analyzed after standard holding time
o Sample comprised of partial composite
p Alpha spectroscopy analysis of uranium isotopes
q Gamma spectroscopy analysis of uranium isotopes
r Tritium data represents non-detect with activity calc'd for 100 percent error.

Lab Codes:

CS California Laboratory Services 3249 Fitzgerald Rd. Rancho Cordova, CA 95742

Validation Codes:

V Validated
N Not validated (default value)
U Undeclared
H Historical comparison only

CLP flags: (follow result)

B Analyte found in method blank
D Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E The analyte was detected below the LLNL reporting limit, but above the analytical laboratory minimum detection limit.
F Analyte found in field blank, trip blank, or equipment blank
G Quantitated using fuel calibration, but does not match typical fuel fingerprint (fuel maybe gasoline, diesel, motor oil etc.).
H Sample analyzed outside of holding time, sample results should be evaluated
J Analyte was postively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
L Spike accuracy not within control limits
O Duplicate spike or sample precision not within control limits
P Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S Analytical results for this sample are suspect
T Analyte is tentatively identified compound; result is approximate
U Compound was analyzed for, but not detected above detection limit

Table A-23. PCBs in soil and rock (mg/kg) collected from the Building 854 area. Results recorded by March 20, 2003.

PCBs in Soil, Site 300 in 854 Study Area
March 24, 2003
gemini2

s3pcbsoL.24mar2003
s3pcbsoR.24mar2003

Table A-23. PCBs in soil and rock (mg/kg) collected from the Building 854 area.

Location Date	Lab	Val. Note	Depth (ft)	PCB 1016	PCB 1221	PCB 1232	PCB 1242	PCB 1248
W-854-01								
21-nov-1995	CS a	V	0.5	<1 U	<1 U	<1 U	<1 U	<1 U
21-nov-1995	CS ag	V	5.0	<1 U	<1 U	<1 U	<1 U	<1 U
21-nov-1995	CS ag	V	10.0	<1 U	<1 U	<1 U	<1 U	<1 U
21-nov-1995	FS ag	V	10.0	<0.05 HU	<0.05 HU	<0.05 HU	<0.05 HU	<0.05 HU
W-854-02								
22-jan-1996	CS a	V	0.5	<0.02 U	<0.02 U	<0.02 U	<0.02 U	<0.02 U
22-jan-1996	CS a	V	5.0	<0.02 U	<0.02 U	<0.02 U	<0.02 U	<0.02 U
22-jan-1996	CS a	V	10.0	<0.02 U	<0.02 U	<0.02 U	<0.02 U	<0.02 U
23-jan-1996	CS a	V	20.1	<0.02 U	<0.02 U	<0.02 U	<0.02 U	<0.02 U
23-jan-1996	CS a	V	33.0	<0.02 U	<0.02 U	<0.02 U	<0.02 U	<0.02 U
24-jan-1996	CS a	V	42.0	<0.02 U	<0.02 U	<0.02 U	<0.02 U	<0.02 U
24-jan-1996	CS a	V	52.5	<0.02 U	<0.02 U	<0.02 U	<0.02 U	<0.02 U
24-jan-1996	CS a	V	62.0	<0.02 U	<0.02 U	<0.02 U	<0.02 U	<0.02 U
W-854-03								
14-feb-1996	CS ag	V	0.5	<0.02 ULO	<0.02 ULO	<0.02 ULO	<0.02 ULO	<0.02 ULO
14-feb-1996	CS ag	V	5.0	<0.02 U	<0.02 U	<0.02 U	<0.02 U	<0.02 U
W-854-04								
28-feb-1996	CS a	V	0.5	<0.02 U	<0.02 U	<0.02 U	<0.02 U	<0.02 U
W-854-05								
04-apr-1996	CS a	V	0.5	<0.02 U	<0.02 U	<0.02 U	<0.02 U	<0.02 U
3SS-854-021								
29-nov-1995	CS a	V	0.0	<10 DU	<10 DU	<10 DU	34 D	<10 DU
29-nov-1995	FS a	V	0.0	<0.05 U	<0.05 U	<0.05 U	<0.05 U	52 D
3SS-854-022								
22-nov-1995	CS a	V	0.0	<0.02 U	<0.02 U	<0.02 U	<0.02 U	<0.02 U

Results recorded by March 20, 2003.

PCB 1254	PCB 1260	PCB 1262	PCB 1268	Total PCBs	Location Date
					W-854-01
<1 U	<1 U	-	-	-	21-nov-1995
<1 U	<1 U	-	-	-	21-nov-1995
<1 U	<1 U	-	-	-	21-nov-1995
<0.05 HU	<0.05 HU	-	-	-	21-nov-1995
					W-854-02
<0.02 U	<0.02 U	-	-	-	22-jan-1996
<0.02 U	<0.02 U	-	-	-	22-jan-1996
<0.02 U	<0.02 U	-	-	-	22-jan-1996
<0.02 U	<0.02 U	-	-	-	23-jan-1996
<0.02 U	<0.02 U	-	-	-	23-jan-1996
<0.02 U	<0.02 U	-	-	-	24-jan-1996
<0.02 U	<0.02 U	-	-	-	24-jan-1996
<0.02 U	<0.02 U	-	-	-	24-jan-1996
					W-854-03
<0.02 ULO	<0.02 ULO	-	-	-	14-feb-1996
<0.02 U	<0.02 LOU	-	-	-	14-feb-1996
					W-854-04
<0.02 U	<0.02 U	-	-	-	28-feb-1996
					W-854-05
<0.02 U	<0.02 U	-	-	-	04-apr-1996
					3SS-854-021
<10 DU	-	-	-	-	29-nov-1995
<0.05 U	<0.05 U	-	-	-	29-nov-1995
					3SS-854-022
0.16	<0.02 LOU	-	-	-	22-nov-1995

See following page for notes

Table A-23. PCBs in soil and rock (mg/kg) collected from the Building 854 area. Results recorded by March 20, 2003.

Notes:

- Indicates no analysis performed for this compound

Val. = Validation code

Footnotes:

a ERD data
b ORAD WGMG data
c Analytical results for this sample are suspect
d Sample collected during hydraulic testing
e Blind sample, sent to lab without location identity
f Sample dilution necessary for analysis; detection limits increased
g Interlaboratory collocated sample
h Intralaboratory collocated sample
i Sample collected as part of pilot study
j Note field may contain important information regarding this sample
k Pre-development sample
l Norm month, norm quarter or norm year inconsistent with sample date
m Confirmation sample
n Sample analyzed after standard holding time
o Sample comprised of partial composite
p Alpha spectroscopy analysis of uranium isotopes
q Gamma spectroscopy analysis of uranium isotopes
r Tritium data represents non-detect with activity calc'd for 100 percent error.

Lab Codes:

CS California Laboratory Services 3249 Fitzgerald Rd. Rancho Cordova, CA 95742
FS FruitGrowers Environmental Lab 2500 Stagecoach Rd., Stockton, CA 95215

Validation Codes:

V Validated
N Not validated (default value)
U Undeclared
H Historical comparison only

CLP flags: (follow result)

B Analyte found in method blank
D Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E The analyte was detected below the LLNL reporting limit, but above the analytical laboratory minimum detection limit.
F Analyte found in field blank, trip blank, or equipment blank
G Quantitated using fuel calibration, but does not match typical fuel fingerprint (fuel maybe gasoline, diesel, motor oil etc.).
H Sample analyzed outside of holding time, sample results should be evaluated
J Analyte was postively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
L Spike accuracy not within control limits
O Duplicate spike or sample precision not within control limits
P Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S Analytical results for this sample are suspect
T Analyte is tentatively identified compound; result is approximate
U Compound was analyzed for, but not detected above detection limit

Table A-24. Perchlorate in ground water and surface water (ug/L) collected from the Building 854 area. Results recorded by April 22, 2003.

Site 300 Perchlorate in Ground Water
April 23, 2003
gemini1

gwperc.23apr2003

Table A-24. Perchlorate in ground water and surface water (ug/L) collected from the Building 854 area. Results recorded by April 22, 2003.

Location Date	Lab	Note	Val.	Perchlorate (ug/L)
W-854-01				
30-jul-1998	CS	a	V	<4 U
20-mar-2000	CN	a	V	<4 U
17-may-2000	CN	a	V	<4 U
08-may-2001	CN	a	V	<4 U
03-jul-2001	CN	a	V	<4 U
29-nov-2001	CN	a	V	<4 LOU
28-jan-2002	CN	a	V	<4 U
28-aug-2002	CN	a	V	<4 U
18-dec-2002	CN	a	V	<4 U
W-854-02				
30-jul-1998	CS	a	V	<4 U
29-mar-2000	CN	a	V	7
30-jun-2000	CN	af	V	8.31
30-aug-2000	CN	af	V	5.1
26-mar-2001	BB	a	V	7.6
06-jun-2001	SE	af	V	7.7
06-jul-2001	BB	a	V	7.8
15-jan-2002	SE	af	N	6.4
14-mar-2002	SE	af	V	<4 U
10-apr-2002	SE	af	V	<4 U
08-may-2002	SE	af	V	5.3
18-jun-2002	SE	af	V	4.6
10-jul-2002	SE	afj	V	6.4
08-aug-2002	SE	afj	V	5
09-oct-2002	SE	afj	V	4.5
W-854-03				
30-jul-1998	CS	ag	V	<4 U
30-jul-1998	CS	a	V	6.5
23-nov-1998	CS	ag	V	7.4 H
16-feb-1999	CS	a	V	8.4
28-jun-1999	CN	af	V	9.7 H
29-sep-1999	CN	af	V	8.3 HL
01-dec-1999	CN	af	V	8.2 H
28-feb-2000	BB	afg	V	11
28-feb-2000	CN	afg	V	14 J
16-may-2000	CN	af	V	13.1
16-aug-2000	CN	af	V	11
26-mar-2001	BB	a	V	11
06-jun-2001	SE	af	V	11
09-jul-2001	CN	af	V	11
06-mar-2002	SE	af	V	9.5
10-apr-2002	SE	af	V	10
08-may-2002	SE	af	V	9.4
18-jun-2002	SE	af	V	9.5
10-jul-2002	SE	afj	V	10
08-aug-2002	SE	afj	V	10
09-oct-2002	SE	afj	V	7.5
W-854-04				
30-jul-1998	CS	a	V	<4 U
16-may-2000	CN	a	V	<4 U
08-may-2001	CN	a	V	<4 U
03-jul-2001	CN	a	V	<4 U
29-nov-2001	CN	a	V	<4 LOU
26-feb-2002	CN	a	V	<4 U
28-aug-2002	CN	a	V	<4 U
18-dec-2002	CN	a	V	<4 U
W-854-05				
30-jul-1998	CS	a	V	<4 U
29-feb-2000	CN	a	V	<4 U
16-may-2000	CN	af	V	<4 U
09-may-2001	CN	af	V	<4 U
03-jul-2001	CN	af	V	<4 U

Table A-24. Perchlorate in ground water and surface water (ug/L) collected from the Building 854 area. Results recorded by April 22, 2003.

Location Date	Lab	Note	Val.	Perchlorate (ug/L)
W-854-05 (continued)				
29-nov-2001	CN	a	V	4.1
30-jan-2002	CN	af	V	<4 U
21-jun-2002	CN	af	V	<4 U
13-aug-2002	CN	af	V	<4 U
13-dec-2002	CN	a	N	<4 U
W-854-06				
30-jul-1998	CS	a	V	<4 U
20-mar-2000	CN	a	V	<4 U
17-may-2000	BB	ag	V	<4 U
17-may-2000	CN	ag	V	<4 U
09-may-2001	CN	a	V	<4 U
03-jul-2001	CN	ah	V	<4 U
03-jul-2001	CN	aeh	V	<4 U
13-dec-2001	CN	a	V	<4 U
26-feb-2002	CN	a	V	<4 U
21-jun-2002	CN	a	V	<4 U
10-sep-2002	CN	aeh	V	<4 U
10-sep-2002	CN	ah	V	<4 U
19-dec-2002	BB	ag	V	4.1
19-dec-2002	CN	a	V	<4 U
W-854-07				
13-nov-1998	BB	a	V	6.44
17-feb-1999	CS	a	V	5.2
28-jun-1999	CN	a	V	8.3 H
24-sep-1999	CN	a	V	7.2 H
01-dec-1999	CN	a	V	7.3 H
20-mar-2000	CN	a	V	7.5
17-may-2000	CN	af	V	5.5
16-aug-2000	CN	a	V	5.6
14-dec-2000	CN	af	V	8.3
14-feb-2001	BB	ah	V	5.5
14-feb-2001	BB	aeh	V	5.2
11-jun-2001	CN	af	V	5.7
09-jul-2001	BB	ag	V	6.7
09-jul-2001	CN	agf	V	5.9
13-dec-2001	CN	af	V	6.7
29-jan-2002	CN	afh	V	7.3
29-jan-2002	CN	aefh	V	5.4
20-jun-2002	CN	a	V	<4 U
13-aug-2002	CN	af	V	<4 U
19-dec-2002	CN	af	V	<4 U
W-854-08				
31-jul-1998	CS	ag	V	<4 U
28-feb-2000	CN	af	V	6.4 J
17-may-2000	CN	a	V	4.2
08-may-2001	CN	af	V	<4 U
10-jul-2001	CN	af	V	4.6
21-jun-2002	CN	af	V	<4 U
10-sep-2002	CN	af	V	<4 U
22-nov-2002	CN	a	V	<4 U
W-854-09				
31-jul-1998	CS	ag	V	<4 U
20-mar-2000	CN	a	V	4.4
17-may-2000	CN	af	V	<4 U
09-may-2001	CN	af	V	<4 U
05-jul-2001	CN	af	V	4
13-dec-2001	CN	af	V	<4 U
30-jan-2002	CN	a	V	<4 U
07-jun-2002	CN	af	V	<4 U
10-sep-2002	CN	af	V	<4 U

Table A-24. Perchlorate in ground water and surface water (ug/L) collected from the Building 854 area. Results recorded by April 22, 2003.

Location Date	Lab	Note	Val.	Perchlorate (ug/L)
W-854-10				
17-aug-1998	CS	ag	V	<4 U
28-jun-1999	CN	a	V	<4 HU
29-feb-2000	CN	aeh	V	<4 U
29-feb-2000	CN	ah	V	<4 U
17-may-2000	CN	a	V	<4 U
09-may-2001	BB	ag	V	<4 U
09-may-2001	CN	afg	V	<4 U
05-jul-2001	CN	a	V	<4 U
29-nov-2001	CN	a	V	<4 LOU
29-jan-2002	CN	a	V	<4 U
07-jun-2002	CN	a	V	<4 U
10-sep-2002	CN	a	V	<4 U
13-dec-2002	CN	ah	N	<4 U
13-dec-2002	CN	aeh	N	<4 U
W-854-11				
17-aug-1998	CS	ag	V	<4 U
28-jun-1999	BB	ag	V	16
28-jun-1999	CN	ag	V	<4 HU
29-feb-2000	CN	a	V	6.8
10-may-2001	CN	af	V	5.8
W-854-13				
22-mar-1999	CS	a	N	<4 U
25-may-1999	CN	a	V	<4 UH
26-aug-1999	CN	a	V	<4 U
02-dec-1999	CN	af	V	<4 HU
28-feb-2000	CN	a	V	<4 U
16-may-2000	CN	a	V	<4 U
08-may-2001	CN	a	V	<4 U
03-jul-2001	CN	a	V	<4 U
13-dec-2001	BB	a	V	<4 U
28-jan-2002	CN	a	V	<4 U
28-aug-2002	BB	a	V	<3 U
17-dec-2002	CN	a	N	<4 U
W-854-14				
31-mar-1999	BB	a	V	<4 U
24-may-1999	CN	af	V	<4 UH
28-feb-2000	CN	af	V	<4 U
17-may-2000	CN	af	V	<4 U
08-may-2001	CN	af	V	<4 U
05-jul-2001	CN	af	V	<4 U
W-854-15				
29-jun-2000	CN	af	V	<4 U
09-may-2001	CN	af	V	<4 U
06-jul-2001	BB	a	V	<4 U
14-dec-2001	CN	a	V	<4 U
29-jan-2002	CN	a	V	<4 U
20-jun-2002	CN	a	V	<4 U
10-sep-2002	CN	a	V	<4 U
17-dec-2002	CN	a	N	<4 U
W-854-17				
30-jun-2000	CN	af	V	<4 U
29-aug-2000	CN	af	V	<4 U
09-may-2001	BB	ag	V	<4 U
09-may-2001	CN	ag	V	<4 U
05-jul-2001	CN	a	V	<4 U
14-dec-2001	CN	a	V	<4 U
29-jan-2002	CN	aeh	V	<4 U
29-jan-2002	CN	ah	V	<4 U
07-jun-2002	BB	aefg	V	<3 U
07-jun-2002	CN	ag	V	<4 U
10-sep-2002	BB	ag	V	<3 U
10-sep-2002	CN	ag	V	<4 U

Table A-24. Perchlorate in ground water and surface water (ug/L) collected from the Building 854 area. Results recorded by April 22, 2003.

Location Date	Lab	Note	Val.	Perchlorate (ug/L)
W-854-17 (continued)				
17-dec-2002	CN	aeh	N	<4 U
17-dec-2002	CN	ah	N	<4 U
W-854-18A				
30-jun-2000	CN	af	V	<4 U
10-may-2001	CN	af	V	<4 U
05-jul-2001	CN	a	V	<4 U
13-dec-2001	CN	ah	V	<4 U
13-dec-2001	CN	aeh	V	<4 U
28-jan-2002	CN	a	V	<4 U
20-jun-2002	BB	ag	V	<3 U
20-jun-2002	CN	afg	V	<4 U
28-aug-2002	CN	a	V	<4 U
17-dec-2002	CN	a	N	<4 U
W-854-45				
10-jul-2001	CN	af	V	8.9
14-dec-2001	CN	af	V	6.1
28-jan-2002	CN	a	V	5
07-jun-2002	CN	a	V	<4 U
13-aug-2002	CN	a	V	<4 U
18-dec-2002	CN	af	V	<4 U
W-854-1701				
11-jul-2001	CN	af	V	<4 U
26-feb-2002	CN	a	V	<4 U
21-jun-2002	CN	a	V	<4 U
10-sep-2002	CN	a	V	<4 U
W-854-1707				
09-jul-2001	CN	af	V	<4 U
30-jan-2002	CN	a	V	<4 U
21-jun-2002	CN	a	V	<4 U
10-sep-2002	CN	a	V	<4 U
W-854-1731				
27-sep-2002	CN	af	V	<4 U
W-854-1822				
11-mar-2003	CN	a	N	<4 U
W-854-1823				
07-mar-2003	BB	a	V	27
W-854-1902				
07-mar-2003	BB	a	V	7.8
SPRING11				
21-jun-2002	CN	a	V	<4 U

See following page for notes

Table A-24. Perchlorate in ground water and surface water (ug/L) collected from the Building 854 area. Results recorded by April 22, 2003.

Notes:

- Indicates no analysis performed for this compound

Val. = Validation code

Footnotes:

a ERD data
b ORAD WGMG data
c Analytical results for this sample are suspect
d Sample collected during hydraulic testing
e Blind sample, sent to lab without location identity
f Sample dilution necessary for analysis; detection limits increased
g Interlaboratory collocated sample
h Intralaboratory collocated sample
i Sample collected as part of pilot study
j Note field may contain important information regarding this sample
k Pre-development sample
l Norm month, norm quarter or norm year inconsistent with sample date
m Confirmation sample
n Sample analyzed after standard holding time
o Sample comprised of partial composite
p Alpha spectroscopy analysis of uranium isotopes
q Gamma spectroscopy analysis of uranium isotopes
r Tritium data represents non-detect with activity calc'd for 100 percent error.

Lab Codes:

BB	BC Laboratories, Inc.	Bakersfield, CA
CN	Caltest Analytical Laboratory	1885 N. Kelly Rd, Napa, CA 94558
CS	California Laboratory Services	3249 Fitzgerald Rd. Rancho Cordova, CA 95742
SE	Sequoia Analytical	1551 Industrial Road, San Carlos, CA 94070

Validation Codes:

V Validated
N Not validated (default value)
U Undeclared
H Historical comparison only

CLP flags: (follow result)

B Analyte found in method blank
D Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E The analyte was detected below the LLNL reporting limit, but above the analytical laboratory minimum detection limit.
F Analyte found in field blank, trip blank, or equipment blank
G Quantitated using fuel calibration, but does not match typical fuel fingerprint (fuel maybe gasoline, diesel, motor oil etc.).
H Sample analyzed outside of holding time, sample results should be evaluated
J Analyte was postively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
L Spike accuracy not within control limits
O Duplicate spike or sample precision not within control limits
P Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S Analytical results for this sample are suspect
T Analyte is tentatively identified compound; result is approximate
U Compound was analyzed for, but not detected above detection limit

Table A-25. Aromatic hydrocarbons in ground water and surface water (ug/L) collected from the Building 854 area. Results recorded by March 20, 2003.

BTEX compounds in Ground Water, Site 300
March 24, 2003
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Table A-25. Aromatic hydrocarbons in ground water and surface water (ug/L) collected from the Building 854 area. Results recorded by March 20, 2003.

Location Date	Lab	Note	Val.	Benzene	Toluene	Ethyl-benzene	Total Xylenes
W-854-01							
27-jun-1996	CS	a	V	<1 U	<1 U	<1 U	<2 U
15-aug-1996	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
23-jan-1997	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
07-may-1997	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
12-aug-1997	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
28-oct-1997	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
11-mar-1998	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
24-apr-1998	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
30-jul-1998	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
12-nov-1998	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
26-jan-1999	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
24-may-1999	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
26-aug-1999	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
01-dec-1999	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
20-mar-2000	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
17-may-2000	CN	a	V	<1 U	<1 U	<1 U	<1 U
W-854-02							
27-jun-1996	CS	a	V	<1 U	<1 U	<1 U	<2 U
15-aug-1996	CS	a	V	<1.5 DU	<1.5 DU	<1.5 DU	<2.5 DU
24-jan-1997	CS	a	V	<3 DU	<3 DU	<3 DU	<5 DU
12-may-1997	CS	a	V	<3 DU	14 D	<3 DU	30 D
30-jul-1997	CS	ah	V	<3 DU	<3 DU	<3 DU	<5 DU
30-jul-1997	CS	aeh	V	<1.5 DU	<1.5 DU	<1.5 DU	<2.5 DU
29-oct-1997	CS	a	V	<1.5 DU	<1.5 DU	<1.5 DU	<2.5 DU
13-mar-1998	CS	a	V	<1.5 DU	<1.5 DU	<1.5 DU	<2.5 DU
01-may-1998	CS	af	V	<1.5 DU	<1.5 DU	<1.5 DU	<2.5 DU
30-jul-1998	CS	af	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
13-nov-1998	CS	af	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
17-feb-1999	CS	af	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
28-jun-1999	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
04-oct-1999	CN	af	V	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU
29-mar-2000	CN	a	V	<0.5 LOU	<0.5 LOU	<0.5 LOU	<0.5 LOU
W-854-03							
17-sep-1996	CS	a	V	<1 U	<1 U	<1 U	<2 U
24-jan-1997	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
07-may-1997	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
12-aug-1997	CS	af	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
29-oct-1997	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
13-mar-1998	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
01-may-1998	CS	af	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
30-jul-1998	CS	afg	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
30-jul-1998	CS	af	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
23-nov-1998	CS	af	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
16-feb-1999	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
28-jun-1999	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
29-sep-1999	CN	af	V	<10 DLOU	<10 DLOU	<10 DLOU	<10 DLOU
01-dec-1999	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
28-feb-2000	BB	afg	V	<0.5 U	<0.5 U	<0.5 U	<1 U
28-feb-2000	CN	afg	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
W-854-04							
16-aug-1996	CS	a	V	<1 U	<1 U	<1 U	<2 U
24-jan-1997	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
07-may-1997	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
12-aug-1997	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
28-oct-1997	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
11-mar-1998	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
24-apr-1998	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
30-jul-1998	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
12-nov-1998	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
29-jan-1999	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
26-aug-1999	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Table A-25. Aromatic hydrocarbons in ground water and surface water (ug/L) collected from the Building 854 area. Results recorded by March 20, 2003.

Location Date	Lab	Note	Val.	Benzene	Toluene	Ethyl-benzene	Total Xylenes
W-854-05							
16-aug-1996	CS	a	V	<1 U	<1 U	<1 U	<2 U
23-jan-1997	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
07-may-1997	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
12-aug-1997	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
28-oct-1997	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
11-mar-1998	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
24-apr-1998	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
30-jul-1998	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
13-nov-1998	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
26-jan-1999	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
28-jun-1999	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
01-dec-1999	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
29-feb-2000	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
W-854-06							
10-sep-1996	CS	a	V	<1 U	1.6	<1 U	<2 U
27-jan-1997	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
09-may-1997	CS	a	V	0.39	0.86	<0.3 U	<0.5 U
06-aug-1997	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
28-oct-1997	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
11-mar-1998	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
01-may-1998	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
30-jul-1998	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
12-nov-1998	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
17-feb-1999	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
28-jun-1999	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
01-sep-1999	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
01-dec-1999	BB	ag	V	<0.5 U	<0.5 U	<0.5 U	<1 U
01-dec-1999	CN	ag	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
20-mar-2000	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
17-may-2000	CN	ag	V	<1 U	<1 U	<1 U	<1 U
W-854-07							
10-sep-1996	CS	a	V	<1 U	<1 U	<1 U	<2 U
27-jan-1997	CS	aeh	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
27-jan-1997	CS	ah	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
09-may-1997	CS	aeh	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
09-may-1997	CS	ah	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
06-aug-1997	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
29-oct-1997	BB	ag	V	<0.5 U	<0.5 U	<0.5 U	<1 U
29-oct-1997	CS	ag	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
11-mar-1998	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
01-may-1998	CS	aeh	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
01-may-1998	CS	ah	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
13-nov-1998	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
17-feb-1999	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
28-jun-1999	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
24-sep-1999	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
01-dec-1999	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
20-mar-2000	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
17-may-2000	CN	af	V	<1 U	<1 U	<1 U	<1 U
W-854-08							
10-sep-1996	CS	a	V	<1 U	<1 U	<1 U	<2 U
13-dec-1996	CS	a	V	<1 U	<1 U	<1 U	<2 U
23-jan-1997	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
12-may-1997	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
30-jul-1997	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
28-oct-1997	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
11-mar-1998	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
24-apr-1998	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
31-jul-1998	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
13-nov-1998	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
26-jan-1999	CS	aeh	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
26-jan-1999	CS	ah	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
28-jun-1999	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
01-dec-1999	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Table A-25. Aromatic hydrocarbons in ground water and surface water (ug/L) collected from the Building 854 area. Results recorded by March 20, 2003.

Location Date	Lab	Note	Val.	Benzene	Toluene	Ethyl-benzene	Total Xylenes
W-854-08 (continued)							
28-feb-2000	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
17-may-2000	CN	a	V	<1 U	<1 U	<1 U	<1 U
W-854-09							
06-feb-1997	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
07-may-1997	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
06-aug-1997	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
29-oct-1997	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
11-mar-1998	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
01-may-1998	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
31-jul-1998	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
23-nov-1998	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
05-mar-1999	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
28-jun-1999	CN	aeh	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
28-jun-1999	CN	ah	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
24-sep-1999	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
07-dec-1999	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
20-mar-2000	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
17-may-2000	CN	af	V	<1 U	<1 U	<1 U	<1 U
W-854-10							
06-feb-1997	CS	a	V	<1 U	<1 U	<1 U	<2 U
06-jun-1997	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
16-sep-1997	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
28-oct-1997	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
11-mar-1998	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
24-apr-1998	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
17-aug-1998	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
12-nov-1998	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
16-feb-1999	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
28-jun-1999	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
24-sep-1999	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
02-dec-1999	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
29-feb-2000	CN	aeh	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
29-feb-2000	CN	ah	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
17-may-2000	CN	a	V	<1 U	<1 U	<1 U	<1 U
W-854-11							
19-feb-1997	CS	a	V	<1 U	<1 U	<1 U	<2 U
16-sep-1997	CS	af	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
29-jun-1998	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
17-aug-1998	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
13-nov-1998	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
17-feb-1999	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.5 U
28-jun-1999	BB	ag	V	<0.5 U	<0.5 U	<0.5 U	<1 U
28-jun-1999	CN	ag	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
24-sep-1999	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
02-dec-1999	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
29-feb-2000	CN	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
W-854-13							
22-mar-1999	CS	a	N	<1 U	<1 U	<1 U	<2 U
W-854-14							
31-mar-1999	BB	a	V	<0.5 U	<0.5 U	<0.5 U	<1 U
24-may-1999	CN	af	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
17-may-2000	CN	af	V	<1 U	<1 U	<1 U	<1 U
W-854-15							
29-jun-2000	CN	af	V	<1 U	<1 OU	<1 U	<1 U
W-854-17							
30-jun-2000	CN	af	V	<1 LOU	<1 LOU	<1 LOU	<1 LOU
29-aug-2000	CN	af	V	<1 U	<1 U	<1 U	<1 U

Table A-25. Aromatic hydrocarbons in ground water and surface water (ug/L) collected from the Building 854 area. Results recorded by March 20, 2003.

Location Date	Lab	Note	Val.	Benzene	Toluene	Ethyl-benzene	Total Xylenes
W-854-18A							
30-jun-2000	CN	af	V	<1 LOU	<1 LOU	<1 LOU	<1 LOU
W-854-45							
10-jul-2001	CN	af	V	<1 HU	<1 HU	<1 HU	<1 HU
W-854-1701							
11-jul-2001	CN	af	V	<1 LUH	<1 LUH	<1 LUH	<1 LUH
W-854-1707							
09-jul-2001	CN	af	V	<1 HU	<1 LOUH	<1 LOUH	<1 LOUH
W-854-1731							
27-sep-2002	CN	af	V	<1 U	<1 U	<1 U	<1 U
WELL13							
09-aug-1990	BC	a	U	<0.5 P	<0.5 P	<0.5 P	<0.5 P
08-oct-1990	BC	a	U	<0.5 P	<0.5 P	<0.5 P	<0.5 P
21-oct-1991	CL	ag	U	<0.5 P	<0.5 P	<0.5 P	-
21-oct-1991	BC	ag	U	<0.5 P	<0.5 P	<0.5 P	<0.5 P
15-oct-1992	BC	a	U	<0.5 P	<0.5 P	<0.5 P	<0.5 P
27-apr-1993	BC	a	V	<0.5 U	<0.5 U	<0.5 U	<0.5 U
20-jun-1994	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.6 U
19-dec-1994	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.6 U
24-feb-1995	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.6 U
23-may-1995	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.6 U
25-jul-1995	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.6 U
29-feb-1996	CS	a	V	<0.3 U	<0.3 U	<0.3 U	<0.6 U
SPRING10							
19-nov-1991	BC	a	U	<0.5 P	<0.5 P	<0.5 P	<0.5 P
SPRING11							
14-nov-1991	BC	a	U	<0.5 P	<0.5 P	<0.5 P	<0.5 P
SPRING16							
19-nov-1991	BC	a	U	<0.5 P	<0.5 P	<0.5 P	<0.5 P

See following page for notes

Table A-25. Aromatic hydrocarbons in ground water and surface water (ug/L) collected from the Building 854 area. Results recorded by March 20, 2003.

Notes:

- Indicates no analysis performed for this compound

Val. = Validation code

Footnotes:

a ERD data
b ORAD WGMG data
c Analytical results for this sample are suspect
d Sample collected during hydraulic testing
e Blind sample, sent to lab without location identity
f Sample dilution necessary for analysis; detection limits increased
g Interlaboratory collocated sample
h Intralaboratory collocated sample
i Sample collected as part of pilot study
j Note field may contain important information regarding this sample
k Pre-development sample
l Norm month, norm quarter or norm year inconsistent with sample date
m Confirmation sample
n Sample analyzed after standard holding time
o Sample comprised of partial composite
p Alpha spectroscopy analysis of uranium isotopes
q Gamma spectroscopy analysis of uranium isotopes
r Tritium data represents non-detect with activity calc'd for 100 percent error.

Lab Codes:

BB	BC Laboratories, Inc.	Bakersfield, CA
BC	Brown & Caldwell Emeryville	
CL	Clayton Environmental Cnslt	Pleasanton, CA, (formerly McKesson Envnmtl)
CN	Caltest Analytical Laboratory	1885 N. Kelly Rd, Napa, CA 94558
CS	California Laboratory Services	3249 Fitzgerald Rd. Rancho Cordova, CA 95742

Validation Codes:

V Validated
N Not validated (default value)
U Undeclared
H Historical comparison only

CLP flags: (follow result)

B Analyte found in method blank
D Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E The analyte was detected below the LLNL reporting limit, but above the analytical laboratory minimum detection limit.
F Analyte found in field blank, trip blank, or equipment blank
G Quantitated using fuel calibration, but does not match typical fuel fingerprint (fuel maybe gasoline, diesel, motor oil etc.).
H Sample analyzed outside of holding time, sample results should be evaluated
J Analyte was postively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
L Spike accuracy not within control limits
O Duplicate spike or sample precision not within control limits
P Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S Analytical results for this sample are suspect
T Analyte is tentatively identified compound; result is approximate
U Compound was analyzed for, but not detected above detection limit

Table A-26. Aromatic hydrocarbons in soil and rock (mg/kg) collected from the Building 854 area. Results recorded by March 20, 2003.

BTEX compounds in soil, Site 300
March 24, 2003
gemini2

s3btexSOL.24mar2003
s3btexSOR.24mar2003

Table A-26. Aromatic hydrocarbons in soil and rock (mg/kg) collected from

Location Date	Lab	Val. Note	Depth (ft)	Benzene	Toluene	Ethyl-benzene	Total xylenes
854-14							
03-sep-1996	CS a	V	1.0	-	-	-	-
03-sep-1996	CS a	V	6.0	-	-	-	-
04-sep-1996	CS a	V	12.0	-	-	-	-
04-sep-1996	CS a	V	18.0	-	-	-	-
854-15							
14-aug-1996	CS a	V	1.5	-	-	-	-
14-aug-1996	CS a	V	6.0	-	-	-	-
14-aug-1996	CS a	V	12.0	-	-	-	-
14-aug-1996	CS a	V	18.0	-	-	-	-
854-16							
13-aug-1996	CS a	V	1.5	-	-	-	-
13-aug-1996	CS a	V	6.0	-	-	-	-
13-aug-1996	CS a	V	12.0	-	-	-	-
13-aug-1996	CS a	V	18.0	-	-	-	-
854-17							
26-aug-1996	CS a	V	1.0	-	-	-	-
26-aug-1996	CS a	V	6.0	-	-	-	-
26-aug-1996	CS a	V	12.0	-	-	-	-
26-aug-1996	CS a	V	18.0	-	-	-	-
854-18							
28-aug-1996	CS ag	V	1.0	-	-	-	-
28-aug-1996	CS ag	V	6.0	-	-	-	-
30-aug-1996	CS a	V	12.0	-	-	-	-
30-aug-1996	CS a	V	18.0	-	-	-	-
854-19							
15-aug-1996	CS ag	V	1.5	-	-	-	-
15-aug-1996	CS a	V	6.0	-	-	-	-
15-aug-1996	CS a	V	12.0	-	-	-	-
15-aug-1996	CS a	V	18.0	-	-	-	-
854-20							
14-aug-1996	CS a	V	1.5	-	-	-	-
14-aug-1996	CS a	V	6.0	-	-	-	-
14-aug-1996	CS a	V	12.0	-	-	-	-
15-aug-1996	CS a	V	16.0	-	-	-	-
854-21							
26-apr-2000	CN aj	V	95.0	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU
26-apr-2000	CN aj	V	100.0	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU
26-apr-2000	CN aj	V	105.0	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU
26-apr-2000	CN aj	V	111.0	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU
26-apr-2000	CN a	V	115.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
26-apr-2000	CN a	V	120.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
27-apr-2000	CN a	V	130.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
27-apr-2000	CN a	V	140.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
10-may-2000	CN a	V	182.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
10-may-2000	CN a	V	192.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
10-may-2000	CN a	V	197.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
10-may-2000	BB a	V	202.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
10-may-2000	CN a	V	202.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
10-may-2000	CN a	V	207.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
10-may-2000	CN a	V	214.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
854-21A							
31-may-2000	CN a	V	172.4	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
31-may-2000	CN a	V	188.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
854-22							
14-aug-1996	CS a	V	1.5	-	-	-	-
14-aug-1996	CS a	V	6.0	-	-	-	-
14-aug-1996	CS a	V	12.0	-	-	-	-

the Building 854 area. Results recorded by March 20, 2003.

1,2 Dichloro-benzene	1,3 Dichloro-benzene	1,4 Dichloro-benzene	Chloro-benzene	Location Date
				854-14
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	03-sep-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	03-sep-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	04-sep-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	04-sep-1996
				854-15
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	14-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	14-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	14-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	14-aug-1996
				854-16
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	13-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	13-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	13-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	13-aug-1996
				854-17
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	26-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	26-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	26-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	26-aug-1996
				854-18
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	28-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	28-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	30-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	30-aug-1996
				854-19
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	15-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	15-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	15-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	15-aug-1996
				854-20
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	14-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	14-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	14-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	15-aug-1996
				854-21
<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	26-apr-2000
<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	26-apr-2000
<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	26-apr-2000
<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	<0.0005 LOU	26-apr-2000
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	26-apr-2000
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	26-apr-2000
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	27-apr-2000
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	27-apr-2000
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	10-may-2000
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	10-may-2000
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	10-may-2000
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	10-may-2000
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	10-may-2000
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	10-may-2000
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	10-may-2000
				854-21A
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	31-may-2000
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	31-may-2000
				854-22
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	14-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	14-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	14-aug-1996

Table A-26. Aromatic hydrocarbons in soil and rock (mg/kg) collected from

Location Date	Lab	Val. Note	Depth (ft)	Benzene	Toluene	Ethyl-benzene	Total xylenes
854-22 (continued)							
14-aug-1996	CS a	V	18.0	–	–	–	–
854-23							
03-sep-1996	CS a	V	1.0	–	–	–	–
03-sep-1996	CS a	V	6.0	–	–	–	–
03-sep-1996	CS a	V	12.0	–	–	–	–
03-sep-1996	CS a	V	18.0	–	–	–	–
854-24							
19-aug-1996	CS a	V	1.5	–	–	–	–
19-aug-1996	CS a	V	6.0	–	–	–	–
19-aug-1996	CS a	V	12.0	–	–	–	–
19-aug-1996	CS a	V	18.0	–	–	–	–
854-25							
28-aug-1996	CS a	V	1.0	–	–	–	–
28-aug-1996	CS a	V	6.0	–	–	–	–
28-aug-1996	CS a	V	12.0	–	–	–	–
28-aug-1996	CS a	V	18.0	–	–	–	–
28-aug-1996	CS a	V	20.5	–	–	–	–
28-aug-1996	CS a	V	26.0	–	–	–	–
854-26							
16-aug-1996	CS a	V	1.5	–	–	–	–
16-aug-1996	CS a	V	6.0	–	–	–	–
16-aug-1996	CS a	V	12.0	–	–	–	–
16-aug-1996	CS a	V	18.0	–	–	–	–
854-27							
27-aug-1996	CS a	V	1.0	<0.005 U	<0.005 U	<0.005 U	<0.01 U
27-aug-1996	CS a	V	1.0	<0.005 U	<0.005 U	<0.005 U	<0.01 U
27-aug-1996	CS a	V	6.0	<0.005 U	<0.005 U	<0.005 U	<0.01 U
27-aug-1996	CS a	V	6.0	<0.005 U	<0.005 U	<0.005 U	<0.01 U
27-aug-1996	CS a	V	12.0	<0.005 U	<0.005 U	<0.005 U	<0.01 U
27-aug-1996	CS a	V	12.0	<0.005 U	<0.005 U	<0.005 U	<0.01 U
27-aug-1996	CS a	V	18.0	<0.005 U	<0.005 U	<0.005 U	<0.01 U
27-aug-1996	CS a	V	18.0	<0.005 U	<0.005 U	<0.005 U	<0.01 U
854-27A							
27-aug-1996	CS a	V	1.0	<0.005 U	<0.005 U	<0.005 U	<0.01 U
27-aug-1996	CS a	V	1.0	<0.005 U	<0.005 U	<0.005 U	<0.01 U
27-aug-1996	CS a	V	6.0	<0.005 U	<0.005 U	<0.005 U	<0.01 U
27-aug-1996	CS a	V	6.0	<0.005 U	<0.005 U	<0.005 U	<0.01 U
28-aug-1996	CS a	V	12.0	<0.005 U	<0.005 U	<0.005 U	<0.01 U
28-aug-1996	CS a	V	12.0	<0.005 U	<0.005 U	<0.005 U	<0.01 U
28-aug-1996	CS a	V	18.0	<0.005 U	<0.005 U	<0.005 U	<0.01 U
28-aug-1996	CS a	V	18.0	<0.005 U	<0.005 U	<0.005 U	<0.01 U
854-28							
21-aug-1996	CS a	V	1.0	–	–	–	–
21-aug-1996	CS a	V	3.0	–	–	–	–
21-aug-1996	CS a	V	6.0	–	–	–	–
21-aug-1996	CS a	V	12.0	–	–	–	–
21-aug-1996	CS a	V	18.0	–	–	–	–
21-aug-1996	CS a	V	24.0	–	–	–	–
854-29							
22-aug-1996	CS a	V	1.0	–	–	–	–
22-aug-1996	CS ag	V	6.0	–	–	–	–
22-aug-1996	CS a	V	12.0	–	–	–	–
22-aug-1996	CS a	V	18.0	–	–	–	–
23-aug-1996	CS a	V	24.0	–	–	–	–
26-aug-1996	CS a	V	30.0	–	–	–	–
26-aug-1996	CS a	V	36.0	–	–	–	–
26-aug-1996	CS a	V	42.0	–	–	–	–

the Building 854 area. Results recorded by March 20, 2003.

1,2 Dichloro-benzene	1,3 Dichloro-benzene	1,4 Dichloro-benzene	Chloro-benzene	Location Date
				(continued) 854-22
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	14-aug-1996
				854-23
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	03-sep-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	03-sep-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	03-sep-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	03-sep-1996
				854-24
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	19-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	19-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	19-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	19-aug-1996
				854-25
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	28-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	28-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	28-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	28-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	28-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	28-aug-1996
				854-26
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	16-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	16-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	16-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	16-aug-1996
				854-27
<0.005 U	<0.005 U	<0.005 U	<0.005 U	27-aug-1996
-	-	-	-	27-aug-1996
<0.005 U	<0.005 U	<0.005 U	<0.005 U	27-aug-1996
-	-	-	-	27-aug-1996
<0.005 U	<0.005 U	<0.005 U	<0.005 U	27-aug-1996
-	-	-	-	27-aug-1996
<0.005 U	<0.005 U	<0.005 U	<0.005 U	27-aug-1996
-	-	-	-	27-aug-1996
				854-27A
<0.005 U	<0.005 U	<0.005 U	<0.005 U	27-aug-1996
-	-	-	-	27-aug-1996
<0.005 U	<0.005 U	<0.005 U	<0.005 U	27-aug-1996
-	-	-	-	27-aug-1996
<0.005 U	<0.005 U	<0.005 U	<0.005 U	28-aug-1996
-	-	-	-	28-aug-1996
<0.005 U	<0.005 U	<0.005 U	<0.005 U	28-aug-1996
-	-	-	-	28-aug-1996
				854-28
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-aug-1996
				854-29
<0.0005 IUJ	<0.0005 IUJ	<0.0005 IUJ	<0.0005 IUJ	22-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	23-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	26-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	26-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	26-aug-1996

Table A-26. Aromatic hydrocarbons in soil and rock (mg/kg) collected from

Location Date	Lab	Val. Note	Depth (ft)	Benzene	Toluene	Ethyl-benzene	Total xylenes
854-29A							
05-nov-1996	CS	a	V 44.0	-	-	-	-
05-nov-1996	CS	agh	V 54.0	-	-	-	-
05-nov-1996	CS	a	V 64.0	-	-	-	-
06-nov-1996	CS	a	V 74.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
854-30							
15-aug-1996	CS	a	V 1.5	-	-	-	-
15-aug-1996	CS	ag	V 6.0	-	-	-	-
15-aug-1996	CS	a	V 12.0	-	-	-	-
15-aug-1996	CS	a	V 18.0	-	-	-	-
854-31							
30-aug-1996	CS	a	V 1.0	-	-	-	-
30-aug-1996	CS	a	V 6.0	-	-	-	-
30-aug-1996	CS	a	V 12.0	-	-	-	-
30-aug-1996	CS	a	V 18.0	-	-	-	-
854-32							
20-aug-1996	CS	a	V 1.0	-	-	-	-
20-aug-1996	CS	a	V 3.0	-	-	-	-
20-aug-1996	CS	a	V 6.0	-	-	-	-
20-aug-1996	CS	a	V 12.0	-	-	-	-
21-aug-1996	CS	a	V 18.0	-	-	-	-
21-aug-1996	CS	a	V 24.0	-	-	-	-
854-33							
28-aug-1996	CS	a	V 6.0	-	-	-	-
28-aug-1996	CS	a	V 11.0	-	-	-	-
854-34							
22-aug-1996	CS	a	V 1.0	-	-	-	-
22-aug-1996	CS	a	V 6.0	-	-	-	-
22-aug-1996	CS	a	V 12.0	-	-	-	-
22-aug-1996	CS	ag	V 18.0	-	-	-	-
22-aug-1996	CS	a	V 24.0	-	-	-	-
854-34A							
07-nov-1996	CS	a	V 56.0	-	-	-	-
07-nov-1996	CS	a	V 56.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
07-nov-1996	CS	a	V 66.0	-	-	-	-
07-nov-1996	CS	a	V 76.0	-	-	-	-
854-35							
19-aug-1996	CS	a	V 6.0	-	-	-	-
19-aug-1996	CS	a	V 12.0	-	-	-	-
19-aug-1996	CS	a	V 18.0	-	-	-	-
20-aug-1996	CS	ag	V 24.0	-	-	-	-
854-36							
20-aug-1996	CS	a	V 6.0	-	-	-	-
20-aug-1996	CS	ag	V 12.0	-	-	-	-
20-aug-1996	CS	a	V 18.0	-	-	-	-
20-aug-1996	CS	a	V 24.0	-	-	-	-
854-38							
06-sep-1996	CS	a	V 1.0	-	-	-	-
06-sep-1996	CS	a	V 6.0	-	-	-	-
06-sep-1996	CS	a	V 12.0	-	-	-	-
06-sep-1996	CS	a	V 18.0	-	-	-	-
854-40							
04-sep-1996	CS	a	V 1.0	-	-	-	-
04-sep-1996	CS	ag	V 6.0	-	-	-	-
04-sep-1996	CS	a	V 12.0	-	-	-	-
04-sep-1996	CS	a	V 18.0	-	-	-	-

the Building 854 area. Results recorded by March 20, 2003.

1,2 Dichloro-benzene	1,3 Dichloro-benzene	1,4 Dichloro-benzene	Chloro-benzene	Location Date
				854-29A
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	05-nov-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	05-nov-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	05-nov-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	06-nov-1996
				854-30
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	15-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	15-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	15-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	15-aug-1996
				854-31
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	30-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	30-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	30-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	30-aug-1996
				854-32
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	20-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	20-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	20-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	20-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-aug-1996
				854-33
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	28-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	28-aug-1996
				854-34
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-aug-1996
				854-34A
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	07-nov-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	07-nov-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	07-nov-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	07-nov-1996
				854-35
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	19-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	19-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	19-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	20-aug-1996
				854-36
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	20-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	20-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	20-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	20-aug-1996
				854-38
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	06-sep-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	06-sep-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	06-sep-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	06-sep-1996
				854-40
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	04-sep-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	04-sep-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	04-sep-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	04-sep-1996

Table A-26. Aromatic hydrocarbons in soil and rock (mg/kg) collected from

Location Date	Lab	Val. Note	Depth (ft)	Benzene	Toluene	Ethyl-benzene	Total xylenes
854-41							
06-sep-1996	CS a	V	1.0	-	-	-	-
16-sep-1996	CS ag	V	12.0	-	-	-	-
16-sep-1996	CS ag	V	24.0	-	-	-	-
854-44							
29-oct-1996	CS a	V	1.0	-	-	-	-
29-oct-1996	CS a	V	6.0	-	-	-	-
29-oct-1996	CS a	V	12.0	-	-	-	-
W-854-01							
21-nov-1995	CS a	V	0.5	-	-	-	-
21-nov-1995	CS ag	V	5.0	-	-	-	-
21-nov-1995	CS ag	V	10.0	-	-	-	-
21-nov-1995	CS a	V	20.0	-	-	-	-
21-nov-1995	CS a	V	22.0	-	-	-	-
21-nov-1995	CS a	V	25.0	-	-	-	-
21-nov-1995	CS a	V	40.0	-	-	-	-
21-nov-1995	CS a	V	40.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
22-nov-1995	CS a	V	60.0	-	-	-	-
22-nov-1995	CS a	V	60.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
22-nov-1995	CS ag	V	80.0	-	-	-	-
22-nov-1995	FS ag	V	80.0	-	-	-	-
22-nov-1995	CS ag	V	80.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
22-nov-1995	FS ag	V	80.0	<0.003 U	<0.003 U	<0.003 U	<0.003 U
27-nov-1995	CS a	V	100.0	-	-	-	-
27-nov-1995	CS a	V	121.0	-	-	-	-
13-dec-1995	CS a	V	141.0	-	-	-	-
04-jan-1996	CS a	V	193.3	-	-	-	-
04-jan-1996	CS a	V	223.1	-	-	-	-
04-jan-1996	CS a	V	236.0	-	-	-	-
05-jan-1996	CS a	V	246.0	-	-	-	-
05-jan-1996	CS a	V	256.0	-	-	-	-
05-jan-1996	CS a	V	264.0	-	-	-	-
08-jan-1996	CS a	V	301.1	-	-	-	-
09-jan-1996	CS a	V	350.8	-	-	-	-
09-jan-1996	CS ag	V	391.0	-	-	-	-
09-jan-1996	FS ag	V	391.0	-	-	-	-
09-jan-1996	FS ag	V	391.0	<0.003 U	<0.003 U	<0.003 U	<0.003 U
W-854-02							
22-jan-1996	CS a	V	0.5	-	-	-	-
22-jan-1996	CS a	V	0.5	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
22-jan-1996	CS a	V	5.0	-	-	-	-
22-jan-1996	CS a	V	5.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
22-jan-1996	CS a	V	10.0	-	-	-	-
22-jan-1996	CS a	V	10.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
22-jan-1996	FS a	V	10.0	<0.003 U	<0.003 U	<0.003 U	<0.003 U
23-jan-1996	CS a	V	20.1	-	-	-	-
23-jan-1996	CS a	V	20.1	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
23-jan-1996	CS a	V	33.0	-	-	-	-
23-jan-1996	CS a	V	33.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
24-jan-1996	CS a	V	42.0	-	-	-	-
24-jan-1996	CS a	V	52.5	-	-	-	-
24-jan-1996	CS a	V	62.0	-	-	-	-
24-jan-1996	CS a	V	73.0	-	-	-	-
25-jan-1996	CS a	V	93.0	-	-	-	-
25-jan-1996	CS a	V	106.0	-	-	-	-
25-jan-1996	CS a	V	116.0	-	-	-	-
25-jan-1996	CS a	V	124.1	-	-	-	-
30-jan-1996	CS a	V	132.0	-	-	-	-
30-jan-1996	CS a	V	139.1	-	-	-	-
01-feb-1996	CS a	V	147.7	-	-	-	-
01-feb-1996	CS a	V	156.5	-	-	-	-
01-feb-1996	CS a	V	162.0	-	-	-	-
01-feb-1996	CS a	V	167.0	-	-	-	-
01-feb-1996	CS a	V	170.6	-	-	-	-
01-feb-1996	CS a	V	176.0	-	-	-	-

the Building 854 area. Results recorded by March 20, 2003.

1,2 Dichloro-benzene	1,3 Dichloro-benzene	1,4 Dichloro-benzene	Chloro-benzene	Location Date
				854-41
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	06-sep-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	16-sep-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	16-sep-1996
				854-44
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	29-oct-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	29-oct-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	29-oct-1996
				W-854-01
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995
<0.005 U	<0.005 U	<0.005 U	<0.005 U	22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995
<0.003 U	<0.003 U	<0.003 U	<0.003 U	22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	27-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	27-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	13-dec-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	04-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	04-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	04-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	05-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	05-jan-1996
<0.0005 IUJ	<0.0005 IUJ	<0.0005 IUJ	<0.0005 IUJ	05-jan-1996
<0.0005 IUJ	<0.0005 IUJ	<0.0005 IUJ	<0.0005 IUJ	08-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	09-jan-1996
<0.0005 IUJ	<0.0005 IUJ	<0.0005 IUJ	<0.0005 IUJ	09-jan-1996
<0.005 U	<0.005 U	<0.005 U	<0.005 U	09-jan-1996
<0.003 UL	<0.003 UL	<0.003 UL	<0.003 U	09-jan-1996
				W-854-02
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-jan-1996
<0.003 U	<0.003 U	<0.003 U	<0.003 U	22-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	23-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	23-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	23-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	23-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	24-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	24-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	24-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	24-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	25-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	25-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	25-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	25-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	30-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	30-jan-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	01-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	01-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	01-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	01-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	01-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	01-feb-1996

Table A-26. Aromatic hydrocarbons in soil and rock (mg/kg) collected from

Location Date	Lab	Val. Note	Depth (ft)	Benzene	Toluene	Ethyl-benzene	Total xylenes
W-854-02 (continued)							
01-feb-1996	CS a	V	181.0	-	-	-	-
01-feb-1996	CS a	V	186.0	-	-	-	-
01-feb-1996	CS a	V	190.0	-	-	-	-
W-854-03							
14-feb-1996	CS ag	V	0.5	-	-	-	-
14-feb-1996	CS ag	V	0.5	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
14-feb-1996	CS ag	V	0.5	<0.005 U	<0.005 U	<0.005 U	<0.01 U
14-feb-1996	CS ag	V	5.0	-	-	-	-
14-feb-1996	CS ag	V	5.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
14-feb-1996	CS ag	V	5.0	<0.005 U	<0.005 U	<0.005 U	<0.01 U
14-feb-1996	CS a	V	10.0	-	-	-	-
14-feb-1996	CS a	V	10.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
14-feb-1996	CS a	V	20.0	-	-	-	-
14-feb-1996	CS a	V	20.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
14-feb-1996	CS ag	V	30.0	-	-	-	-
14-feb-1996	FS ag	V	30.0	-	-	-	-
14-feb-1996	CS ag	V	30.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
14-feb-1996	FS ag	V	30.0	<0.003 U	<0.003 U	<0.003 U	<0.003 U
15-feb-1996	CS a	V	41.0	-	-	-	-
15-feb-1996	CS a	V	41.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
15-feb-1996	CS a	V	54.0	-	-	-	-
15-feb-1996	CS a	V	54.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
15-feb-1996	CS a	V	61.0	-	-	-	-
15-feb-1996	CS a	V	61.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
15-feb-1996	CS a	V	76.0	-	-	-	-
15-feb-1996	CS a	V	76.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
15-feb-1996	CS ag	V	87.0	-	-	-	-
15-feb-1996	FS ag	V	87.0	-	-	-	-
15-feb-1996	CS ag	V	87.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
15-feb-1996	CS a	V	94.0	-	-	-	-
15-feb-1996	CS a	V	94.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
20-feb-1996	CS a	V	105.0	-	-	-	-
20-feb-1996	CS a	V	115.0	-	-	-	-
20-feb-1996	CS a	V	121.0	-	-	-	-
20-feb-1996	CS a	V	125.0	-	-	-	-
21-feb-1996	CS a	V	133.0	-	-	-	-
21-feb-1996	CS a	V	152.0	-	-	-	-
21-feb-1996	CS a	V	157.0	-	-	-	-
21-feb-1996	CS a	V	162.0	-	-	-	-
W-854-04							
28-feb-1996	CS a	V	0.5	-	-	-	-
28-feb-1996	CS a	V	0.5	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
28-feb-1996	CS a	V	0.5	<0.005 U	<0.005 U	<0.005 U	<0.01 U
29-feb-1996	CS a	V	51.0	-	-	-	-
29-feb-1996	CS a	V	61.0	-	-	-	-
29-feb-1996	CS a	V	78.0	-	-	-	-
29-feb-1996	CS a	V	91.0	-	-	-	-
04-mar-1996	CS a	V	121.0	-	-	-	-
04-mar-1996	CS a	V	135.0	-	-	-	-
05-mar-1996	CS a	V	157.0	-	-	-	-
05-mar-1996	CS a	V	162.0	-	-	-	-
18-mar-1996	CS a	V	183.0	-	-	-	-
19-mar-1996	CS a	V	219.0	-	-	-	-
19-mar-1996	CS a	V	235.0	-	-	-	-
20-mar-1996	CS a	V	267.0	-	-	-	-
20-mar-1996	CS a	V	277.0	-	-	-	-
21-mar-1996	CS a	V	315.0	-	-	-	-
25-mar-1996	CS a	V	336.0	-	-	-	-
W-854-05							
04-apr-1996	CS a	V	0.5	-	-	-	-
04-apr-1996	CS a	V	0.5	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
04-apr-1996	CS a	V	5.0	-	-	-	-
04-apr-1996	CS a	V	5.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
04-apr-1996	CS a	V	20.0	-	-	-	-

the Building 854 area. Results recorded by March 20, 2003.

1,2 Dichloro-benzene	1,3 Dichloro-benzene	1,4 Dichloro-benzene	Chloro-benzene	Location Date
				(continued) W-854-02
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	01-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	01-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	01-feb-1996
				W-854-03
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	14-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	14-feb-1996
<0.005 U	<0.005 U	<0.005 U	<0.005 U	14-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	14-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	14-feb-1996
<0.005 U	<0.005 U	<0.005 U	<0.005 U	14-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	14-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	14-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	14-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	14-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	14-feb-1996
<0.005 U	<0.005 U	<0.005 U	<0.005 U	14-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	14-feb-1996
<0.003 U	<0.003 U	<0.003 U	<0.003 U	14-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	15-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	15-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	15-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	15-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	15-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	15-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	15-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	15-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	15-feb-1996
<0.005 U	<0.005 U	<0.005 U	<0.005 U	15-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	15-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	15-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	15-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	20-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	20-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	20-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	20-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-feb-1996
				W-854-04
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	28-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	28-feb-1996
<0.005 U	<0.005 U	<0.005 U	<0.005 U	28-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	29-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	29-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	29-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	29-feb-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	04-mar-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	04-mar-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	05-mar-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	05-mar-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	18-mar-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 UO	19-mar-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 UO	19-mar-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	20-mar-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	20-mar-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-mar-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	25-mar-1996
				W-854-05
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	04-apr-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	04-apr-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	04-apr-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	04-apr-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	04-apr-1996

Table A-26. Aromatic hydrocarbons in soil and rock (mg/kg) collected from

Location Date	Lab	Val. Note	Depth (ft)	Benzene	Toluene	Ethyl-benzene	Total xylenes
W-854-05 (continued)							
10-apr-1996	CS a	V	30.0	–	–	–	–
10-apr-1996	CS a	V	40.0	–	–	–	–
10-apr-1996	CS a	V	60.0	–	–	–	–
11-apr-1996	CS a	V	80.0	–	–	–	–
W-854-06							
29-apr-1996	CS a	V	60.0	–	–	–	–
29-apr-1996	CS a	V	80.0	–	–	–	–
29-apr-1996	CS a	V	100.0	–	–	–	–
30-apr-1996	CS a	V	120.0	–	–	–	–
30-apr-1996	CS a	V	133.0	–	–	–	–
16-may-1996	BB a	V	136.0	–	–	–	–
30-apr-1996	CS a	V	140.0	–	–	–	–
16-may-1996	CS a	V	163.0	–	–	–	–
20-may-1996	CS a	V	173.0	–	–	–	–
20-may-1996	CS a	V	183.0	–	–	–	–
W-854-07							
07-jun-1996	CS a	V	115.0	–	–	–	–
07-jun-1996	CS a	V	121.0	–	–	–	–
07-jun-1996	CS a	V	124.0	–	–	–	–
07-jun-1996	CS a	V	129.0	–	–	–	–
07-jun-1996	CS a	V	134.0	–	–	–	–
07-jun-1996	CS a	V	140.0	–	–	–	–
W-854-08							
19-jun-1996	CS a	V	0.5	–	–	–	–
19-jun-1996	CS a	V	6.5	–	–	–	–
19-jun-1996	CS a	V	6.5	<0.0005 UO	<0.0005 UO	<0.0005 U	<0.001 U
19-jun-1996	CS a	V	11.0	–	–	–	–
19-jun-1996	CS a	V	11.0	<0.0005 UO	<0.0005 UO	<0.0005 U	<0.001 U
19-jun-1996	CS a	V	21.0	–	–	–	–
19-jun-1996	CS a	V	41.0	–	–	–	–
19-jun-1996	CS a	V	50.0	–	–	–	–
20-jun-1996	CS a	V	70.0	–	–	–	–
20-jun-1996	CS a	V	80.0	–	–	–	–
20-jun-1996	CS a	V	84.0	–	–	–	–
20-jun-1996	CS a	V	90.0	–	–	–	–
20-jun-1996	CS a	V	100.0	–	–	–	–
20-jun-1996	CS a	V	110.0	–	–	–	–
20-jun-1996	CS a	V	120.0	–	–	–	–
24-jun-1996	CS a	V	121.0	–	–	–	–
24-jun-1996	CS a	V	131.0	–	–	–	–
W-854-09							
03-jul-1996	CS a	V	0.5	–	–	–	–
03-jul-1996	CS a	V	10.0	–	–	–	–
03-jul-1996	CS a	V	20.0	–	–	–	–
03-jul-1996	CS a	V	30.0	–	–	–	–
08-jul-1996	CS a	V	40.0	–	–	–	–
11-jul-1996	CS a	V	180.0	–	–	–	–
11-jul-1996	CS a	V	185.0	–	–	–	–
11-jul-1996	CS a	V	190.0	–	–	–	–
W-854-10							
24-jul-1996	CS a	V	1.0	–	–	–	–
24-jul-1996	CS a	V	1.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
24-jul-1996	CS a	V	10.0	–	–	–	–
24-jul-1996	CS a	V	10.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
24-jul-1996	CS a	V	20.0	–	–	–	–
24-jul-1996	CS a	V	20.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
24-jul-1996	CS ag	V	30.0	–	–	–	–
24-jul-1996	BB ag	V	30.0	<0.0005 U	<0.0005 U	<0.001 U	<0.0021 U
24-jul-1996	CS ag	V	30.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
25-jul-1996	CS a	V	40.0	–	–	–	–
25-jul-1996	CS a	V	50.0	–	–	–	–
25-jul-1996	CS a	V	60.0	–	–	–	–

the Building 854 area. Results recorded by March 20, 2003.

1,2 Dichloro-benzene	1,3 Dichloro-benzene	1,4 Dichloro-benzene	Chloro-benzene	Location Date
				(continued) W-854-05
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	10-apr-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	10-apr-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	10-apr-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	11-apr-1996
				W-854-06
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	29-apr-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	29-apr-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	29-apr-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	30-apr-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	30-apr-1996
<0.0004 U	<0.0007 U	<0.0007 U	<0.0009 U	16-may-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	30-apr-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	16-may-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	20-may-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	20-may-1996
				W-854-07
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	07-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	07-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	07-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	07-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	07-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	07-jun-1996
				W-854-08
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 UO	19-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 UO	19-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 UO	19-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 UO	19-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 UO	19-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 UO	19-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 UO	19-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 UO	19-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	20-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	20-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	20-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	20-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	20-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	20-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	20-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	24-jun-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	24-jun-1996
				W-854-09
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	03-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	03-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	03-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	03-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	08-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	11-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	11-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	11-jul-1996
				W-854-10
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	24-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	24-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	24-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	24-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	24-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	24-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	24-jul-1996
<0.0006 U	<0.00039 U	<0.00045 U	<0.0003 U	24-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	24-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	25-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	25-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	25-jul-1996

Table A-26. Aromatic hydrocarbons in soil and rock (mg/kg) collected from

Location Date	Lab	Val. Note	Depth (ft)	Benzene	Toluene	Ethyl-benzene	Total xylenes
W-854-10 (continued)							
25-jul-1996	CS a	V	70.0	–	–	–	–
30-jul-1996	CS a	V	80.0	–	–	–	–
30-jul-1996	CS a	V	100.0	–	–	–	–
31-jul-1996	CS a	V	120.0	–	–	–	–
31-jul-1996	CS a	V	135.0	–	–	–	–
W-854-11							
08-aug-1996	CS a	V	1.0	–	–	–	–
08-aug-1996	CS a	V	1.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
08-aug-1996	CS a	V	10.0	–	–	–	–
08-aug-1996	CS a	V	10.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
08-aug-1996	CS a	V	20.0	–	–	–	–
12-aug-1996	CS a	V	30.0	–	–	–	–
12-aug-1996	CS a	V	40.0	–	–	–	–
12-aug-1996	CS a	V	50.0	–	–	–	–
12-aug-1996	CS a	V	60.0	–	–	–	–
13-aug-1996	CS a	V	80.0	–	–	–	–
13-aug-1996	BB ag	V	90.0	–	–	–	–
13-aug-1996	CS ag	V	90.0	–	–	–	–
13-aug-1996	CS a	V	100.0	–	–	–	–
14-aug-1996	CS a	V	125.0	–	–	–	–
14-aug-1996	CS a	V	140.0	–	–	–	–
14-aug-1996	CS a	V	150.0	–	–	–	–
14-aug-1996	CS a	V	160.0	–	–	–	–
14-aug-1996	CS a	V	170.0	–	–	–	–
W-854-12							
21-jan-1998	CS a	V	0.5	–	–	–	–
21-jan-1998	CS a	V	0.5	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
21-jan-1998	CS a	V	5.0	–	–	–	–
21-jan-1998	CS a	V	5.3	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
21-jan-1998	CS a	V	21.8	–	–	–	–
21-jan-1998	CS a	V	22.1	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
21-jan-1998	CS a	V	41.2	–	–	–	–
21-jan-1998	CS a	V	41.5	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
21-jan-1998	CS a	V	51.1	–	–	–	–
21-jan-1998	BB ahg	V	59.2	–	–	–	–
21-jan-1998	CS ag	V	59.2	–	–	–	–
22-jan-1998	CS a	V	71.1	–	–	–	–
22-jan-1998	CS a	V	86.4	–	–	–	–
23-jan-1998	CS a	V	91.0	–	–	–	–
23-jan-1998	CS a	V	111.5	–	–	–	–
23-jan-1998	BB ag	V	129.5	–	–	–	–
23-jan-1998	CS ag	V	129.5	–	–	–	–
23-jan-1998	CS a	V	133.2	–	–	–	–
23-jan-1998	CS a	V	136.4	–	–	–	–
26-jan-1998	BB ag	V	148.9	–	–	–	–
26-jan-1998	CS a	V	148.9	–	–	–	–
09-feb-1998	CS a	V	151.0	–	–	–	–
10-feb-1998	CS a	V	170.1	–	–	–	–
10-feb-1998	CS a	V	187.7	–	–	–	–
12-feb-1998	CS a	V	218.3	–	–	–	–
W-854-13							
10-mar-1998	CS a	V	97.2	–	–	–	–
10-mar-1998	CS a	V	104.1	–	–	–	–
10-mar-1998	CS a	V	107.3	–	–	–	–
10-mar-1998	BB ag	V	110.2	–	–	–	–
10-mar-1998	CS a	V	110.5	–	–	–	–
10-mar-1998	CS a	V	113.7	–	–	–	–
12-mar-1998	CS a	V	124.7	–	–	–	–
12-mar-1998	CS a	V	130.6	–	–	–	–
12-mar-1998	CS a	V	134.4	–	–	–	–
12-mar-1998	CS a	V	139.0	–	–	–	–
12-mar-1998	CS a	V	144.9	–	–	–	–
12-mar-1998	CS a	V	150.6	–	–	–	–
12-mar-1998	CS a	V	154.3	–	–	–	–

the Building 854 area. Results recorded by March 20, 2003.

1,2 Dichloro-benzene	1,3 Dichloro-benzene	1,4 Dichloro-benzene	Chloro-benzene	Location Date
				(continued) W-854-10
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	25-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	30-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	30-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	31-jul-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	31-jul-1996
				W-854-11
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	08-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	08-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	08-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	08-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	08-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	12-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	12-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	12-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	12-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	13-aug-1996
<0.0004 U	<0.0007 U	<0.0007 U	<0.0009 U	13-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	13-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	13-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	14-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	14-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	14-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	14-aug-1996
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	14-aug-1996
				W-854-12
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-jan-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-jan-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-jan-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-jan-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-jan-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-jan-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-jan-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-jan-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-jan-1998
<0.00073 U	<0.00089 U	<0.00117 U	<0.00119 U	21-jan-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-jan-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-jan-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-jan-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	23-jan-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	23-jan-1998
<0.00073 U	<0.00089 U	<0.00117 U	<0.00119 U	23-jan-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	23-jan-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	23-jan-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	23-jan-1998
<0.00073 U	<0.00089 U	<0.00117 U	<0.00119 U	26-jan-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	26-jan-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	09-feb-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	10-feb-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	10-feb-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	12-feb-1998
				W-854-13
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	10-mar-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	10-mar-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	10-mar-1998
<0.00073 U	<0.00089 U	<0.00117 U	<0.00119 U	10-mar-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	10-mar-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	10-mar-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	12-mar-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	12-mar-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	12-mar-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	12-mar-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	12-mar-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	12-mar-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	12-mar-1998

Table A-26. Aromatic hydrocarbons in soil and rock (mg/kg) collected from

Location Date	Lab	Val. Note	Depth (ft)	Benzene	Toluene	Ethyl-benzene	Total xylenes
W-854-13 (continued)							
12-mar-1998	BB ag	V	158.6	-	-	-	-
12-mar-1998	CS a	V	158.9	-	-	-	-
17-mar-1998	CS a	V	165.5	-	-	-	-
W-854-14							
14-jul-1998	CS a	V	3.9	-	-	-	-
14-jul-1998	CS a	V	3.9	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
15-jul-1998	CS a	V	15.0	-	-	-	-
15-jul-1998	CS a	V	15.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
15-jul-1998	CS a	V	50.6	-	-	-	-
15-jul-1998	CS a	V	50.6	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
20-jul-1998	CS a	V	60.1	-	-	-	-
20-jul-1998	CS a	V	60.1	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
20-jul-1998	CS a	V	70.3	-	-	-	-
20-jul-1998	BB ag	V	70.3	<0.0011 U	<0.00126 U	<0.0015 U	<0.00348 U
20-jul-1998	CS a	V	70.3	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
22-jul-1998	CS a	V	81.5	-	-	-	-
22-jul-1998	CS a	V	81.5	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
22-jul-1998	CS a	V	91.7	-	-	-	-
22-jul-1998	CS a	V	91.7	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
22-jul-1998	CS a	V	102.3	-	-	-	-
22-jul-1998	CS a	V	102.3	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
22-jul-1998	CS a	V	111.2	-	-	-	-
22-jul-1998	CS a	V	111.2	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
W-854-15							
17-jun-1999	CN a	V	70.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
17-jun-1999	CN a	V	75.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
17-jun-1999	CN a	V	80.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
17-jun-1999	CN a	V	85.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
23-jun-1999	CN a	V	90.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
23-jun-1999	CN a	V	95.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
23-jun-1999	CN a	V	100.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
23-jun-1999	BB agj	V	105.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
23-jun-1999	CN ag	V	105.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
23-jun-1999	CN a	V	115.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
23-jun-1999	CN a	V	128.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
23-jun-1999	CN a	V	137.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
23-jun-1999	CN a	V	142.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
W-854-17							
22-jul-1999	CN a	V	8.5	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
22-jul-1999	CN a	V	19.5	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
22-jul-1999	CN a	V	30.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
26-jul-1999	CN a	V	85.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
26-jul-1999	CN a	V	90.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
26-jul-1999	CN a	V	95.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
26-jul-1999	CN a	V	105.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
28-jul-1999	CN a	V	110.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
28-jul-1999	BB ag	V	115.0	<0.0005 U	0.00056	<0.0005 U	<0.0005 U
28-jul-1999	CN ag	V	115.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
28-jul-1999	CN a	V	119.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
28-jul-1999	CN a	V	130.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
28-jul-1999	CN a	V	134.5	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
28-jul-1999	CN a	V	145.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
W-854-19							
08-jul-1999	CN a	V	52.5	<0.0005 OU	<0.0005 OU	<0.0005 U	<0.0005 OU
08-jul-1999	CN a	V	60.0	<0.0005 OU	<0.0005 OU	<0.0005 U	<0.0005 OU
08-jul-1999	CN a	V	65.0	<0.0005 OU	<0.0005 OU	<0.0005 U	<0.0005 OU
08-jul-1999	CN a	V	70.0	<0.0005 OU	<0.0005 OU	<0.0005 U	<0.0005 OU
08-jul-1999	BB agj	V	75.0	<0.0005 U	0.00068 B	<0.0005 U	<0.0005 U
08-jul-1999	CN ag	V	75.0	<0.0005 OU	<0.0005 OU	<0.0005 U	<0.0005 OU
W-854-45							
27-nov-2000	BB a	V	5.0	<0.0005 LU	<0.0005 U	<0.0005 U	<0.0005 U
29-nov-2000	BB a	V	91.0	<0.0005 LU	<0.0005 U	<0.0005 U	<0.0005 U

the Building 854 area. Results recorded by March 20, 2003.

1,2 Dichloro-benzene	1,3 Dichloro-benzene	1,4 Dichloro-benzene	Chloro-benzene	Location Date
				(continued) W-854-13
<0.00073 U	<0.00089 U	<0.00117 U	<0.00119 U	12-mar-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	12-mar-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	17-mar-1998
				W-854-14
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	14-jul-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	14-jul-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	15-jul-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	15-jul-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	15-jul-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	15-jul-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	20-jul-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	20-jul-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	20-jul-1998
<0.00073 U	<0.00089 U	<0.00117 U	<0.00119 U	20-jul-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	20-jul-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-jul-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-jul-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-jul-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-jul-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-jul-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-jul-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-jul-1998
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-jul-1998
				W-854-15
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	17-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	17-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	17-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	17-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	23-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	23-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	23-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	23-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	23-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	23-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	23-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	23-jun-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	23-jun-1999
				W-854-17
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-jul-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-jul-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-jul-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	26-jul-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	26-jul-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	26-jul-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	26-jul-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	28-jul-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	28-jul-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	28-jul-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	28-jul-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	28-jul-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	28-jul-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	28-jul-1999
				W-854-19
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	08-jul-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	08-jul-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	08-jul-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	08-jul-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	08-jul-1999
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	08-jul-1999
				W-854-45
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	27-nov-2000
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	29-nov-2000

Table A-26. Aromatic hydrocarbons in soil and rock (mg/kg) collected from

Location Date	Lab	Val. Note	Depth (ft)	Benzene	Toluene	Ethyl-benzene	Total xylenes
W-854-45 (continued)							
29-nov-2000	BB a	V	106.0	<0.0005 LU	<0.0005 U	<0.0005 U	<0.0005 U
29-nov-2000	BB a	V	112.0	<0.0005 LU	<0.0005 U	<0.0005 U	<0.0005 U
B-854-1706							
27-mar-2001	BB a	V	2.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
28-mar-2001	BB a	V	7.5	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
28-mar-2001	BB a	V	9.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
28-mar-2001	BB a	V	11.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
28-mar-2001	BB a	V	13.5	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
B-854-1707							
23-apr-2001	BB a	V	57.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
23-apr-2001	BB a	V	64.6	<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U
3SS-854-001							
29-nov-1995	CS a	V	0.0	-	-	-	-
29-nov-1995	CS a	V	0.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
3SS-854-002							
29-nov-1995	CS a	V	0.0	-	-	-	-
29-nov-1995	CS a	V	0.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
3SS-854-003							
21-nov-1995	CS a	V	0.0	-	-	-	-
21-nov-1995	CS a	V	0.0	<0.0005 U	0.00062	<0.0005 U	<0.001 U
3SS-854-004							
21-nov-1995	CS a	V	0.0	-	-	-	-
21-nov-1995	CS a	V	0.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
3SS-854-005							
21-nov-1995	CS a	V	0.0	-	-	-	-
21-nov-1995	CS a	V	0.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
3SS-854-006							
21-nov-1995	CS a	V	0.0	-	-	-	-
21-nov-1995	CS a	V	0.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
3SS-854-007							
21-nov-1995	CS a	V	0.0	-	-	-	-
21-nov-1995	CS a	V	0.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
3SS-854-008							
21-nov-1995	CS a	V	0.0	-	-	-	-
21-nov-1995	CS a	V	0.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
3SS-854-009							
21-nov-1995	CS a	V	0.0	-	-	-	-
21-nov-1995	CS a	V	0.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
3SS-854-010							
21-nov-1995	CS a	V	0.0	-	-	-	-
21-nov-1995	FS a	V	0.0	-	-	-	-
21-nov-1995	CS a	V	0.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
21-nov-1995	FS a	V	0.0	<0.003 U	<0.003 U	<0.003 U	<0.003 U
3SS-854-011							
22-nov-1995	CS a	V	0.0	-	-	-	-
22-nov-1995	CS a	V	0.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
3SS-854-012							
22-nov-1995	CS a	V	0.0	-	-	-	-
22-nov-1995	CS a	V	0.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
3SS-854-013							
22-nov-1995	CS a	V	0.0	-	-	-	-
22-nov-1995	CS a	V	0.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U

the Building 854 area. Results recorded by March 20, 2003.

1,2 Dichloro- benzene	1,3 Dichloro- benzene	1,4 Dichloro- benzene	Chloro- benzene	Location Date
				(continued) W-854-45
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	29-nov-2000
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	29-nov-2000
				B-854-1706
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	27-mar-2001
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	28-mar-2001
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	28-mar-2001
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	28-mar-2001
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	28-mar-2001
				B-854-1707
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	23-apr-2001
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	23-apr-2001
				3SS-854-001
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	29-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	29-nov-1995
				3SS-854-002
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	29-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	29-nov-1995
				3SS-854-003
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-nov-1995
				3SS-854-004
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-nov-1995
				3SS-854-005
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-nov-1995
				3SS-854-006
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-nov-1995
				3SS-854-007
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-nov-1995
				3SS-854-008
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-nov-1995
				3SS-854-009
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-nov-1995
				3SS-854-010
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-nov-1995
<0.005 U	<0.005 U	<0.005 U	<0.005 U	21-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	21-nov-1995
<0.003 U	<0.003 U	<0.003 U	<0.003 U	21-nov-1995
				3SS-854-011
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995
				3SS-854-012
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995
				3SS-854-013
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995

Table A-26. Aromatic hydrocarbons in soil and rock (mg/kg) collected from

Location Date	Lab	Val. Note	Depth (ft)	Benzene	Toluene	Ethyl-benzene	Total xylenes
3SS-854-014							
22-nov-1995	CS a	V	0.0	-	-	-	-
22-nov-1995	CS a	V	0.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
3SS-854-015							
22-nov-1995	CS a	V	0.0	-	-	-	-
22-nov-1995	CS a	V	0.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
3SS-854-016							
22-nov-1995	CS a	V	0.0	-	-	-	-
22-nov-1995	CS a	V	0.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
3SS-854-017							
22-nov-1995	CS a	V	0.0	-	-	-	-
22-nov-1995	CS a	V	0.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
3SS-854-018							
22-nov-1995	CS a	V	0.0	-	-	-	-
22-nov-1995	CS a	V	0.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
3SS-854-019							
22-nov-1995	CS a	V	0.0	-	-	-	-
22-nov-1995	CS a	V	0.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
3SS-854-020							
22-nov-1995	CS a	V	0.0	-	-	-	-
22-nov-1995	FS a	V	0.0	-	-	-	-
22-nov-1995	CS a	V	0.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
22-nov-1995	FS a	V	0.0	<0.003 U	<0.003 U	<0.003 U	<0.003 U
3SS-854-021							
29-nov-1995	CS a	V	0.0	-	-	-	-
29-nov-1995	CS a	V	0.0	<0.0005 U	<0.0005 U	<0.0005 U	0.0029
29-nov-1995	CS a	V	0.0	<0.005 U	<0.005 U	<0.005 U	<0.01 U
3SS-854-022							
22-nov-1995	CS a	V	0.0	-	-	-	-
22-nov-1995	CS a	V	0.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
22-nov-1995	CS a	V	0.0	<0.005 U	<0.005 U	<0.005 U	<0.01 U
3SS-854-023							
22-nov-1995	CS a	V	0.0	-	-	-	-
22-nov-1995	CS a	V	0.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
3SS-854-024							
22-nov-1995	CS a	V	0.0	-	-	-	-
22-nov-1995	CS a	V	0.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
3SS-854-025							
22-nov-1995	CS a	V	0.0	-	-	-	-
22-nov-1995	CS a	V	0.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
3SS-854-026							
22-nov-1995	CS a	V	0.0	-	-	-	-
22-nov-1995	CS a	V	0.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
3SS-854-027							
29-nov-1995	CS a	V	0.0	-	-	-	-
29-nov-1995	CS a	V	0.0	<0.0005 U	<0.0005 U	<0.0005 U	0.001
29-nov-1995	CS a	V	0.0	<0.005 U	<0.005 U	<0.005 U	<0.01 U
3SS-854-028							
29-nov-1995	CS a	V	0.0	-	-	-	-
29-nov-1995	CS a	V	0.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
29-nov-1995	CS a	V	0.0	<0.005 U	<0.005 U	<0.005 U	<0.01 U

the Building 854 area. Results recorded by March 20, 2003.

1,2 Dichloro-benzene	1,3 Dichloro-benzene	1,4 Dichloro-benzene	Chloro-benzene	Location Date
				3SS-854-014
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995
				3SS-854-015
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995
				3SS-854-016
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995
				3SS-854-017
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995
				3SS-854-018
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995
				3SS-854-019
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995
				3SS-854-020
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995
<0.005 U	<0.005 U	<0.005 U	<0.005 U	22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995
<0.003 U	<0.003 U	<0.003 U	<0.003 U	22-nov-1995
				3SS-854-021
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	29-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	29-nov-1995
<0.005 U	<0.005 U	<0.005 U	<0.005 U	29-nov-1995
				3SS-854-022
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995
<0.005 U	<0.005 U	<0.005 U	<0.005 U	22-nov-1995
				3SS-854-023
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995
				3SS-854-024
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995
				3SS-854-025
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995
				3SS-854-026
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	22-nov-1995
				3SS-854-027
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	29-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	29-nov-1995
<0.005 U	<0.005 U	<0.005 U	<0.005 U	29-nov-1995
				3SS-854-028
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	29-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	29-nov-1995
<0.005 U	<0.005 U	<0.005 U	<0.005 U	29-nov-1995

Table A-26. Aromatic hydrocarbons in soil and rock (mg/kg) collected from

Location Date	Lab	Val. Note	Depth (ft)	Benzene	Toluene	Ethyl-benzene	Total xylenes
EFA/WFA Study Area (continued)							
3SS-854-029							
29-nov-1995	CS a	V	0.0	-	-	-	-
29-nov-1995	CS a	V	0.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
29-nov-1995	CS a	V	0.0	<0.005 U	<0.005 U	<0.005 U	<0.01 U
3SS-854-030							
29-nov-1995	CS a	V	0.0	-	-	-	-
29-nov-1995	CS a	V	0.0	<0.0005 U	<0.0005 U	<0.0005 U	<0.001 U
29-nov-1995	CS a	V	0.0	<0.005 U	<0.005 U	<0.005 U	<0.01 U
29-nov-1995	FS a	V	0.0	<0.005 U	<0.005 U	<0.005 U	<0.005 U

the Building 854 area. Results recorded by March 20, 2003.

1,2 Dichloro-benzene	1,3 Dichloro-benzene	1,4 Dichloro-benzene	Chloro-benzene	Location Date
				3SS-854-029
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	29-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	29-nov-1995
<0.005 U	<0.005 U	<0.005 U	<0.005 U	29-nov-1995
				3SS-854-030
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	29-nov-1995
<0.0005 U	<0.0005 U	<0.0005 U	<0.0005 U	29-nov-1995
<0.005 U	<0.005 U	<0.005 U	<0.005 U	29-nov-1995
<0.005 U	<0.005 U	<0.005 U	<0.005 U	29-nov-1995

See following page for notes

Table A-26. Aromatic hydrocarbons in soil and rock (mg/kg) collected from the Building 854 area. Results recorded by March 20, 2003.

Notes:

- Indicates no analysis performed for this compound

Val. = Validation code

Footnotes:

a ERD data
b ORAD WGMG data
c Analytical results for this sample are suspect
d Sample collected during hydraulic testing
e Blind sample, sent to lab without location identity
f Sample dilution necessary for analysis; detection limits increased
g Interlaboratory collocated sample
h Intralaboratory collocated sample
i Sample collected as part of pilot study
j Note field may contain important information regarding this sample
k Pre-development sample
l Norm month, norm quarter or norm year inconsistent with sample date
m Confirmation sample
n Sample analyzed after standard holding time
o Sample comprised of partial composite
p Alpha spectroscopy analysis of uranium isotopes
q Gamma spectroscopy analysis of uranium isotopes
r Tritium data represents non-detect with activity calc'd for 100 percent error.

Lab Codes:

BB	BC Laboratories, Inc.	Bakersfield, CA
CN	Caltest Analytical Laboratory	1885 N. Kelly Rd, Napa, CA 94558
CS	California Laboratory Services	3249 Fitzgerald Rd. Rancho Cordova, CA 95742
FS	FruitGrowers Environmental Lab	2500 Stagecoach Rd., Stockton, CA 95215

Validation Codes:

V Validated
N Not validated (default value)
U Undeclared
H Historical comparison only

CLP flags: (follow result)

B Analyte found in method blank
D Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E The analyte was detected below the LLNL reporting limit, but above the analytical laboratory minimum detection limit.
F Analyte found in field blank, trip blank, or equipment blank
G Quantitated using fuel calibration, but does not match typical fuel fingerprint (fuel maybe gasoline, diesel, motor oil etc.).
H Sample analyzed outside of holding time, sample results should be evaluated
J Analyte was postively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
L Spike accuracy not within control limits
O Duplicate spike or sample precision not within control limits
P Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S Analytical results for this sample are suspect
T Analyte is tentatively identified compound; result is approximate
U Compound was analyzed for, but not detected above detection limit

Table A-27. Thorium isotopes in ground water and surface water (pCi/L) collected from the Building 854 area. Results recorded by March 20, 2003.

Thorium Isotopes in Ground Water, Site 300
March 24, 2003
gemini2

s3thorium.24mar2003

Table A-27. Thorium isotopes in ground water and surface water (pCi/L) collected from the Building 854 area. Results recorded by March 20, 2003.

Location Date	Lab	Note	Val.	Thorium 228 by mass measurement	Thorium 230 by mass measurement	Thorium 232 by mass measurement
W-854-01						
27-jun-1996	IC	a	V	-	-	12.5 +/- 0.2F
29-dec-1998	IC	a	N	-	-	9.26e-05 +/- 1.5e-06H
W-854-02						
27-jun-1996	IC	a	V	-	-	59 +/- 2UF
29-dec-1998	IC	a	N	-	-	0.000363 +/- 1.9e-05H
W-854-03						
29-dec-1998	IC	a	N	-	-	0.000335 +/- 1.1e-05H
W-854-04						
16-aug-1996	IC	a	V	-	-	0.0714 +/- 0.005
W-854-05						
16-aug-1996	IC	a	V	-	-	0.00853 +/- 0.00027
29-dec-1998	IC	a	N	-	-	0.000151 +/- 1.3e-05H
W-854-08						
13-dec-1996	IC	a	V	-	-	<0.0001 +/- 3.1e-05U
W-854-09						
29-dec-1998	IC	a	N	-	-	0.151 +/- 0.002H
W-854-10						
06-feb-1997	IC	a	V	-	-	<5e-06 U
29-dec-1998	IC	a	N	-	-	0.0004 +/- 2e-05H
W-854-11						
19-feb-1997	IC	a	V	-	-	0.00281 +/- 0.00014
29-dec-1998	IC	a	N	-	-	0.0429 +/- 0.0002H
W-854-15						
29-jun-2000	IC	a	N	-	-	0.00530528 +/- 6.78e-05
W-854-17						
08-may-2001	IC	a	N	-	-	0.00951043 +/- 0.000303889
W-854-18A						
30-jun-2000	IC	a j	N	-	-	0.00178266 +/- 5.58e-05

See following page for notes

Table A-27. Thorium isotopes in ground water and surface water (pCi/L) collected from the Building 854 area. Results recorded by March 20, 2003.

Notes:

- Indicates no analysis performed for this compound

Val. = Validation code

Footnotes:

a ERD data
b ORAD WGMG data
c Analytical results for this sample are suspect
d Sample collected during hydraulic testing
e Blind sample, sent to lab without location identity
f Sample dilution necessary for analysis; detection limits increased
g Interlaboratory collocated sample
h Intralaboratory collocated sample
i Sample collected as part of pilot study
j Note field may contain important information regarding this sample
k Pre-development sample
l Norm month, norm quarter or norm year inconsistent with sample date
m Confirmation sample
n Sample analyzed after standard holding time
o Sample comprised of partial composite
p Alpha spectroscopy analysis of uranium isotopes
q Gamma spectroscopy analysis of uranium isotopes
r Tritium data represents non-detect with activity calc'd for 100 percent error.

Lab Codes:

IC ICP MS Facility

Validation Codes:

V Validated
N Not validated (default value)
U Undeclared
H Historical comparison only

CLP flags: (follow result)

B Analyte found in method blank
D Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E The analyte was detected below the LLNL reporting limit, but above the analytical laboratory minimum detection limit.
F Analyte found in field blank, trip blank, or equipment blank
G Quantitated using fuel calibration, but does not match typical fuel fingerprint (fuel maybe gasoline, diesel, motor oil etc.).
H Sample analyzed outside of holding time, sample results should be evaluated
J Analyte was postively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
L Spike accuracy not within control limits
O Duplicate spike or sample precision not within control limits
P Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S Analytical results for this sample are suspect
T Analyte is tentatively identified compound; result is approximate
U Compound was analyzed for, but not detected above detection limit

Acronyms and Abbreviations

Acronyms and Abbreviations

1,1-DCE	1,1-dichloroethylene
2-D	Two-dimensional
ACI	American Concrete Institute
AISC	American Institute of Steel Construction
ANSI	American National Standards Institute
AQ	Aqueous phase granular activated carbon
ASTM	American Society for Testing and Materials
AWS	American Welding Society
bgs	Below ground surface
BIO	Bioreactor
BTU	Bio Treatment Unit
CCR	California Code of Regulations
$CHCl_3$	Chloroform
CDD	Chlorinated dibenzo-p-dioxin
CDF	Chlorinated dibenzofuran
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
ClO_4^-	Perchlorate
CMP	Compliance Monitoring Plan
COC	Contaminants of Concern
CWS	Containerized wetland system
CY	Calendar year
DIS	Distal
DOE	U.S. Department of Energy
DOL	Department of Labor
DOT	Department of Transportation
DTSC	California Department of Toxic Substances Control
EPA	U.S. Environmental Protection Agency
EPD	Environmental Protection Department
ERD	Environmental Restoration Division
ES&H	Environmental Safety & Health
FFA	Federal Facility Agreement
FIDs	Flame ionization detectors
ft	Feet, foot
ft/s	Feet per seconds
ft^2	Square feet
ft^3	Cubic feet
GAC	Granular activated carbon
gal	Gallon(s)
gpd	Gallons per day
gpm	Gallons per minute
GTU	GAC Treatment Unit
GWE	Ground water extraction
HE	High explosives
HMX	Cyclotetramethylene tetranitramine
hp	Horsepower
HpCDD	Heptachlorinated dibenzo-p-dioxin

HpCDF	Heptachlorinated dibenzofuran
hrs	Hours
HSU	Hydrostratigraphic unit
HxCDD	Hexachlorinated dibenzo-p-dioxin
HxCDF	Hexachlorinated dibenzofuran
Hz	Hertz
ICBO	International Conference of Building Officials (ICBO)
ID	Identification
in.	Inch
Inf Tr	Infiltration trench
I/O	Input/output
IX	Ion-exchange
IWS	Integration Work Sheet
kg	Kilograms
lb	Pound(s)
LLNL	Lawrence Livermore National Laboratory
MCL	Maximum Contaminant Level
mA	Milliamp
μg/L	Micrograms per liter
mg/kg	Milligrams per kilogram
mg/L	Milligrams per liter
mgN/kg	Milligram of nitrate per kilogram of soil sample
MW	Monitor well
NA	Not analyzed; not applicable; not available
NFPA	National Fire Protection Association
NO_3	Nitrate
NRTL	Nationally Recognized Testing Laboratory
OCDD	Octachlorodibenzo-p-dioxin
OCDF	Octachlorodibenzofuran
O&M	Operations and maintenance
OSHA	Occupational Safety and Health Administration
OU	Operable unit
OVA	Organic vapor analyzer
P&ID	Piping and instrument diagram
PeCDD	Pentachlorinated dibenzo-p-dioxin
PeCDF	Pentachlorinated dibenzofuran
PEL(s)	Piping and instrumentation diagram
PEPM	Plant Engineering Project Leader
PEST	Parameter automated estimation tool
ppm_v	Parts per million per volume
PRG	Preliminary Remediation Goal
PRX	Proximal
psi	Pounds per square inch
PVC	Polyvinyl chloride
PVDF	Polyvinylidene fluoride
QA	Quality assurance
Qal	Quaternary Alluvium
QAMP	Quality Assurance Management Plan
QAPP	Quality Assurance Project Plan
QA/QC	Quality assurance/quality control
QC	Quality control
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RDWP	Remedial Design Work Plan
RHWMD	Radioactive and Hazardous Waste Management Division
ROD	Record of Decision

RPM	Remedial Project Manager
RWQCB	California Regional Water Quality Control Board
SARA	Superfund Amendments and Reauthorization Act
SCADA	Supervisory Control and Data Acquisition
SCFM	Standard cubic feet per minute
sec	Second(s)
SJVUAPCD	San Joaquin Valley Unified Air Pollution Control District
SOP	Standard Operating Procedure
SRC	Source
STU	Solar-powered Treatment Unit
SVE	Soil vapor extraction
SVS	Soil vapor survey
SWFS	Site-Wide Feasibility Study
SWRI	Site-Wide Remedial Investigation
TBD	To be determined
TBOS	Tetra 2-ethylbutylorthosilicate
TCDD	Tetrachlorodibenzo-p-dioxin
TCDF	Tetrachlorodibenzofuran
TCE	Trichloroethylene
TEF	Toxicity Equivalency Factor
THA	Total hydrocarbon Analyzer
TLVs	Threshold limit values
Tmss	Cierbo Formation – Lower Siltstone/Claystone Member
$Tnbs_1$	Tertiary Neroly Formation – Lower Blue Sandstone Member
$Tnsc_0$	Tertiary Neroly Formation – Lower Siltstone/Claystone Member
TVOC	Total volatile organic compound
UCRL	University of California Research Laboratory
UBC	Uniform Building Code
UMC	Uniform mechanical Code
UPC	Uniform Plumbing Code
VAC	Volts alternating current
VOC	Volatile organic compound
V p-p	Volts peak to peak
VDC	Volts direct current

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