Formerly Utilized Sites
Remedial Action Program
(FUSRAP)

Maywood Chemical Company Superfund Site

ADMINISTRATIVE RECORD

Operable Unit 2 - Groundwater

Document Number

GW-011

US Army Corps
of Engineers®
New York District

Groundwater Remedial Investigation Report Addendum

Volume I
Report Text and Appendices

New York District
Formerly Utilized Sites Remedial Action Program
Maywood Superfund Site

Prepared by:

Shaw® Shaw Environmental, Inc.
100 West Hunter Ave.
Maywood, New Jersey 07607

for:
US Army Corps of Engineers - Kansas City District
Formerly Utilized Sites Remedial Action Program
Contract No. DACW41-99-D-9001

US Army Corps of Engineers®

March 2004, Revision 3

DRAFT
GROUNDWATER REMEDIAL INVESTIGATION REPORT ADDENDUM

FUSRAP MAYWOOD SUPERFUND SITE
MAYWOOD, NEW JERSEY

SITE-SPECIFIC ENVIRONMENTAL RESTORATION
CONTRACT No. DACW41-99-D-9001
TASK ORDER 00001
WAD 05, WBS 15

Submitted to:

Department of the Army
U.S. Army Engineer District, New York
Corps of Engineers
FUSRAP Project Office
26 Federal Plaza
New York, New York 10278

Department of the Army
U.S. Army Engineer District, Kansas City
Corps of Engineers
700 Federal Building
Kansas City, Missouri 64106

Submitted by:

Shaw Environmental, Inc.
100 West Hunter Avenue
Maywood, New Jersey 07607

March 2004
Revision 3

Volume 1
Report Text and Appendices

Issued to: ______________________________ Date:

Copy No. _____ ☐ Controlled ☐ Uncontrolled

DRAFT
GROUNDWATER REMEDIAL INVESTIGATION REPORT ADDENDUM

FUSRAP MAYWOOD SUPERFUND SITE
MAYWOOD, NEW JERSEY

SITE-SPECIFIC ENVIRONMENTAL RESTORATION
CONTRACT No. DACW41-99-D-9001
TASK ORDER 00001
WAD 05, WBS 15

Submitted to:

Department of the Army
U.S. Army Engineer District, New York
Corps of Engineers
FUSRAP Project Office
26 Federal Plaza
New York, New York 10278

Department of the Army
U.S. Army Engineer District, Kansas City
Corps of Engineers
700 Federal Building
Kansas City, Missouri 64106

Submitted by:

Shaw Environmental, Inc.
100 West Hunter Avenue
Maywood, New Jersey 07607

March 2004
Revision 3

Volume 1
Report Text and Appendices

Reviewed / Approved by: ______________________ Date: ____________
Andy Mills
Project Manager

Reviewed / Approved by: ______________________ Date: ____________
Kevin F. Donnelly, P.E.
Project Environmental Engineer / Task Manager

Reviewed / Approved by: ______________________ Date: ____________
Alan F. Brown, P.E.
Contractor Quality Control System Manager

Reviewed / Approved by: ______________________ Date: ____________
Robert DeMott, R.G.
Project Hydrogeologist

Reviewed / Approved by: ______________________ Date: ____________
Michael R. Kulbersh, P.H.G.
Hydrogeologist

RECORD OF REVISIONS

Revision No.	Description of Revision	Date
Revision 01	Issue of Draft Report	August 2003
Revision 02	Issue of Revised Draft Report	October 2003
Revision 03	Issue of Revised Draft Report	January 2004

This page intentionally left blank.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

This page intentionally left blank.

ABBREVIATIONS, ACRONYMS, FORMULAS AND SYMBOLS

µg/L	microgram per liter
µg/kg	microgram per kilogram
ALT	Advanced Logic Technologies
ATP	Adenine Triphosphate
ATV	acoustic televiewer
B	blank contamination data qualifier
BOD_5	biological oxygen demand
BRA	Baseline Risk Assessment
BTEX	benzene, toluene, ethylbenzene, and xylenes
CAD	computer aided drafting
CDQMP	Chemical Data Quality Management Plan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFU	colony forming units
CH_4	methane
COD	chemical oxygen demand
D	dilution data qualifier
DO	dissolved oxygen
DOE	U.S. Department of Energy
EDSA	Electronic Data Submittal Application
EE/CA	Engineering Analysis / Cost Evaluation
Eh	redox potential
EMP	Environmental Monitoring Program
EPA	U.S. Environmental Protection Agency
Fe^{+2}	divalent iron
Fe_{solid}	trivalent iron (mineral form)
FFA	Federal Facilities Agreement
FMSS	FUSRAP Maywood Superfund Site
FRes	field resistivity
FTemp	field temperature as related to borehole geophysics
FS	Feasibility Study
FUSRAP	Formerly Utilized Sites Remedial Action Program
gpm	gallons per minute
GWQC	New Jersey Groundwater Quality Criteria
GWRI	Groundwater Remedial Investigation
ICP	Inductively Coupled Plasma
J	estimated data qualifier
Kd	Batch Sorption Soil Distribution test
km	kilometer
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MCA	Methods for Chemical Analysis
MCL	Maximum Contaminant Level
MCW	Maywood Chemical Works
mi	miles
MISS	Maywood Interim Storage Site
mL	milliliters
mL/min	milliliters per minute
Mn^{+2}	divalent manganese
Mn^{+3}	trivalent manganese
Mn^{+4}	Manganese (solid)
Mn_{solid}	Manganese (solid)

MNA	monitored natural attenuation
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NAD	North American Datum
NGVD	National Geodetic Vertical Datum
NH_4^+	ammonia
NO_3^-	nitrate
NJ	New Jersey
NJDEP	New Jersey Department of Environmental Protection
NJ	GWQC New Jersey Groundwater Quality Criteria
NE	northeast azmithal bearing
NNE	north-northeast azmithal bearing
NPL	National Priorities List
NTU	Nephelometric Turbidity Units
NW	Northwest Azmithal Bearing
ORP	Oxidation Reduction Potential
PCE	Tetrachloroethene
PID	photoionization detector
POTW	Publicly Owned Treatment Works
PVC	polyvinyl chloride
Q	Flow Rate, ft3/day
QA/QC	quality assurance / quality control
R	rejected data qualifier
RA	Risk Assessment
RAGS	Risk Assessment Guidance for Superfund
RI	Remedial Investigation
s	Drawdown, ft
SAIC	Science Applications International Corporation
Shaw	Shaw Environmental, Inc.
SM	Standard Methods
S^{-2}	sulfide
$SO_4^=$	sulfate
S&W	Stone & Webster, Inc.
SP	spontaneous potential
SPR	single point resistance
SSW	south-southwest azmithal bearing
STL	Severn Trent Laboratories, Inc.
SW	southwest azmithal bearing
T	transmissivity, ft^2/day
TCE	trichloroethene
TCL	target compound list
TIC	top of inner casing
TOC	total organic carbon
TP	total phosphorous
U	non-detect data qualifier
UJ	estimated non-detect data qualifier
USACE	U.S. Army Corps of Engineers
VOC	volatile organic chemical

1.0 INTRODUCTION

1.1 OVERVIEW

Shaw Environmental, Inc. (Shaw) is under contract to the U.S. Army Corps of Engineers (USACE) for the environmental restoration of the Formerly Utilized Sites Remedial Action Program (FUSRAP) Maywood Superfund Site (FMSS). The FMSS consists of property owned by the Federal Government, the Maywood Interim Storage Site (MISS), the Stepan Company, and other government, commercial, and private properties in Maywood, Lodi, and Rochelle Park, New Jersey (NJ) (**Figure 1-1**). The *Groundwater Remedial Investigation* (GWRI) was conducted on the FMSS during 2000, 2001, and 2002, which culminated in the submittal of the Draft GWRI Report to the U.S. Environmental Protection Agency (EPA) and the New Jersey Department of Environmental Protection (NJDEP) in June 2003 (USACE 2003a).

Preliminary results of the GWRI were presented to the EPA on February 19, 2002. In that meeting, the USACE was directed to further investigate the source and downgradient extent of a bedrock benzene plume that was partially delineated on the MISS. An RI Addendum Work Plan was prepared by the USACE, and approved by the EPA and NJDEP in May 2002 (Appendix A). The scope of work included installation of source area and downgradient bedrock monitoring wells, permeability testing, and borehole geophysical logging of newly installed wells, water level measurements, and a new round of groundwater sampling for volatile organic constituents (VOCs) and biogeochemical parameters.

Fieldwork commenced in August 2002, and the final elements were completed in June 2003. This report provides the results of the RI Addendum fieldwork, and provides recommendations for future action.

1.2 SCOPE OF THE RI ADDENDUM

The scope of work was defined in the RI Addendum Work Plan, and includes the following tasks or elements:

1. Install four bedrock monitoring wells on the MISS to delineate the benzene source area.
2. Install two offsite bedrock monitoring wells to determine the downgradient extent of the benzene plume.
3. Develop six newly installed wells, and calculate well hydraulic conductivity using a short-term specific capacity test.
4. Collect and analyze groundwater samples from 38 bedrock monitoring wells for TCL VOCs.
5. Collect and analyze biogeochemical (bioremediation) samples at nine wells.
6. Conduct borehole geophysics at six new wells to measure the distribution and orientation of borehole fractures.
7. Survey newly installed wells.
8. Measure water level elevations at 54 shallow and deep bedrock wells.
9. Prepare the RI Addendum Report, which includes evaluation of the data, conclusions, and recommendations.

1.3 BACKGROUND

Elevated benzene concentrations on the MISS were first identified in May 2001, and have been partially delineated by sampling of former bedrock test wells and other monitoring wells as part of the GWRI. Benzene sampling results from the GWRI (USACE 2003b) are presented on **Figure 1-2**. This figure depicts a benzene isopleth map superimposed over the December 2001 bedrock groundwater flow lines. As depicted, a contiguous benzene plume is plotted on site, extending northeast (NE) to southwest (SW) from the area of upgradient well MW-26D to MISS-5B, which is located at the downgradient property boundary. Maximum detected benzene concentrations within the plume were recorded at wells BRPZ-5 (5000 µg/L) and MISS-5B (3500 µg/L). Benzene was also detected in deep packer zone samples collected at bedrock wells BRPZ-5 (480 µg/L) and BRPZ-7 (270 µg/L duplicate sample). The sampling results indicate that the highest benzene concentrations are found in shallow bedrock and, that benzene concentrations decrease approximately an order of magnitude between shallow (35 to 60 feet bgs open interval) wells and deep (90 to 115 feet bgs open interval) wells.

The upper portion of the plume appears to be aligned with local groundwater flow, however, this changes further downgradient as bedrock groundwater flow turns west, as noted in the GWRI. Benzene transport in bedrock may be impacted (or controlled) by aquifer anisotropy in the Passaic Formation. Aquifer permeability is typically higher along bedrock strike or bedding plane fractures, which locally trends north-northeast (NNE).

GWRI benzene sampling data was presented in a February 19, 2002 meeting with the EPA. The USACE was directed to prepare an RI Addendum Work Plan to further delineate the benzene source area and downgradient extent of the plume. An RI Addendum Work Plan was submitted to the EPA and NJDEP on May 8, 2002, and was approved without modification by the regulators on May 31, 2002. The approved RI Addendum Work Plan is presented in Appendix A (USACE 2002a).

1.4 SUMMARY OF EXISTING SOIL AND OVERBURDEN GROUNDWATER SAMPLING DATA

1.4.1 Evaluation of Existing Soil Sampling Data

Soil sample data was reviewed from previous MISS and Stepan investigations to identify potential benzene source areas for the plotted bedrock benzene plume. This includes Geoprobe®, boring and test pit sampling data collected as part of the Remedial Investigation Report (DOE 1992), Pilot Study Report (USACE 2000a), and Draft Groundwater Remedial Investigation Report (USACE 2003a) for the FMSS. Soil sampling data collected as part of the Stepan Remedial Investigation Report (CH2M Hill 1994) was also reviewed in the evaluation.

A total of 137 soil borings, well test borings, and test pit soil samples were obtained from the MISS and adjacent areas of the Stepan Chemical property. From these 137 sample locations, 202 soil samples were submitted for benzene analysis. A majority of these samples were collected from the MISS. Soil sample locations, identification, and benzene sampling results are shown on **Figure 1-3**. Additional sampling data (sample type, date, and investigation) is summarized in **Table 1-1**. As shown on **Figure 1-3**, a large number of soil samples were collected in the probable source area, which is located upgradient and in proximity to monitoring well MW-26D (refer to **Figure 1-2)**. Soils were also sampled along the slab of former MCW Building 62, which is located within the plotted probable benzene source area. Historical MCW maps show two above ground chemical storage tanks located on the east side of former Building 62. The location of former MCW Building 62 is shown in Figures 1-2 and 1-3.

Soil sampling results show benzene soil exceedances of the 1000 µg/kg NJDEP standard in 4 of 202 samples. Benzene soil exceedances are highlighted on **Figure 1-3,** and as shown, exceedances were detected at USACE Test Pit 3 (4300 µg/kg), Test Pit 4 (3600 µg/kg), Test Pit 5 (380,000 µg/kg), and in Stepan soil boring C-44 located along the southern boundary of the Stepan property. Test Pits 3 and 4 are located at the edge of former Retention Ponds C and E', and Test Pit 5 is located at the southern edge of Building 76. As shown in Figure 1-3, benzene soil exceedances were not detected in test pits along the slab at former MCW Building 62.

Test Pits 3, 4, and 5 are located within the mapped extent of the overburden aquifer (USACE 2003a). As discussed in Section 3.1.2 "Water Level Measurements", slightly elevated benzene concentrations were detected in overburden groundwater downgradient of Building 76 on the MISS, refer to **Figure 1-4**. Site areas with shallow bedrock (without an overburden aquifer) were also evaluated, since those areas could potentially leach benzene directly into the bedrock aquifer.

Site areas without an overburden aquifer were mapped as part of the GWRI and are shown on **Figure 1-5 (GWRI Figure 3-19b).** Shallow bedrock was mapped on the Stepan Chemical Site, and is located approximately 275 feet east of the plotted bedrock benzene plume.

1.4.2 Evaluation of Existing Overburden Groundwater Sampling Data

Historical benzene overburden groundwater sampling data was evaluated on the MISS and Stepan as a potential source to the bedrock aquifer. This included a review of overburden groundwater benzene data collected from the Remedial Investigation Report (DOE 1992), Groundwater Remedial Investigation Report (USACE 2003a), and 2002 Annual Monitoring Report (USACE 2003d) prepared for the MISS, and Stepan's Remedial Investigation Report (CH2M Hill 1994).

Volatile organic constituent (VOC) overburden groundwater sampling was conducted on the MISS and adjacent Stepan property during the GWRI (USACE 2003a). Overburden groundwater benzene sampling results are presented on **Figure 1-4 (GWRI Figure 5-6).** Low-level benzene exceedances were detected in MISS Geoprobe® locations 12b017 (71 µg/L), 12b017 (4 µg/L), 12b028 (2 µg/L), 12b020 (9 µg/L), and 12b011 (36 µg/L). The reported GWRI overburden groundwater benzene concentrations on the MISS are considered too low to constitute a source of benzene to the bedrock aquifer. As shown on **Figure 1-4**, overburden wells located adjacent and downgradient to the bedrock benzene plume (B38W25S, MISS-6A, MISS-7A, PW-1S, OVPZ-17, B38W19S, and MISS-1AA) report very low or non-detect concentrations of benzene.

Historical sampling data (except recently installed wells PW-1S and OVPZ-17) for these wells goes back to 1987, and likewise do not report exceedances of benzene in groundwater (USACEb). Evaluation of the current and historical overburden groundwater benzene data does not show any evidence of a former overburden groundwater source to the bedrock aquifer. Historical groundwater benzene data for the bedrock aquifer is presented and discussed in Section 3.4.

This page intentionally left blank.

2.0 INVESTIGATION SCOPE OF WORK & METHODOLOGY

As outlined in the RI Addendum Work Plan, Appendix A, six additional bedrock wells were advanced as depicted on **Figure 2-1**. Four of the bedrock monitoring wells were advanced on the MISS, and two wells were advanced in Rochelle Park, along Grove Avenue. The purpose of the additional monitoring wells was to further attempt to define the source and extent of the bedrock benzene contamination presented and discussed in the GWRI report (USACE, 2003a). The four bedrock monitoring wells were installed within the MISS in an attempt to identify potential overburden sources of benzene, whereas the wells in Rochelle Park were installed to define the extent of the benzene plume.

The RI Addendum also consisted of the sampling and analysis of 38 bedrock monitoring wells for TCL VOCs. Additionally, nine bedrock wells were analyzed for geochemical parameters (alternate electron acceptors, and nutrients) and biological activity - refer to specific analyses discussed in Section 2.7 "Groundwater Sampling".

A synoptic round of water levels was conducted and included the measurement of shallow and deep bedrock wells. A total of 54 wells were gauged. Additionally, borehole geophysical activities were conducted on five of six bedrock wells. All wells but MW-33D were included in the borehole geophysical program.

The specific capacity of the newly installed bedrock monitoring wells was determined by pumping the wells at a constant rate. The pumping rate and depth to water were recorded until water level stabilization occurred. This information was used to determine the aquifer transmissivity and hydraulic conductivity of the bedrock aquifer.

2.1 MONITORING WELL INSTALLATION

Six bedrock monitoring wells were installed as part of the RI Addendum (**Figure 2-1**), and included bedrock monitoring wells MW-27D, MW-28D, MW-31D, MW-32D, MW-33D, and MW-34D. During installation, a 10-inch diameter temporary casing was driven to the top of bedrock to prevent running sands and potential hole collapse. A nominal 10-inch air hammer was used to clean out the casing and advance the borehole 10 to 15 feet into bedrock until competent rock was encountered. At this point, all source area monitoring wells (MW-27D, MW-28D, MW-33D, and MW-34D) were left overnight to recharge (groundwater), and each well was inspected the next morning for product using a clear bailer. No product or product sheen was detected in any source area wells. A 6-inch diameter steel casing was subsequently seated and grouted into bedrock and allowed to set for a minimum of 48 hours. After curing, all boreholes were advanced an additional 25 feet into bedrock using a nominal 6-inch diameter air hammer. All wells, except MW-33D, were completed with an open borehole.

Well MW-33D encountered soft / fractured bedrock zones in the open borehole below the casing, so the well was screened to prevent borehole collapse. The well was completed with 20-feet length of 2-inch diameter (ID) PVC screen (10 slot), riser, and Morie No. 1 filter sand. The annular space was tremie grouted from the top of the filter pack to the surface with a bentonite-cement grout. Due to the overburden depth (>20 feet) at MISS wells, the driller could not pull the 10-inch ID temporary drive casings at wells MW-27D, MW-28D, and MW-34D, and they were left in place. Wells MW-31D and MW32D were installed in residential driveways, where drive casings were left in place to avoid potential damage to concrete. The retention of 10-inch ID drive casings has resulted in "double cased" bedrock wells, where the overburden aquifer is cased off from bedrock by both the drive casing and 6-inch ID riser pipe. This should enhance the seal between the overburden and bedrock aquifers. MISS wells MW-27D, MW-28D, MW-33D, and MW-34D were completed as stickups whereas offsite wells

MW-31D and MW-32D were completed in the flush mount configuration. Well construction data is summarized in **Table 2-1**. Monitoring Well permits and Monitoring Well Records, the latter prepared by the Driller, B&B Drilling, Inc., Netcong, NJ, is presented in Appendix B. The boring logs and as-built well construction diagrams for the bedrock monitoring wells are provided in Appendix C.

2.2 WELL DEVELOPMENT AND SPECIFIC CAPACITY TESTING

All newly installed wells with the exception of MW-33D were developed by air and surge / pumping to remove sediment, and ensure well communication with the aquifer. Bedrock wells were air developed by the drill rig after completion of the hole to remove sediment from the well. The air was pumped under pressure to the well bottom through drill rods, which displaced water and sediment from the well. Development water was collected in a mud tub, and subsequently pumped off into drums. Once the wells recharged, they were developed by surging and pumping.

Prior to well pumping development, the well headspace was field screened for VOCs with a PID. The depth to water and depth to bottom were measured with a water level indicator to calculate the volume of water in the well. A YSI 650MDS and flow through cell was used to monitor pH, temperature, conductivity, dissolved oxygen (DO), oxidation-reduction potential (ORP), and turbidity parameters during development. Development was continued until a minimum three well volumes were purged and turbidity measurements of 50 Nephelometric Turbidity Units (NTUs) or less was achieved.

Bedrock wells were pumped using either a 2-inch submersible pump or a 1.5-inch disposable submersible (whale) pump in sequence to produce the required flow. The pump was also used as a surge device to suspend and pump off sediment that settled on the bottom of the well. During the initial phase of development, the wells were pumped at a relatively high flow rate to evacuate coarse sediment at the bottom of the well, and to draw down the water level. The pump was shut off, and the water level in the well was allowed to recover. The well was then pumped at a sustainable rate to remove the required volume and to achieve a turbidity reading below 50 NTU.

Following well development, all bedrock wells were pumped at a constant rate to determine the wells specific capacity. The specific capacity results are discussed further in Section 3.0 "Results of the Field Investigation". Bedrock wells were pumped at rates ranging from 0.15 gpm to approximately 5gpm. During the specific capacity test, the depth to water was typically recorded every 10 to 15 minutes. Knowing the pumping rate and associated drawdown, the transmissivity ("T") of the aquifer may be determined. The Method by Razack and Huntley, 1991, as presented in Fetter (1994) was used to determine an approximate value of transmissivity. The equation cited was derived for a granular (alluvial) aquifer, and assumes homogenous and isotropic conditions, in an aquifer of infinite areal extent. The well is assumed to be fully penetrating, with minimal well loss. The tested wells are installed into the bedrock aquifer, which has principle secondary (fracture) porosity, and may not meet all assumptions of the Razack and Huntley (and Theis) equation.

A similar specific capacity testing method employed by Bradbury and Rothschild (1985) reported less than an order of magnitude difference in calculated hydraulic conductivity (K) values at pump test and specific capacity tested wells in an alluvial aquifer, and "just over an order of magnitude" in a fractured dolomite (bedrock) aquifer. Accordingly, the calculated transmissivity values should be considered estimated values. The equation used to determine "T" as presented in Fetter (i.e., Section 7.6, page 256-257, eq., 7-90b,1994). is as follows:

$$T=33.6(Q/s)^{0.67}$$

Where:

$T = ft^2/day$
$Q = ft^3/day$
$s = ft$

Transcribed Specific Capacity forms are contained in Appendix E, and the results are discussed in Section 3.0 “Results of the Field Investigation”.

Water generated from well development and specific capacity testing was placed in drums or truck mounted tanks and brought back to the MISS. After treatment and batch testing, the water was discharged to the Publicly Owned Treatment Works (POTW).

2.3 WELL ABANDONMENT

Three USACE monitoring wells, including MW-1S, MW-1D and B38W06B, were abandoned during the RI Addendum field program. Although well abandonment was not proposed in the Work Plan, the details are provided in this report. USACE monitoring wells MW-1S/1D were located on the Bristol Manor property and well B38W06B was located on the Stepan property. Abandonment of well MW-1S/D was approved by the EPA pursuant to a USACE and property owner request. The USACE noted that MW-1S was historically dry, and that the cluster wells were of limited further technical value to the FUSRAP RI.

Bedrock monitoring well B38W06B was damaged by a truck, and the stickup was sheared off. At this location on the Stepan site, the overburden aquifer is heavily impacted by benzene, and there was a USACE concern about cross contamination if the well riser was broken or displaced. Well B38W06B was abandoned and not reinstalled due to the close proximity of Stepan wells PT-1DA/B (60 feet) and PT-2DA/B (100 feet), which could be used for water level measurements.

All monitoring wells were abandoned by B&B Drilling in accordance with the NJDEP requirements and procedures for the decommissioning of wells in N.J.A.C. 7:9D-3 and the site-specific Chemical Data Quality Management Plan (USACE 2002b). Monitoring Well Abandonment forms are included in Appendix F.

Abandonment activities included tremie grouting bentonite-cement grout into the well. Displaced water was containerized and the grout was allowed to flow to the surface in order to ensure an adequate seal. Well casing / risers were cut approximately 1.5 feet below grade and backfilled with a Quikcrete cement to approximately 6 inches below grade. The well pads were broken up and taken to the MISS for disposal. Topsoil was placed on top of the cement at all locations, and grass was planted at the Bristol Manor residence.

2.4 BOREHOLE GEOPHYSICS

Geophysical Applications, Inc. performed borehole geophysical logging as part of the RI Addendum activities. All newly installed bedrock monitoring wells were logged with the exception of MW-33D. This well was completed with 2-inch PVC and would not accommodate the borehole geophysical equipment.

The logging suite included conventional measurements (caliper, fluid temperature [FTemp], fluid resistivity [FRes], single-point resistance [SPR], spontaneous potential [SP], and natural gamma), acoustic televiewer [ATV], and heat-pulse flowmeter logging. All borehole logs were referenced to depths below the top of the outer steel casing. The geophysical logging winches contain optical depth encoders that maintain depth measurements accurate within approximately ± 0.2 feet throughout each borehole.

A Mount Sopris Model 4MXB digital logging winch was used with a Mount Sopris heat-pulse flowmeter, polygamma, and caliper probes to obtain conventional geophysical logging data. The caliper probe included a fluid resistivity / fluid temperature subassembly at the probe's bottom. Caliper, fluid temperature, fluid resistivity, SP, SPR, and natural gamma data were recorded at 0.1-foot depth increments, as determined by the logging winch's digital depth encoder. The fluid logs were recorded using a relatively slow speed of 3 to 4 feet per minute to allow the thermistor to measure subtle temperature variations. The remaining conventional logs were recorded at higher logging speeds (typically 5 to 10 feet per minute).

ATV data were recorded using Advanced Logic Technologies (ALT) Model ABI40 acoustic televiewer probe with the Mount Sopris logging winch. This televiewer can adapt to a wide range of borehole diameters (up to 16-inch diameter) and is not hindered by suspended sediments in the water column. ATV data were recorded at 0.01-foot intervals throughout each borehole at a speed of approximately 1.3 feet per minute. The ABI40 contains a high-frequency sonic transducer aimed upwards at a rotating mirror. This mirror is tilted approximately 45 degrees from the probe's vertical axis to direct the sonic pulses at the borehole wall. The transducer divides each sweep around a borehole's circumference into 288 arc segments, and records two-way sonic travel time and reflected signal amplitude for each segment. The ABI40 chooses the largest-amplitude reflected signal within the measurement time window as representing the borehole wall.

Flowmeter data were recorded at specific depth ranges approximately 5 feet apart, above and below possible bedrock fractures indicated by the caliper and fluid temperature / resistivity logs. Flow data were recorded in ambient conditions on the downward run to measure natural groundwater flow between fracture zones encountered by each boring. Flowmeter data were subsequently repeated under low-flow (approximately 0.15 to 0.5 gallon per minute [gpm]) pumping conditions to help determine which fracture zones were providing significant recharge into the wells.

All geophysical logs were recorded on a laptop computer's hard drive and transferred to a CD-ROM as a backup precaution. Post-survey plot scales were adjusted to display as much detail as possible. All conventional logs from the same borehole were merged onto one log plot to aid data correlation. Acoustic televiewer logs are presented on a separate page for clarity. All geophysical log data are presented in this report using ALT's WellCad software package, with a special image-processing module for the acoustic televiewer data.

The borehole geophysical survey report is presented in Appendix G.

2.5 WATER LEVEL MEASUREMENTS

A synoptic round of groundwater level measurements was obtained from 54 bedrock monitoring wells on June 23 and 24, 2003. Forty-nine (49) of the water level measurements were obtained on June 23, with the remaining measurements obtained the next morning. Groundwater levels were obtained using electronic water level devices, and measurements were referenced to the inside casings of the monitoring wells, where applicable. All groundwater measurement data was converted to elevations relative to the 1929 National Geodetic Vertical Datum (NGVD). A bedrock groundwater isopleth map was prepared, and is discussed in Section 3.0 "Results of the Field Investigation".

2.6 MONITORING WELL SURVEY

All newly installed wells were surveyed on June 25, 2003 by Garden State Surveyors, Inc., a licensed New Jersey Surveyor (NJ License 37586). Horizontal controls were based on the North American Datum (NAD), 1927. Vertical elevations were based on the NGVD, 1929. **Table 2-2** presents the Northing, Easting, Ground Surface, Top of Inner Casing, where applicable, and Top of Outer Casing for each well. Monitoring Well Certifications (NJDEP Form B) are provided in Appendix H.

2.7 GROUNDWATER SAMPLING

As part of the RI Addendum, groundwater samples were collected from 38 bedrock monitoring wells. The low flow sampling method (EPA, 1998a) was used to collect the groundwater samples at each of the wells. Each well was purged at a pumping rate varying between 200 and 500 milliliters / minute (mL/min), and groundwater samples were collected at a pumping rate of approximately 250 mL/min. A decontaminated (non-dedicated), 2-inch diameter stainless steel submersible pump was used for purging and sample collection. Prior to reuse of the pump, the pump was decontaminated in accordance with the procedures outlined in the CDQMP (USACE 2002b).

Dedicated polyethylene tubing was connected through a two-way valve to a flow through cell. Initially, the water was allowed to drain out of an out flow tube near the top of the flow through cell and into a bucket until the parameters stabilized and the water sample could be collected. A YSI 650MDS and flow through cell was used to measure pH, dissolved oxygen, temperature, conductivity, oxidation / reduction potential (ORP) and turbidity (**Table 2-3**). Once the parameters stabilized, a groundwater sample was collected. Field measurements were typically recorded at 5-minute intervals.

Groundwater samples were obtained by shutting off the valve to the flow through cell and opening the valve to the sample collection tube. Sample glassware and preservative were in accordance with the analytical method. Upon collection of the sample, the flow through cell, field instruments, and pumps were decontaminated following the procedures outlined in the CDQMP (USACE 2002b). Well purging and sampling records are provided in Appendix I.

2.7.1 Total Volatile Organic Compound Sampling

Thirty-eight bedrock groundwater samples were collected as part of this supplemental investigation, including six newly installed wells. As outlined in the RI Addendum Work Plan, the RI Addendum, and Environmental Monitoring Program (EMP), field sampling efforts were combined to avoid duplication of effort and reduce costs. TCL VOC data was utilized from 11 bedrock wells sampled as part of the EMP. All VOC samples were analyzed by Severn Trent Laboratory, STL Connecticut, Shelton, CT using SW-846 Method 8260B.

2.7.2 Biogeochemical Sampling

Biogeochemical sampling was performed to further characterize the bedrock aquifer, and provide specific information about the utilization and availability of electron acceptors, oxygen demand, nutrients and bacteria in groundwater. Dissolved oxygen and oxidation–reduction potential were measured in the field during sampling using a calibrated YSI MS 650 meter and flow through cell. Monitored natural attenuation (MNA) is currently being evaluated for remediation of the benzene plume, and collection of biogeochemical samples / parameters is the first step in the evaluation process. Biogeochemical samples were collected from nine wells, including MISS wells MISS-5B, BRPZ-4, BRPZ-9, MW-26D, and offsite wells B38W17D, MW-31D, MW-32D, B38W15D, and MW-2D.

The wells were sampled for the following alternate electron acceptors and reduced species: nitrate / ammonia (NO_3^-/NH_4^+), total and dissolved manganese (Mn_{Tot}/Mn_{dis}), total and dissolved iron (Fe_{Tot}/Fe_{dis}), sulfate / sulfide (SO_4^{-2}/S^{-2}), and methane (CH_4). Although nitrogen gas (N_2) is the thermodynamically favored reaction and product of denitrification, measurement of nitrogen gas is not feasible in the field. Therefore, ammonia, is measured in groundwater to show that nitrate reduction is occurring as part of in-situ biodegradation. Iron (Fe_{Tot}/Fe_{dis}) and manganese (Mn_{Tot}/Mn_{dis}) samples were collected in field filtered (0.45 micrometer) and unfiltered samples, and were analyzed using the total iron / manganese (EPA) method 6010B. In the normal groundwater environment, stability field diagrams indicate iron and manganese exist in the oxidized Fe^{+3} and Mn^{+4} form and reduced Fe^{+2} and Mn^{+2} form. Fe^{+3} and Mn^{+4} exist as insoluble oxyhydroxides in groundwater, and are referred to as Fe_{solid} and Mn_{solid} in the text. Reduced Fe^{+2} and Mn^{+2} are relatively soluble and found in the dissolved groundwater fraction, and are referenced as Mn_{dis} and Fe_{dis} in the text. It is noted that some Fe_{solid}/Mn_{solid} may be present in fine particulate or colloidal form in groundwater (less than 0.45 micrometer), and would pass through the filter and be analyzed as part of the dissolved fraction. This would result in the overestimation of the Mn_{dis}/Fe_{dis} fraction in groundwater. For this reason, Mn_{dis}/Fe_{dis} concentrations are only considered an estimate of the reduced Fe^{+2}/Mn^{+2} fraction in groundwater.

Groundwater oxygen demand was measured by sampling and analysis for biological oxygen demand (BOD_5) and chemical oxygen demand (COD). Sampled nutrients include nitrate / ammonia, total phosphorous, and total organic carbon (TOC). Microbiologic samples were collected to measure bacteria concentrations in groundwater, and include analysis for total heterotrophs and benzene, toluene, ethylbenzene, and xylenes (BTEX) degraders. All samples were analyzed by STL Connecticut with the exception of methane and BTEX Degrader Heterotrophs / Total Heterotrophs. Methane analyses were performed by STL's Burlington laboratory, Burlington, Vermont. BTEX Degraders / Total Heterotroph analysis was performed by New Jersey Analytical Laboratory, Pennington, NJ. Analytical methods used during the RI Addendum are summarized as follows:

- EPA's Test Methods for Evaluating Solid Waste Physical / Chemical Methods (SW-846) 6010B: Iron and manganese, total and dissolved.
- SW-846 8015A modified: Methane.
- EPA's Methods for Chemical Analysis of Water and Wastes (MCA) 300: Nitrate.
- MCA 300: Sulfate.
- MCA 365.2: Phosphorous (total).
- MCA 350.1: Ammonia.
- MCA 376.1: Sulfide.
- MCA 415.1: Total organic carbon.
- MCA 405.1: BOD.
- MCA 410.4: COD.
- Standard Methods for the Examination of Water and Wastewater (SM) 9215M: BTEX Degrader Heterotrophs.
- SM9215B: Total Heterotrophs.

2.7.3 Sample Management / Data Validation

Sample management includes laboratory Quality Assurance / Quality Control (QA/QC) and data package review by the project chemist. Shipped samples were logged in by laboratory staff and temperature blanks and/or the temperature of the cooler(s) were measured. The sample containers were checked for breakage / leakage, and in the case of the VOC samples, the sample containers were inverted to check for the presence of air bubbles. The laboratory then verified that the samples identified on the chain-of-custody were received and that the sample containers / methods of analysis match the information on the chain-of-custody. If there were discrepancies, they were noted on the sample login form, and Shaw was contacted if clarification was required.

A laboratory chain-of-custody was prepared which identifies the methods of analysis required for each sample aliquot. The pH of the sample was verified, if applicable, and the laboratory then recorded this information. After analysis, the data package was assembled and internally reviewed by the laboratory QA Staff. Discrepancies were addressed in the case narrative, which may include sample holding time exceedances, temperature issues, poor matrix spike / matrix spike duplicate (MS/MSD) or laboratory control standards (LCS) recoveries, etc.

Upon receipt of the data package from the laboratory, the Project Chemist reviewed all packages for completeness and the case narrative to identify major issues. All data packages were submitted to a certified validator for validation in accordance with the U.S. Army Corp Guidance CENWK-EC-EF Data Quality Evaluation Guidance (USACE 1999). RI Addendum Data Packages were validated by Kestrel Environmental, Inc., Freeport, Maine, or Validata, Duluth, Georgia. The following components of the data packages were reviewed by the validation contractor:

- Holding times
- Laboratory blank data
- LCSs
- Surrogate recovery (organic methods)
- MS/MSD and MS/MD percent recoveries and relative percent differences
- Internal standards (primarily organic methods)
- Inductively Coupled Plasma (ICP) or atomic absorption QC (inorganic methods only)
- Calibration
- Sample reanalysis
- Secondary dilutions
- Laboratory case narrative

Data qualifiers were assigned to samples by the validator, and include the following:

- U - denotes the analyte was non-detect
- UJ - denotes that the analyte was non-detect and that the detection limits were estimated
- J - denotes that the concentration presented, was estimated
- R - denotes that the analyte was rejected

A data validation memorandum was prepared by the validation contractor for each data package. The data validation memo was reviewed by the project chemist, and entered into the project database. Copies of the laboratory data packages and data validation memorandums are presented as attachments to the RI Addendum's Quality Control Summary Report (QCSR), Appendix J.

As required by the NJDEP Site Remediation Program, and as identified in NJAC 7:26E or the Tech Regs, an electronic data submission is required for samples obtained as part of a Site Investigation, Remedial Investigation, or Remedial Action. The HazSite deliverable was formatted in an ASCII Tab Delimited format. Appendix J contains the electronic deliverable on CD. Both chemical and geochemical data obtained as part of the RI Addendum is contained on the CD. As recommended by NJDEP, USACE utilized the Electronic Data Submittal Application (EDSA) routine to verify that the files would be acceptable for importing into the NJ DEP database. The database files were accepted by the EDSA routine.

3.0 RESULTS OF THE FIELD INVESTIGATION

Results of the RI Addendum Field Investigation are presented in Section 3.0. Results of well logging and installation, water level monitoring, specific capacity (permeability) testing, and borehole geophysics are discussed in Section 3.1. Groundwater TCL VOC and biogeochemical sampling results are presented in Sections 3.2 and 3.3, respectively.

3.1 HYDROGEOLOGY

3.1.1 Overburden and Bedrock Geology

Four bedrock monitoring wells were installed on the MISS as part of the source area investigation, and two were installed on Grove Avenue, in order to define the downgradient extent of the benzene plume. Bedrock was encountered at 18 to 20 feet depth in wells installed on the MISS, and 9 to 10 feet depth at wells MW-31D and MW-32D on Grove Avenue. Overburden deposits encountered at MISS wells MW-27D, MW-28D and MW-33D are generally described as tan to black sand from the surface to 15 to 20 feet depth, bgs. This sand unit also contains wood fragments and clumps of clay material that may have been ash, and likely represents fill and stained soils in and around Former Retention Pond A. The fill unit is underlain by native red-brown sand at well MW-28D, and is presumably present at other locations below fill. Overburden deposits at MISS well MW-34D are described as gravel, sand, and silt fill to approximately five feet bgs, and is underlain by native red-brown sand and gravel above bedrock.

Overburden deposits at wells MW-31D and MW-32D on Grove Ave are described as a thin concrete and sub-base fill at the surface, and overlies red brown sand to bedrock. The shallow (overburden) groundwater table was encountered at approximately 12 feet bgs on the MISS, and at 5 feet bgs along Grove Avenue in Rochelle Park. All bedrock wells were cased through the overburden aquifer, and casings were set and grouted a minimum of 10 feet into bedrock.

Bedrock cuttings were sampled and logged every 5 feet during drilling, and fractures were logged as encountered. Bedrock is described as a red-brown, interbedded fine to medium grained sandstone and coarse grained siltstone. Large discrete fractures were mapped in wells MW-31D and MW-32D, and readily produced water during development and testing. Several feet of soft, weathered bedrock was typically encountered at the bedrock surface, and five of six well casings were set at 10 feet (below bedrock surface) in competent rock. Shallow bedrock at well MW-33D was extensively fractured, and was described as “soft” during drilling. Casing was installed 18 feet to competent rock in order to minimize the potential for leakage / communication from the overlying overburden aquifer. Fractured and “soft” rock zones were also logged at depth, so the borehole was screened (with a 2-inch PVC screen) to avoid collapse.

3.1.2 Water Level Measurements

Water levels were obtained from 54 bedrock monitoring wells on June 23 and 24, 2003. Groundwater level measurements, well elevations ((top of inner casing (TIC)), groundwater elevations and other well data are summarized in **Table 3-1**. Plotted and contoured shallow bedrock groundwater well elevations are shown on **Figure 3-1.** As depicted in this figure, the direction of groundwater flow is predominantly west-southwest, with a component of flow towards the south. The slope of the water table ranges from approximately 0.035 ft/ft on the MISS and Stepan property, to 0.01 ft/ft further west and downgradient from the site in Rochelle Park (west of Route 17). Groundwater elevations were also measured at five shallow / deep bedrock well clusters, including wells MW-19D/DD, MW-23D/DD, MW-24D/DD, BRPZ-4/BRPW-1DRE, and PT-1DA/1DB. All bedrock well clusters showed slightly higher groundwater heads in the shallow well, which indicates an overall downward vertical gradient within bedrock. It is noted that the site had received approximately 8.33 inches of rain for the month of June 2003, which significantly exceeds the 20 year monthly June average of 3.51 inches (recorded at Teterboro Airport, NJ). Overburden / bedrock cluster wells also measured during this period (as part of the Environmental Monitoring Program or EMP) also recorded higher (shallow depth to water) heads, and may reflect aquifer recharge following a period of very heavy rainfall.

Historical groundwater levels for overburden/shallow bedrock and shallow bedrock/deep bedrock clusters on the FMSS and Stepan Company Property were evaluated in the Draft RI Report (Section 3.5.3) to identify vertical gradients. Water levels were measured in July and December 2003 for the 21 newly installed overburden/bedrock well clusters, and 13 quarterly measurements were evaluated for the 14 existing overburden/bedrock well clusters. A number of cluster locations showed consistent vertical gradients over time. Most overburden/shallow bedrock cluster wells on the MISS showed a net downward gradient from the overburden to bedrock aquifer; whereas most overburden/shallow bedrock clusters located downgradient (Rochelle Park and Lodi, NJ) showed a net upward gradient from the bedrock to overburden aquifer.

Shallow and deep bedrock cluster well elevation monitoring was started in 2003 as part of the GWRI, and was conducted in June and December 2003. As noted in the Draft RI Report, all bedrock clusters except PT-1DA/PT-1DB show weak (<0.1 feet difference) or inconsistent (reversed) vertical gradients. Stepan Company well cluster PT-1DA/PT-1DB has shown a consistent downward gradient."

3.1.3 Permeability Testing

As discussed in Section 2.2, specific capacity tests were conducted on all newly installed wells following completion of well development or concurrent with the last development event. During the test, groundwater discharge (Q) was stabilized at a constant rate, and well drawdown was monitored. The well specific capacity (Q/s) was computed once the discharge and water levels stabilized for three or more readings. The specific capacity tests were typically conducted over a 70-minute (MW-31D) to 130-minute (MW-33D and MW-34D) period. The method of Razack and Huntley (Fetter 1994) was used to determine the transmissivity "T" of the bedrock aquifer. The hydraulic conductivity of the bedrock aquifer was then determined by dividing the transmissivity of the aquifer by the saturated thickness of the aquifer, which was determined to be the wells "open hole" interval.

A summary of the specific capacity test parameters (Q, s), computed specific capacity, transmissivity, and hydraulic conductivity for each well is given in **Table 3-2**. The calculated well hydraulic conductivities ranged from 2.79×10^{-3} (MW-27D) to 3.01×10^{-2} cm/sec (MW-31D), with a geometric mean of 7.05×10^{-3} cm/sec. Pumping rate and water level data for each test is provided in Appendix E. The computed hydraulic conductivity is higher than the median (1.63×10^{-3} cm/s) and mean (1.48×10^{-3} cm/s) values cited in the RI. This may be attributed to the effect of two high yielding wells (MW-31D and MW-32D) on the small data set.

3.1.4 Borehole Geophysics

Borehole geophysics was conducted at five of the six newly installed bedrock wells. The logging suite included caliper, SPR, SP, natural gamma, fluid temperature, fluid resistivity, ATV, and heat pulse flowmeter logging (ambient and pumping conditions). Borehole fractures were identified using the ATV and Well CAD software, which was used to determine fracture dip angles and down-dip azimuths. Tadpole plots indicate measured fracture orientations, where the filled circles indicate dip angles (0 to 90 degrees). Each tadpole "tail" points in the measured down dip direction, which is perpendicular to the fracture strike. Borehole geophysical logs are presented in Appendix G.

Open fractures were identified (visible) using both the ATV travel time and ATV amplitude plots, whereas less open fractures were only visible on the ATV amplitude plots. Water conducting fractures were identified using the heat - pulse flow meter, fluid temperature and fluid resistivity data. The heat pulse flow meter identified fractures that exhibited either an upward or downward flow of water within the borehole within the instrument operation range of 0.3 to 1.0 gpm. Conductive fractures were also identified using the fluid temperature and fluid resistivity log (down to the minimum instrument detection level), where local inflections or changes in slope of the log(s) typically represent water movement entering or exiting a fracture.

Well fracture orientations for each well are presented on **Figure 3-2**, using Rose diagrams and Stereonet plots. A Rose diagram is a circular plot used to represent fracture dip directions. The circular diagram represents points of a compass, and is divided into 15 degree sectors. Fracture dip data are input into the appropriate sectors, where the population of the fracture data determines the sector size or magnitude. Overall, the Rose diagrams show a dominant NW fracture dip direction, with a lesser number of fractures dipping west, southeast, and east.

A stereonet plot was used to represent the individual fracture dip direction and angle data on the same diagram. Individual fractures are displayed as a point on the stereonet. The dip direction is determined by measuring the compass direction of a line from the fracture point through the origin or axis of the stereo plot. The dip angle of the fracture point is measured relative to the concentric dip angles plotted on the stereo plot. The origin represents zero dip angle, and increases 10 degrees at each line toward the edge of the stereo plot, which depicts vertical fractures. In total, the stereo plots show a dominant NW dip azmith, with those fractures mostly dipping between 10 and 20 degrees. Water bearing fractures are labeled blue on the stereoplot, and also show a dominant NW dip direction and 10 to 20 degree dip angle. Some steeply dipping water bearing fractures were noted in MW-31D, with fractures dipping 50 degrees towards the northwest, while conductive fractures in MW-32D measured between 70 to 80 degrees towards the southeast.

A comparison of the well drilling and geophysical logs in the GWRI and this study show a substantially greater number of features using borehole geophysics. Although all fractures or water bearing zones observed by the driller and/or geologist were entered into the field logs, only large fractures with significant open or soft areas, and/or water bearing zones can be identified during drilling. Borehole geophysics is considered more accurate than field logging, and for that reason, was selected to definitively characterize the fracture distribution and orientation in bedrock using multiple logs. The larger fractures and/or water bearing zones logged in the field in both the GWRI and RI Addendum were also corroborated by borehole geophysics.

Borehole geophysics fracture dip azmith and angle data are similar to those reported in the GWRI and likewise correspond with the measured NNE bedrock strike and NW dip (8 to 14 degrees) in area outcrops. A summary Rose diagram and stereonet plot of water bearing fractures from the GWRI is provided for comparison in Appendix G, which also contains the Borehole Geophysics report.

3.2 TCL VOC SAMPLING RESULTS

A total of 38 bedrock wells were sampled for TCL VOCs. Thirty four (34) groundwater samples were collected in July and August 2002, with later installed wells sampled in October 2002 (MW-33D / MW-34D), March 2003 (MW-31D) and May 2003 (MW-32D). The later sampling dates are noted for these wells shown on **Figure 3-3**. Benzene sampling results are discussed in Section 3.2.1, and other TCL VOC exceedances are summarized in Section 3.2.2. Results of the Biogeochemical Sampling is discussed in Section 3.2.3.

3.2.1 Benzene Sampling Results

Benzene was detected in 19 of 38 bedrock groundwater samples, with 14 samples exceeding the New Jersey Groundwater Quality Criteria (GWQC) of 1 µg/L. The maximum concentration of 9500 µg/L was detected at bedrock well BRPZ-5, which is located on the MISS within Former Retention Pond C. Benzene sampling results are summarized in **Table 3-3**, and exceedances are presented in **Table 3-4**.

Benzene sample concentrations were plotted and contoured using 1, 10, 100 and 1000 µg/L concentration contours. As depicted on **Figure 3-3**, the extent of the plume has been delineated by the 1.0 µg/L benzene standard. The benzene plume extends approximately 1075 feet, and is oriented NNE to SSW along the plume axis. As noted in the GWRI, the apparent SSW plume direction does not follow the predicted site bedrock groundwater flow, and may reflect local flow conditions not captured by site wells.

Source Area Delineation

Low concentrations of benzene are detected at upgradient well MW-3D (15 µg/L), and the upgradient edge of the benzene plume is projected offsite onto the New York Susquehanna & Western Railroad property. An active upgradient source of benzene is considered unlikely, due to the low concentrations of benzene detected in wells MW-3D, MW-27D (5 µg/L) and MW-33D (10 µg/L). A potential active benzene source located in soils adjacent Building 76 is also considered unlikely, due to the low detected concentrations of benzene in downgradient bedrock monitoring wells MW-28D (6 µg/L), MW-34D (16 µg/L) and B38W25D (ND). A slug or intermittent benzene source, however, cannot be precluded at these locations.

A potential benzene bedrock source area was delineated based upon benzene sampling data, and is shown on **Figure 3-3**. Noting that there is no detected product in bedrock, the plotted potential source area represents the predicted upgradient extent of elevated (>100 µg/L) benzene concentrations in bedrock. The plotted potential source area is located sidegradient to well MW-26D (180 µg/L), and is upgradient relative to plume monitoring wells BRPZ-9 (1800 µg/L) and BRPZ-5 (9500 µg/L). The plotted potential source area is located on a local bedrock groundwater high (see **Figure 3-1**), and may account for the distribution of benzene in MW-33D, MW-27D, MW-3D and other site wells. A potential benzene source located in soils adjacent Building 76 is also considered unlikely, due to the low detected concentrations of benzene in downgradient bedrock monitoring wells MW-28D (6 µg/L), MW-34D (16 µg/L) and B38W25D (ND).

The source of benzene in bedrock is not known, or no longer exists. As noted in Section 1.4.1, former MCW Building 62 is located in the plotted potential bedrock source area (50 feet northwest of MW-26D). The soils along the east side of the Former MCW Building 62 slab were investigated by the USACE in August 1999 as part of the Pilot Demonstration Work Plan (USACE 2000a). Benzene was not detected in the test pit soil samples or shallow groundwater. Benzene was also not detected in other soil boring and Geoprobe® samples collected within or adjacent to the plotted source area. It is noted that Former MCW Building 62 and the plotted potential bedrock source area lie within the mapped extent of the overburden aquifer. As shown on **Figure 1-4**, benzene was not detected in downgradient overburden wells MISS-6A, MISS-7A and PW-1, and Geoprobe® samples 12b-029 and 12b-009. A low concentration of benzene was detected in Geoprobe® boring 12b020 (9 µg/L).

Soils within the plotted bedrock source area, Building 76 and surrounding MISS areas are scheduled for excavation as part of the Operating Unit (OU) 1 soil remediation for radiological constituents. All potential benzene sources on the MISS such as buried tanks, drums, pipes, and impacted soils would be removed during the remediation.

Downgradient Plume Delineation

The downgradient edge of the benzene plume is extrapolated between MISS well MW-24D (29 µg/L) and downgradient offsite wells B38W17B (ND), MW-31D (ND), and MW-32D (ND). Wells B38W17B and MW-32D are located approximately 150 feet downgradient from the plotted 1 µg/L benzene isopleth, and along the projected centerline of the plume. These wells should be effective compliance / sentry wells for monitoring of the benzene plume.

3.2.2 Other VOCs

Additional VOC exceedances were detected in groundwater samples. Eight VOCs were detected at concentrations exceeding the lower of the NJDEP GWQC, NJDEP MCL, or Federal MCL, including 1,1-dichloroethene, 1,2-dichloroethene (cis), 1,2-dichloroethene (total), bromodichloromethane, chloroform, tetrachloroethene, trichloroethene, and vinyl chloride. VOC sampling results are summarized in **Table 3-5**, and exceedances are presented in **Table 3-6**. As depicted in **Table 3-6**, tetrachloroethene and trichloroethene are the most commonly reported VOC exceedances. Tetrachloroethene and trichloroethene sampling results are briefly discussed in the following section. High concentrations of chlorinated solvent (and degradation products) was detected in overburden and bedrock wells on the 158 West Central Avenue Property, and is the likely source of these COCs on the MISS and in overburden and bedrock monitoring wells in Rochelle Park. A summary of the 158 West Central Avenue investigation results is provided in Section 1.8.3 of the Draft RI Report USACE (2003a).

Trichloroethene

Trichloroethene was detected in 15 samples with concentrations ranging from 0.3 to 300 µg/L. The maximum detected concentration was present in well MW-7D, located on the 141 West Central Avenue property, Rochelle Park. Eight of the samples had concentrations that were at or exceeded the NJ GWQC / State MCL of 1 µg/L.

Tetrachloroethene

Tetrachloroethene was detected in 14 samples with concentrations ranging from 0.1 to 1300 µg/L. The maximum detected concentration was present in well MW-7D, located on the 141 West Central Avenue property, Rochelle Park. Eleven of the samples had concentrations that exceeded the NJ GWQC / State MCL of 1 µg/L.

3.3 BIOGEOCHEMICAL SAMPLING RESULTS

As part of the RI Addendum, field parameters were analyzed for dissolved oxygen, redox potential (Eh), pH, temperature, and turbidity. Of these parameters, dissolved oxygen and redox potential are important parameters in assessing in-situ bioremediation potential. Additionally, alternate electron acceptors consisting of manganese reduction, nitrate reduction, iron reduction, sulfate reduction, and methanogenesis are indicators of in-situ bioremediation. Biological community data was also collected in the form of BOD_5, COD, and BTEX Degrader Heterotrophs and Total Heterotroph analysis. Furthermore, nutrient data in the form of phosphate, nitrate, and total organic carbon (TOC) data were collected. These data are presented in the following sections.

3.3.1 Dissolved Oxygen and Oxidation-Reduction Potential

Dissolved Oxygen

Dissolved oxygen (DO) is the most thermodynamically favored electron acceptor used by microbes for the degradation of organic carbon. Aerobic biodegradation of benzene typically occurs with DO concentrations greater than 1.0 mg/L, but has been reported as low as 0.5 mg/L (EPA 1998b, 1998c). Dissolved oxygen was measured at all wells in the field during sampling, using a YSI 650 multimeter and flow through cell. Measured dissolved oxygen values are presented in **Table 2-3**.

Dissolved oxygen was measured at 38 bedrock monitoring wells, and is shown on **Figure 3-4**. Dissolved oxygen values recorded at wells MISS-2B, B38W25D and MW-26D were rejected since they exceeded the maximum theoretical D.O. value of 9.9 mg/L at sea level (North Carolina State University, College of Agriculture and Life Sciences, April 2002). The field measured DO values at wells BRPZ-5 (1.58 mg/L), MISS-5B (1.16 mg/L), and MW-26D (1.67 mg/L) are inconsistent with other sampling data showing deeply reduced groundwater conditions at these wells, and may reflect DO meter / sensor error during purging.

Twenty-nine (29) wells have DO concentrations less than 1.0 mg/L, with 20 wells below 0.5 mg/L. This data indicates anaerobic groundwater conditions at a majority of site wells. Low DO concentrations (0.5 to 1.0 mg/L) were detected at eight wells located upgradient and sidegradient to the plotted benzene plume. Elevated DO levels were detected at wells MISS-1B (2.24 mg/L) and MW-5D (4.02 mg/L). The DO data indicates anaerobic groundwater conditions at a majority of site wells, and in all wells located downgradient from the projected benzene source area.

Oxidation – Reduction Potential

The oxidation-reduction potential (ORP) of groundwater is a measure of electron activity and is an indicator of the relative tendency of a solution to accept or transfer electrons. The ORP of groundwater generally ranges from -500 millivolts (mV) to +800 mV. Under aerobic (or oxidizing) conditions, the ORP of groundwater is positive and typically above +800 mV, whereas anaerobic (reducing) conditions are characterized by ORP readings below +800 mV. The ORP of groundwater can be used as an indicator since certain biodegradation processes (i.e., sulfate reduction, methanogenesis) only operate within a prescribed range of ORP conditions. The oxidation-reduction potential for various oxidation-reduction reactions is shown on **Figure 3-5**.

ORP was measured in 38 wells during sampling, and is presented in **Table 2-3**, and depicted spatially on **Figure 3-4.** Groundwater ORP ranged from -626.3 to +332.6 mV, with 31 of 38 values below +0.0 mV. The lowest Eh values are reported at wells located within the benzene plume including MW-26D (-626 mV), BRPZ-9 (-72.8 mV), BRPZ-5 (-332 mV), MISS-5B (-88.9 mV), BRPZ-4 (-55.4 mV) and BRPZ-3 (-578 mV). The range of Eh values in the plume area indicate that Fe_{solid}/Fe_{dis}, SO_4/hydrogen sulfide (HS^-) and CO_2/methane reduction reactions may be occurring in groundwater as part of the anaerobic benzene biodegradation process (see **Figure 3-5**). Projected downgradient compliance wells (B38W17B, MW-31D, MW-32D, B38W15D, and MW-2D) are less reduced, and indicate potential Mn_{solid}/Mn_{dis} and Fe_{solid}/Fe_{dis} reduction reactions.

pH Data

The pH is defined as the negative logarithm of the hydrogen ion activity and describes whether a solution is acidic (pH<7), neutral (pH=7), or basic (pH>7). Microbes capable of degrading petroleum hydrocarbon compounds generally prefer pH values ranging from 6 to 8 standard units (SU).

The pH of the groundwater was measured during sample purging, and is presented in **Table 2-3**. The pH values ranged from 5.54 to 7.49 SU, with three samples (B38W18D, B38W24D, and BRPZ-5) slightly outside the prescribed range.

3.3.2 Alternate Electron Acceptors

Microorganisms obtain energy by transferring electrons from donors, such as organic carbon compounds (BTX), to compounds that accept electrons. For biodegradation to occur, electron acceptors must be present. In respiration, electrons are transferred directly to inorganic compounds that are relatively oxidized, and include molecular oxygen, nitrate, manganese (Mn_{solid}), iron (Fe_{solid}), sulfate, or carbon dioxide. In fermentation (methanogenesis), organic compounds act as both the electron donor (BTX) and acceptor (CO_2), and generate incompletely oxidized by-products such as methane.

The alternate electron acceptors (other than oxygen) were sampled to identify available acceptors, and provide data for the Feasibility Study. Reduced electron acceptor species / compounds (NH_4^+, Mn^{+2}, Mn_{dis}), Fe^{+2} (Fe_{dis}), HS^-, and CH_4 were also sampled to provide evidence of specific acceptor utilization and biologic activity. Although nitrogen gas (N_2) is the thermodynamically favored reaction and product of denitrification, measurement of nitrogen gas is not feasible in the field. Therefore, ammonia was measured in order to show that nitrate reduction is occurring as part of in-situ biodegradation. As illustrated on **Figure 3-5**, biochemical reactions will preferentially reduce electron acceptors in the order of nitrate / ammonia (NO_3^-/NH_4^+)], manganese (Mn_{Tot}/Mn_{dis}), iron (Fe_{Tot}/Fe_{dis}), sulfate (SO_4^{-2}/S^{-2}), and carbon dioxide / methane (CO_2/CH_4). Alternate electron acceptors were sampled and analyzed in nine monitoring well samples. The electron acceptor data is given in **Table 3-7**, and depicted graphically on **Figure 3-6**. Sampling results for each electron acceptor and reduced compound are presented in the following section.

Nitrate / Ammonia Reduction

Low concentrations of nitrate (0.04 to 0.14 mg/L) were detected in four of nine samples. Three of four wells with detected nitrate are located downgradient of the plotted benzene plume. Ammonia, the reduced form of nitrate, was detected in all wells at concentrations ranging from 0.88 to 19 mg/L (MISS-5B). The highest ammonia concentration was detected at wells located within the mapped benzene plume, indicating more reduced conditions. The absence / trace detected concentrations of nitrate, and high concentrations of ammonia in groundwater indicate the utilization of nitrate as an electron acceptor, and ongoing degradation of organic carbon in the aquifer.

Manganese Reduction

Manganese occurs as a solid in the form of the minerals rhodochrosite, manganite, and pyrolusite. Under anaerobic conditions, bacteria can use these minerals as electron acceptors. In the presence of benzene, manganite (MnO_2) will be reduced from Mn_{solid} to Mn_{dis}. Under anaerobic conditions (DO < 0.5 mg/L), manganese (Mn_{solid}) is reduced to Mn_{dis}. As noted in Section 2.7.2, the Mn_{solid} concentration was estimated by subtracting the filtered or dissolved (Mn_{dis}) sample results from the total manganese concentration.

As indicated in **Table 3-7**, low / trace concentrations of Mn_{solid} were detected in all but one sample (BRPZ-9), with detected concentrations ranging from 0.02 to 3.82 mg/L (BRPZ-4). Dissolved Mn_{dis} concentrations substantially exceeded Mn_{solid} at all locations, and ranged from 0.328 to 5.26 mg/L (BRPZ-4). Overall, approximately 95% of the total manganese was in the dissolved (reduced) form. As depicted on **Figure 3-6**, the highest dissolved (Mn_{dis}) manganese concentrations are detected at wells located within the plotted benzene plume, and downgradient well B38W17B.

The low concentrations / absence of Mn_{solid}, and relatively high concentrations of dissolved manganese (Mn_{dis}), indicate that the Mn_{solid} is substantially diminished as an electron acceptor in the bedrock aquifer. The higher concentrations of dissolved manganese in plume areas appear to indicate that reduced conditions have occurred due to degradation of organics in groundwater. However, it should be noted that site-specific analysis for Biologically Extractable $Mn_{(solid)}$ has not been conducted, therefore, it is difficult to determine the amount of Biologically Extractable $Mn_{(solid)}$ that has been reduced in the aquifer.

Iron Reduction

Ferric Iron (Fe_{solid}) was detected in seven of eight groundwater samples, with concentrations ranging from 0.02 to 5.85 mg/L (BRPZ-4). Dissolved (ferrous or Fe_{dis}) iron was detected in five of seven wells, with detected concentrations ranging from 0.44 to 62.7 mg/L (MW-26D). As shown on **Figure 3-6**, the highest dissolved iron concentrations are detected in wells within the plotted benzene plume and at downgradient well B38W17B. Downgradient wells show decreasing ferrous (dissolved) iron concentrations (to non-detect) with distance from the site.

Iron sampling data indicates that ferric iron (as an electron acceptor) is substantially diminished at monitoring wells MW-26D and B38W17B, and is significantly (>50%) diminished at benzene plume monitoring wells BRPZ-9 and BRPZ-4. Downgradient (offsite) wells, except B38W17B, show little if any iron reduction activity. This data appears to indicate that microbes are utilizing iron (Fe_{solid}) as an electron acceptor in much of the benzene plume, and plume fringe areas. Other plume areas are more heavily reduced, and biodegradation may proceed using sulfate or CO_2 as alternate electron acceptors. However, it should be noted that site-specific analysis for Biologically Extractable $Fe_{(solid)}$ has not been determined for this site, therefore, it is difficult to determine the amount of Biologically Extractable $Fe_{(solid)}$ that has been reduced in the aquifer.

Sulfate Reduction

Sulfate can be used as an electron acceptor during biodegradation, where sulfate (S^{+6}) is reduced to sulfide (S^{-2}), and HS^- is generated as an end product. Sulfate was detected in eight of the nine samples collected, with concentrations ranging from 350 to 3000 mg/L (MW-26D). Sulfate / sulfide concentrations are given in **Table 3-7** and shown on **Figure 3-6**.

Sulfide was detected in 3 of 9 samples, including benzene plume monitoring wells BRPZ-9 (1.0 mg/L) and BRPZ-4 (0.2 mg/L), and downgradient well MW-32D (0.5 mg/L). Sulfate reduction at wells BRPZ-9 and BRPZ-4 is consistent with the high ferrous iron concentrations at those wells, and is likewise predicted at wells MW-26D and B38W17B.

Methanogenesis

Carbon dioxide can act as an electron acceptor during anaerobic biodegradation, and is ultimately reduced to methane (CH_4) under strongly reducing (-240 mV) conditions. Methane groundwater concentrations in excess 0.5 mg/L are an indicator of methanogenesis (EPA 1998b). As presented in **Table 3-7**, methane was detected in all nine groundwater samples at concentrations ranging from 0.002 to 3.1 mg/L. High methane concentrations (>1.0 mg/L) were detected in benzene plume monitoring wells BRPZ-4 (3.1 mg/L), BRPZ-9 (2.9 mg/L), and MW-26D (1.8 mg/L). As shown on **Figure 3-6**, methane concentrations generally decrease with distance from the mapped benzene plume.

Methane groundwater data indicates that methanogenesis is an ongoing process in the plotted benzene plume and monitoring wells MW-26D, BRPZ-9, and BRPZ-4. Reduction of sulfate is also predicted in these wells and plume area wells.

3.3.3 Nutrients

The essential microbial nutrients, nitrogen, phosphorous, and carbon, were sampled as part of the RI Addendum. Nine samples were collected and analyzed for ammonia and nitrate, total phosphorous, and total organic carbon (TOC). Nutrient sampling results are summarized in **Table 3-8**, and sample locations are shown on **Figure 3-7,** along with plotted results. The sampling results for each nutrient are briefly discussed in the following sections.

Nitrogen

Nitrogen is needed by microorganisms for protein and nucleic acid synthesis. The most common inorganic source is ammonia, but nitrate can also be reduced by microbes to obtain ammonia. As indicated in **Table 3-8**, ammonia was detected in all samples, and nitrate was detected in three of nine samples.

Phosphorous

Phosphate is utilized by microorganisms for synthesizing phospholipids and nucleic acids, and is also essential for energy transfer reactions involving adenine triphosphate (ATP). As indicated in **Table 3-8**, phosphorous (as total phosphorous or TP) was detected in 8 of 9 groundwater samples, with detected concentrations ranging from 0.0579 to 1.37 mg/L. Phosphorous was not detected in groundwater at well BRPZ-9, and may be a limiting factor to biodegradation at that location (see **Figure 3-7**). It is noted, however, that high total phosphorous concentrations were detected in nearby benzene plume monitoring wells BRPZ-4 (1.37 mg/L), MISS-5B (0.604 mg/L), and MW-26D (0.201 mg/L). However, it should be noted that phosphorous may also be sorbed to the aquifer matrix, and that nutrient cycling will occur among dying and growing populations of microorganisms.

Total Organic Carbon

Microorganisms require carbon sources for cell growth, and are capable of using a wide variety of carbon bearing compounds. They also obtain energy by transferring electrons from donors such as carbon, to compounds that accept electrons. As indicated in **Table 3-8**, and depicted on **Figure 3-7**, TOC was detected in 5 of 9 samples at concentrations ranging from 0.38 to 34 mg/L. Total organic carbon was detected in all benzene impacted wells, with the highest concentrations reported at wells BRPZ-9 (25 mg/L) and MW-26D (34 mg/L). Total organic carbon was not detected in downgradient monitoring wells B38W17B, MW-2D, and MW-31D, which lie outside the plotted extent of the benzene plume.

3.3.4 Oxygen Demand

Biological oxygen demand (BOD_5) was evaluated in groundwater as an indicator of biologic activity. Chemical oxygen demand (COD) measures the non-biologic oxygen demand from reduced compounds, and is used to gauge the degree of aquifer reduction. BOD and COD data will also be used in the Feasibility Study to estimate aquifer oxygen demand for remedial design purposes. BOD and COD sample results are summarized in **Table 3-8**, and spatially depicted on **Figure 3-8**.

BOD_5

BOD_5 is the amount of dissolved oxygen consumed in 5 days by biological processes breaking down organic matter. The sample is initially spiked with bacteria, and incubated over a 5-day period under aerobic conditions. Typically, BOD_5 represents 45-55% of the Theoretical Oxygen Demand (THOD), with COD comprising the balance of the oxygen demand (Corbitt, 1990). BOD_5 was measured in 8 of 9 samples at concentrations ranging from 0.42 to 20 mg/L. As shown on Figure 3-8, the highest BOD_5

values were measured in benzene plume monitoring wells MW-26D (20 mg/L), BRPZ-9 (9.4 mg/L), MISS-5B (9.1 mg/L), and BRPZ-4 (4.8 mg/L). Noting that the mass ratio of benzene is 0.326:1, benzene present within the center of the plume could only account for 1.5 to 6.4 mg/L of the BOD. This may be attributed to the presence of other organics (e.g. chlorotoluene, surfactants, amines) at these locations. The high BOD5 values are attributed to the presence of benzene (and potentially other organics) and other partially oxidized organic substrates, and nutrients in strongly reduced groundwater samples.

Chemical Oxygen Demand (COD)

COD is a measure of the oxygen required to oxidize all compounds, both organic and inorganic, in water to carbon dioxide. COD is also used to assess the ORP of groundwater, where increasing COD values correspond to reduced redox conditions. COD was detected in 6 of 9 samples at concentrations ranging from 9.82 to 125 mg/L. As shown on Figure 3-8, the highest COD values were detected at benzene plume monitoring wells (BRPZ-9), MW-26D (105 mg/L), BRPZ-4 (40.3 mg/L), MISS-5B (19.7 mg/L), and offsite well B38W17B (33.6 mg/L). Downgradient COD concentrations generally decrease to non-detect with distance from the MISS.

Monitoring well COD concentrations correspond well with the measured ORP and electron acceptors, and supports the distribution of redox and electron acceptor (reduction) zones in the study area.

3.3.5 Microbiologic Activity

Direct biologic activity is measured by bacterial plate counts on non-selective (total heterotroph) and/or selective (BTEX) media. Noting that groundwater is moderately to strongly reduced in the site aquifer, replication of the aquifer environment would require incubation on an electron acceptor specific growth media, under anaerobic conditions. Unfortunately, anaerobic bacteria are difficult to grow, and the results are often inconsistent. Total heterotroph bacteria counts (THC) are the most commonly used indicator of microbiologic activity in groundwater. Groundwater samples were also evaluated for BTEX degraders, which utilized a selective media with BTEX as the sole carbon source. However, according to the American Society for Testing and Materials (ASTM), microbial counts are often unreliable indicators of biodegradation. The results of the THC and BTEX Degrader counts are summarized in **Table 3-9**, and are spatially shown on **Figure 3-8**. Plate count results for each method are discussed in the following sections.

Total Heterotroph Bacteria

Nine groundwater samples were collected and evaluated for THC as a general indicator of bacterial activity. Heterotrophic bacteria were detected in seven of nine samples, with a reported range of 160 to 75,000 colony forming units (CFU) per milliliter (CFU/mL). Heterotroph bacteria counts are highest in downgradient areas, and probably reflect the relative abundance of facultative (oxygen tolerant) bacteria in less reduced aquifer areas. Heterotrophic bacteria were not reported in samples from benzene plume area wells MW-26D and BRPZ-4, and probably indicate the dominance of obligate anaerobic sulfur reducing and methanogenic bacteria at those locations. Redox potential (Eh), electron acceptor, and COD data all indicate strongly reduced conditions at wells MW-26D and BRPZ-4. As noted, obligate anaerobic bacteria will not grow in aerobic (THC and BTEX degrader) test environments. Metals toxicity at wells MW-26D and BRPZ-4 is unlikely, noting the growth of spiked bacteria and high BOD_5 measurements at those wells.

BTEX Degrader Bacteria

Nine groundwater samples were evaluated for BTEX degrader bacteria. As noted, groundwater samples are incubated in a selective media, where BTEX is the only available carbon source. The BTEX degrader test should give a more realistic count of organisms that can degrade BTEX compounds than the THC. The BTEX degrader test also incubates samples under aerobic conditions, and will have limited utility with respect to evaluation of anaerobic biodegradation.

BTEX Degrader bacteria were detected in seven of nine wells, with counts ranging from 270 CFU/mL (B38W15D) to 1,700 CFU/mL (MW-32D). Like the THC data, the highest BTEX degrader counts were obtained in downgradient well locations. The relative abundance of BTEX degraders mirror the THC, but actual counts were lower than THC in four of seven detected samples, and the same (at the detection limit of 300 CFU/mL) in two samples. The BTEX degrader counts should be lower due to the more selective growth media. BTEX degraders were also not detected at benzene plume wells MW-26D and BRPZ-4, and may indicate the prevalence of methanogenic (anaerobic) bacteria at these locations.

3.4 DISCUSSION

Historical bedrock benzene sampling results were evaluated with current data to further characterize the benzene plume. Historical benzene sampling data is presented in **Table 3-10**, and shows intermittent bedrock benzene exceedances from the start of sampling in 1985 at downgradient (MISS) wells MISS-5B and MISS-7B. Downgradient MISS well B38W19D also shows intermittent low level exceedances from the onset of sampling in 1994. This data suggests the existence of a MISS benzene plume from at least 1985, including intermittent exceedances at wells B38W19D and MISS-7B, which are currently mapped at the margin or outside the bedrock plume. The fluctuation of benzene concentrations at well MISS-5B and other wells with time is likely influenced by a number of factors, including: (1) the change in sampling methods from dedicated bladder pumps in 1999 to low flow sampling in 2000; (2) groundwater level at the time of sampling; (3) variable benzene concentrations within a residual / stable plume over time; and/or (4) variable benzene source loading or intermittent source of benzene.

As noted in Section 3.2.1, a potential bedrock benzene source area was plotted using sampling data, and represents the probable upgradient extent of elevated benzene plume concentrations. It is not known whether the detected benzene in bedrock is derived from an active source, or is part of a residual bedrock plume. The relatively low benzene plume concentrations, and lack of apparent benzene sources to bedrock in the plotted “source area” favor the latter interpretation. A comparison of MISS bedrock benzene data from the Phase II GWRI sampling event (**Figure 1-2**) and RI Addendum sampling event (**Figure 3-3**) show decreasing benzene concentrations in 10 of 12 wells, including well MISS-5B (3500 to 680 µg/L). Benzene concentrations increased in bedrock well BRPZ-5 (5000 to 9500 µg/L) and MW-3D (5 to 15 µg/L). The overall decrease in MISS benzene groundwater concentrations may be attributed to attenuation.

As noted in Sections 1.4.1 and 1.4.2, benzene is not detected in the plotted potential bedrock source area soils and overburden groundwater. While this data does not indicate a current soil and/overburden groundwater source to bedrock, past benzene releases may have occurred and since been attenuated in the soil and shallow groundwater environment. Alternatively, benzene may have been introduced directly into bedrock by piping or well, or from spills in (offsite) areas with shallow bedrock.

Downgradient offsite well B38W17B shows intermittent low level exceedances from the start of sampling in 1991, with no exceedances detected at well B38W15D (from 1989). As noted in Section 3.2.1, well B38W17B is located along the projected downgradient axis of the plotted benzene plume. The limited downgradient extent of benzene over time suggests a stable (or degrading) plume, and ongoing attenuation of benzene in groundwater. Biogeochemical sampling (Section 3.3) data show strongly reduced groundwater conditions, high COD / BOD, and utilization of alternate electron acceptors in benzene impacted wells. This data suggests an ongoing anaerobic degradation in plume areas, and probable aerobic degradation along the plume fringe

4.0 SUMMARY / CONCLUSIONS AND RECOMMENDATIONS

4.1 SUMMARY / CONCLUSIONS

1. Bedrock groundwater flow is predominantly west-southwest, with a component of flow towards the south. The slope of the water table ranges from 0.035 ft/ft on the MISS and Stepan Property, to 0.01 ft/ft further west and downgradient from the site in Rochelle Park. All shallow / deep bedrock clusters showed slightly higher groundwater heads in shallow wells, indicating a downward vertical gradient within bedrock. This may be attributed to aquifer recharge following an extended wet month (8.33 inches) in June 2003.

2. Specific capacity tests were conducted on all newly installed wells following development. The calculated mean well hydraulic conductivity ranges from 2.79×10^{-3} to 3.01×10^{-2} cm/sec, with a geometric mean of 7.05×10^{-3} cm/sec. This is higher than the computed median (1.63×10^{-3} cm/sec) and mean (1.48×10^{-3} cm/sec) hydraulic conductivity values reported in the GWRI (USACE 2003a), and may be attributed to the effect of two high yielding wells.

3. Borehole geophysics was conducted at five of the six newly installed wells. Borehole fractures show a dominant NW dip direction, with a lesser number of fractures dipping west, southeast, and east. Most fractures dip at 10 to 20 degrees, however, steeply dipping water bearing fractures were noted in wells MW-31D and MW-32D. The overall fracture dip direction and angle data are similar to those reported in the GWRI, and likewise correspond with the GWRI bedrock strike and dip data.

4. Bedrock groundwater samples were collected from 38 wells, and analyzed for TCL VOCs and biogeochemical (bioremediation) parameters. Benzene was detected in 19 of 38 samples, with 14 samples exceeding the New Jersey Groundwater Quality Criteria (GWQC) of 1.0 µg/L. The maximum concentration of benzene (9,500 µg/L) was detected at MISS well BRPZ-5. The plotted benzene plume extends approximately 1,075 feet, and is oriented NNE–SSW along the plume axis. As noted in the GWRI, the apparent SSW plume flow direction does not follow the predicted groundwater flow, and may reflect local flow conditions.

5. A potential benzene bedrock source area was delineated based upon benzene sampling data. Noting that there is no detected product in bedrock, the potential source area represents the predicted upgradient extent of elevated benzene concentrations in bedrock. The source of the benzene in bedrock was not confirmed by previous and/or current soil and groundwater investigations within the MISS.

6. Benzene (15 ppb) was detected at upgradient, offsite well MW-3D. The plotted benzene isopleth map (Figure 3-3) shows an open 10 ppb. contour at the head of the benzene plume. Although unlikely, this data suggests a potential upgradient (inactive or intermittent) benzene source to the MISS.

7. The downgradient extent of the plume is extrapolated between MISS well MW-24D, and downgradient offsite wells B38W17B, MW-31D, and MW-32D. Wells B38W17B and MW-31D are located approximately 150 feet downgradient from the plotted 1.0 µg/L benzene isopleth, and along the projected path of the plume. These wells should be effective compliance / sentry wells for downgradient monitoring of the benzene plume.

8. Eight other VOC compounds were detected in groundwater at concentrations exceeding the NJDEP/EPA water quality standards. Tetrachloroethene (PCE) and trichloroethene (TCE) exceedances were detected in eleven and eight wells, respectively. Very low concentrations of PCE

and TCE were detected in a number of MISS wells. A potential offsite, upgradient source was identified in the GWRI.

9. Geochemical sampling was conducted at nine bedrock wells, and included dissolved oxygen and ORP (field parameters), total and dissolved manganese, total and dissolved iron, nitrate, ammonia, sulfate, sulfide, methane, total phosphorous, BOD, COD, total heterotrophic bacteria, and BTEX degraders.

10. Twenty-nine (29) wells measured DO concentrations less than 1.0 mg/L, with 20 wells below 0.5 mg/L. ORP values ranged from -626.3 to +332.6 mV, with 31 of 38 values below +0.0 mV. The lowest ORP values were measured in wells located within the plotted benzene plume. The DO and ORP data indicate anaerobic groundwater conditions at a majority of tested wells.

11. Alternate electron acceptor compounds, and reduced acceptors, were sampled to identify available receptors and provide evidence of specific acceptor utilization and biologic activity. The electron acceptor / reduced compounds include nitrate / ammonia, Mn_{solid}/Mn_{dis}, Fe_{solid}/Fe_{dis}, sulfate/sulfide, and carbon dioxide/methane.

12. The absence / low concentrations of nitrate and Mn_{solid} in wells, and accumulation of reduced ammonia and Mn_{dis}, indicate that nitrate and manganese acceptors concentrations are substantially diminished in the aquifer. Iron sampling data indicates that Fe_{solid} concentrations are substantially diminished in two wells in the benzene plume, however, Fe_{solid} is being used as an electron acceptor in other plume and plume fringe areas. Sulfide was detected in three of nine samples, and may be indicative of limited sulfate reduction in benzene plume wells. Elevated methane concentrations were also detected in three benzene plume wells, indicating probable methanogenesis and reduction of carbon dioxide in the bedrock aquifer.

13. The essential microbial nutrients include ammonia, phosphorous (TP), and carbon (TOC). Ammonia was detected in all wells, and total phosphorous was detected in eight of nine wells. High TOC concentrations were detected in all wells within the mapped benzene plume, but were absent from downgradient wells.

14. BOD was analyzed in order to determine the biologic oxygen demand, and is an indicator of potential biologic activity. COD, also analyzed as part of the program, measures non-biologic oxygen demand from reduced compounds and is used to gauge the degree of aquifer reduction. BOD was detected in eight of nine wells, with the highest values measured in the benzene plume wells. The high BOD_5 values are attributed to the relative abundance of benzene and other partially oxidized organic substrates, and nutrients in strongly reduced groundwater samples. COD was detected in six of nine wells, with the highest values measured in the benzene plume monitoring wells. Monitoring well COD concentrations correspond well with the measured ORP and electron acceptors, and supports the distribution of redox and electron acceptor reduction zones.

15. Microbiologic activity was measured by sampling / enumeration of total heterotroph and BTEX degrader bacteria in groundwater. Both tests incubate samples under aerobic conditions, and have limited utility with respect to evaluation of anaerobic biodegradation. Bacteria counts were highest in downgradient areas, and probably reflect the relative abundance of facultative (oxygen tolerant) bacteria in less reduced aquifer areas. Total heterotrophic and BTEX degrader bacteria were not detected in two benzene impacted wells, and probably indicates the dominance of obligate anaerobic sulfur reducing and methanogenic bacteria at those locations. Metals toxicity at these wells is unlikely, since the elevated BOD_5 concentrations indicate rapid growth of spiked bacteria.

16. Historic MISS benzene sampling data indicates a long-term source of benzene in the bedrock aquifer. It is unclear whether benzene in bedrock is currently derived from an active source, or is part of a residual bedrock plume. While soil and overburden groundwater data do not indicate a recent benzene source to bedrock, a past source may have attenuated in soil and/or shallow groundwater. Alternatively, benzene may have been introduced directly to bedrock by piping or well, or from spills in (offsite) areas with shallow bedrock.

17. The low detected (and non-detect) concentration of benzene at downgradient wells over time indicate a stable or degrading plume. Biogeochemical sampling indicates ongoing anaerobic degradation in plume areas, and probable aerobic degradation along the plume fringe.

4.2 RECOMMENDATIONS

- Low concentrations of benzene are detected at well MW-3D, which is located upgradient from the MISS on the New York Susquehanna & Western Railroad property. Annual groundwater sampling for VOCs is recommended at well MW-3D, and upgradient MISS bedrock well MW-27D, to monitor for any potential upgradient contribution and/or source of benzene to the MISS.
- A benzene plume well monitoring program shall be developed as part of the Monitored Natural Attenuation (MNA) alternative in the Feasibility Study, and will be proposed in the Long-Term Monitoring Plan (LTMP). The MNA sampling program shall include the sampling of VOCs and bioremedial parameters (i.e., D.O., and nitrate, iron, manganese, sulfate, and methane species) at selected benzene plume monitoring wells.

This page intentionally left blank.

5.0 REFERENCES

ASTM 1998. American Society for Testing and Materials. Standard Guide for Remediation of Groundwater by Natural Attenuation at Petroleum Release Sites. E-1943-98. August 1998.

CH2M Hill, 1994. Final Remedial Investigation Report. Corbitt 1990. Corbitt, Robert, Standard Handbook of Environmental Engineering, McGraw Hill, NY.

DOE 1992. Remedial Investigation Report for the Maywood Site; Volume I. Prepared for the U.S. Department of Energy by Bechtel National, Inc., October 1992.

EPA 1997. Anaerobic Biodegradation of BTEX in Aquifer Material. EPA/600/s-97/003. August 1997.

EPA 1998a. Groundwater Sampling Procedure Low Stress (Low Flow) Purging and Sampling. March 16, 1998.

EPA 1998b. Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater. EPA/600/R-98/128. September 1998.

EPA 1998c. Seminars: Monitored Natural Attenuation for Groundwater. EPA/625/K-98/001. September 1998.

EPA 1999. Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites. Directive Number 9200.4-17P. April 21, 1999.

Fetter 1994. Applied Hydrogeology. Third Edition. 1994.

Fetter 1999. Contaminant Hydrogeology. Second Edition. 1999.

NJDEP 1992. Field Sampling Procedures Manual. May 1992

USACE 1999. Data Quality Evaluation Guidance. CENWK-PE-ES. July 26, 1999.

USACE 2000a. Final Pilot Demonstration Work Plan, prepared for USACE by Stone & Webster Environmental Technology & Services. June 2000.

USACE 2000b. Draft Phase I - Groundwater Data Report, prepared for USACE by Stone & Webster, Inc. November 2000.

USACE 2002a. Groundwater Remedial Investigation Addendum Work Plan, prepared for USACE-Kansas City District by Shaw Environmental, Inc., May 2002.

USACE 2002b. Chemical Data Quality Management Plan, Revision 01, prepared for USACE by Stone & Webster, Inc. October 2002.

USACE 2003a. Draft Groundwater Remedial Investigation Report, prepared for USACE-Kansas City District by Shaw Environmental, Inc., June 2003.

USACE 2003b. Draft Groundwater Feasibility Study Approach and Initial Screening of Technologies Interim Submittal, prepared by Shaw Environmental, Inc. for U.S. Army Corps of Engineers-Kansas City District, July 2003.

USACE 2003c. Draft Groundwater Baseline Risk Assessment Report, prepared by Shaw Environmental, Inc. for U.S. Army Corps of Engineers-Kansas City District, July 2003.

USACE 2003d. Annual Environmental Monitoring Report, 2002, prepared by Shaw Environmental, Inc. for U.S. Army Corps of Engineers-Kansas City District, August 2003.

USACE 2003e. Remedial Action Work Plan, 2003, prepared by Shaw Environmental, Inc. for U.S. Army Corps of Engineers-Kansas City District, September 2003.

TABLES

TABLE 1-1

SUMMARY OF HISTORICAL BENZENE SOIL RESULTS

FUSRAP MAYWOOD SUPERFUND SITE, MAYWOOD, NJ

No. of Samples	No. of Sample Location	Boring Name	Sample Depth	Unsaturated/ Saturated Sample	Benzene (μg/kg)	Sample Type	Investigative Program
1	1	CP2	6'-8'	Unsaturated	ND	Grab Sample	DOE, 1992
2	2	CP3	0'-2'	Unsaturated	ND	Grab Sample	DOE, 1992
3	2	CP3	2'-4'	Unsaturated	ND	Grab Sample	DOE, 1992
4	3	CP4	2'-4'	Unsaturated	ND	Grab Sample	DOE, 1992
5	4	CP8	0'-2'	Unsaturated	ND	Grab Sample	DOE, 1992
6	5	CP9	6'-8'	Unsaturated	ND	Grab Sample	DOE, 1992
7	6	CP10	0'-2'	Unsaturated	ND	Grab Sample	DOE, 1992
8	6	CP10	2'-4'	Unsaturated	2	Grab Sample	DOE, 1992
9	6	CP10	6'-8'	Unsaturated	ND	Grab Sample	DOE, 1992
10	7	CP11	2'-6'	Unsaturated	ND	Grab Sample	DOE, 1992
11	7	CP11	6'-8'	Unsaturated	ND	Grab Sample	DOE, 1992
12	8	CP12	4'-8'	Unsaturated	2	Grab Sample	DOE, 1992
13	8	CP12	8'-9.6'	Unsaturated	ND	Grab Sample	DOE, 1992
14	9	CP14	8'-12'	Unsaturated	ND	Grab Sample	DOE, 1992
15	10	CP15	0'-2'	Unsaturated	ND	Grab Sample	DOE, 1992
16	11	CP16	4'-6'	Unsaturated	ND	Grab Sample	DOE, 1992
17	12	CP18	6'-8'	Unsaturated	ND	Grab Sample	DOE, 1992
18	13	CP20	0'-2'	Unsaturated	ND	Grab Sample	DOE, 1992
19	13	CP20	2'-6'	Unsaturated	ND	Grab Sample	DOE, 1992
20	13	CP20	6'-8'	Unsaturated	ND	Grab Sample	DOE, 1992
21	14	CP22	6'-8'	Unsaturated	ND	Grab Sample	DOE, 1992
22	14	CP22	12'-14.5'	Unsaturated	ND	Grab Sample	DOE, 1992
23	15	CP28	2'-4'	Unsaturated	ND	Grab Sample	DOE, 1992
24	15	CP28	4'-6'	Unsaturated	ND	Grab Sample	DOE, 1992
25	15	CP28	8'-11'	Unsaturated	ND	Grab Sample	DOE, 1992
26	16	CP32	0'-2'	Unsaturated	ND	Grab Sample	DOE, 1992
27	17	CP35	0'-2'	Unsaturated	ND	Grab Sample	DOE, 1992
28	18	CP37	8'-12'	Unsaturated	ND	Grab Sample	DOE, 1992
29	19	C001	0'-2	Unsaturated	ND	Soil Boring	DOE, 1992
30	19	C001	4'-6'	Unsaturated	ND	Soil Boring	DOE, 1992
31	19	C001	6'-8'	Unsaturated	ND	Soil Boring	DOE, 1992
32	19	C001	10'-12'	Saturated	ND	Soil Boring	DOE, 1992
33	20	C002	4'-6'	Unsaturated	ND	Soil Boring	DOE, 1992
34	20	C002	10'-12'	Unsaturated	ND	Soil Boring	DOE, 1992
35	21	C003	0'-2'	Unsaturated	ND	Soil Boring	DOE, 1992
36	21	C003	2'-4'	Unsaturated	ND	Soil Boring	DOE, 1992
37	21	C003	4'-6'	Unsaturated	ND	Soil Boring	DOE, 1992
38	21	C003	10'-12'	Saturated	ND	Soil Boring	DOE, 1992
39	22	C004	16'-17.5'	Saturated	ND	Soil Boring	DOE, 1992
40	22	C004	17.5'-19.5'	Saturated	ND	Soil Boring	DOE, 1992
41	22	C004	19.5'-21.5'	Saturated	ND	Soil Boring	DOE, 1992
42	23	C005		Unsaturated	ND	Soil Boring	DOE, 1992
43	24	C006	4'-6'	Unsaturated	ND	Soil Boring	DOE, 1992
44	24	C006	6'-8'	Unsaturated	ND	Soil Boring	DOE, 1992
45	25	C008	0'-2'	Unsaturated	ND	Soil Boring	DOE, 1992
46	25	C008	14'-16'	Saturated	ND	Soil Boring	DOE, 1992
47	26	C009	8'-10'	Unsaturated	ND	Soil Boring	DOE, 1992
48	27	C010	0'-2'	Unsaturated	ND	Soil Boring	DOE, 1992
49	27	C010	4'-8'	Unsaturated	ND	Soil Boring	DOE, 1992
50	27	C010	6'-8'	Unsaturated	ND	Soil Boring	DOE, 1992
51	28	C011	12'-14'	Saturated	ND	Soil Boring	DOE, 1992
52	29	C012	10'-12'	Unsaturated	ND	Soil Boring	DOE, 1992
53	29	C012	14'-16'	Unsaturated	ND	Soil Boring	DOE, 1992
54	30	C013	12'-14'	Unsaturated	ND	Soil Boring	DOE, 1992
55	31	C014	12'-14'	Unsaturated	ND	Soil Boring	DOE, 1992
56	32	C015	12'-14'	Saturated	ND	Soil Boring	DOE, 1992

TABLE 1-1

SUMMARY OF HISTORICAL BENZENE SOIL RESULTS

FUSRAP MAYWOOD SUPERFUND SITE, MAYWOOD, NJ

No. of Samples	No. of Sample Location	Boring Name	Sample Depth	Unsaturated/ Saturated Sample	Benzene (µg/kg)	Sample Type	Investigative Program
57	33	C016	14'-16'	Unsaturated	ND	Soil Boring	DOE, 1992
58	34	C017	12'-14'	Unsaturated	ND	Soil Boring	DOE, 1992
59	35	C018	4'-6'	Unsaturated	ND	Soil Boring	DOE, 1992
60	36	C019	6'-8'	Unsaturated	ND	Soil Boring	DOE, 1992
61	37	C020	0'-2'	Unsaturated	ND	Soil Boring	DOE, 1992
62	37	C020	8'-10'	Unsaturated	ND	Soil Boring	DOE, 1992
63	38	C021	6'-8'	Unsaturated	21	Soil Boring	DOE, 1992
64	39	C022	4'-6'	Unsaturated	ND	Soil Boring	DOE, 1992
65	40	C022	8'-10'	Unsaturated	ND	Soil Boring	DOE, 1992
66	40	C022	12'-12.8'	Unsaturated	ND	Soil Boring	DOE, 1992
67	40	C022	13'-13.9'	Unsaturated	ND	Soil Boring	DOE, 1992
68	40	C022	14'-16'	Unsaturated	ND	Soil Boring	DOE, 1992
69	41	C023	2'-4'	Unsaturated	ND	Soil Boring	DOE, 1992
70	42	C024	0'-2'	Unsaturated	ND	Soil Boring	DOE, 1992
71	42	C024	6'-8'	Unsaturated	ND	Soil Boring	DOE, 1992
72	42	C024	10'-12'	Unsaturated	ND	Soil Boring	DOE, 1992
73	43	C025	10'-12'	Unsaturated	ND	Soil Boring	DOE, 1992
74	44	C026	0'-2'	Unsaturated	ND	Soil Boring	DOE, 1992
75	44	C026	12'-14'	Saturated	ND	Soil Boring	DOE, 1992
76	45	C027	5'-7'	Saturated	ND	Soil Boring	DOE, 1992
77	45	C027	8'-10'	Saturated	ND	Soil Boring	DOE, 1992
78	46	C028	6'-8'	Unsaturated	ND	Soil Boring	DOE, 1992
79	46	C028	8'-11'	Unsaturated	2	Soil Boring	DOE, 1992
80	47	C029	12'-14'	Unsaturated	ND	Soil Boring	DOE, 1992
81	48	C030	4'-6'	Unsaturated	ND	Soil Boring	DOE, 1992
82	48	C030	10'-14'	Saturated	ND	Soil Boring	DOE, 1992
83	49	C031	10'-12'	Saturated	ND	Soil Boring	DOE, 1992
84	50	C032	4'-6'	Unsaturated	ND	Soil Boring	DOE, 1992
85	51	C033	5'-7'	Unsaturated	ND	Soil Boring	DOE, 1992
86	52	C034	6'-8'	Unsaturated	ND	Soil Boring	DOE, 1992
87	53	10a001	5'-8'	Saturated	ND	Geoprobe	USACE, 2003
88	54	10a002	6'-9'	Saturated	ND	Geoprobe	USACE, 2003
89	55	10a003	5-8	NR	ND	Geoprobe	USACE, 2003
90	56	10a004	10'-13'	Saturated	ND	Geoprobe	USACE, 2003
91	57	10a005	5'-9'	Unsaturated	ND	Geoprobe	USACE, 2003
92	58	10a006	5'-9'	Unsaturated	ND	Geoprobe	USACE, 2003
93	59	10a007	2'-5'	Saturated	ND	Geoprobe	USACE, 2003
94	60	10a008	10'-15'	Saturated	ND	Geoprobe	USACE, 2003
95	61	12b001	16'-20'	Saturated	ND	Geoprobe	USACE, 2003
96	62	12b002	7'-10'	Saturated	ND	Geoprobe	USACE, 2003
97	63	12b003	8'-12'	Saturated	ND	Geoprobe	USACE, 2003
98	64	12b004	8'-12'	Unsaturated	ND	Geoprobe	USACE, 2003
99	65	12b005	8'-12'	Saturated	ND	Geoprobe	USACE, 2003
100	66	12b006	4'-8'	Saturated	ND	Geoprobe	USACE, 2003
101	67	12b007	1-3.5	Unsaturated	ND	Geoprobe	USACE, 2003
102	68	12b009	7'-9'	Unsaturated	ND	Geoprobe	USACE, 2003
103	68	12b009	9 - 11	Saturated	ND	Geoprobe	USACE, 2003
104	69	12b010	4 - 6	Unsaturated	ND	Geoprobe	USACE, 2003
105	69	12b010	10 - 12	Unsaturated	ND	Geoprobe	USACE, 2003
106	70	12b011	0 - 4	Unsaturated	ND	Geoprobe	USACE, 2003
107	70	12b011	6 - 8	Unsaturated	ND	Geoprobe	USACE, 2003
108	71	12b012	2 - 4	Unsaturated	120	Geoprobe	USACE, 2003
109	71	12b012	6 - 8	Unsaturated	330	Geoprobe	USACE, 2003
110	72	12b013	3 - 5	Unsaturated	200	Geoprobe	USACE, 2003
111	72	12b013	6 - 8	Unsaturated	ND	Geoprobe	USACE, 2003
112	73	12b014	2 - 4	Unsaturated	ND	Geoprobe	USACE, 2003

TABLE 1-1

SUMMARY OF HISTORICAL BENZENE SOIL RESULTS

FUSRAP MAYWOOD SUPERFUND SITE, MAYWOOD, NJ

No. of Samples	No. of Sample Location	Boring Name	Sample Depth	Unsaturated/ Saturated Sample	Benzene (µg/kg)	Sample Type	Investigative Program
113	73	12b014	4'-6'	Unsaturated	ND	Geoprobe	USACE, 2003
114	74	12b015	0'-2'	Unsaturated	ND	Geoprobe	USACE, 2003
115	74	12b015	2 - 4	Unsaturated	ND	Geoprobe	USACE, 2003
116	75	12b016	1-3	Unsaturated	ND	Geoprobe	USACE, 2003
117	75	12b016	5'-7'	Unsaturated	ND	Geoprobe	USACE, 2003
118	76	12b018	0'-2'	Unsaturated	ND	Geoprobe	USACE, 2003
119	77	12b018	2'-4'	Unsaturated	ND	Geoprobe	USACE, 2003
120	77	12b019	0'-2'	Unsaturated	ND	Geoprobe	USACE, 2003
121	77	12b019	2'-4'	Saturated	ND	Geoprobe	USACE, 2003
122	78	12b020	13'-14'	Saturated	ND	Geoprobe	USACE, 2003
123	79	12b026	8'-9'	Unsaturated	ND	Geoprobe	USACE, 2003
124	80	MW-20S	6'-8'	Unsaturated	ND	Soil Boring	USACE, 2003
125	81	MW-3S	6'-8'	Unsaturated	ND	Soil Boring	USACE, 2003
126	82	TP1RELO	6'-9'	Unsaturated	ND	Test Pit	USACE, 2000
127	83	TP1REOV	0'-2'	Unsaturated	ND	Test Pit	USACE, 2000
128	84	TP1REUP	2'-6'	Unsaturated	ND	Test Pit	USACE, 2000
129	85	TP1SULO	6'-9'	Unsaturated	ND	Test Pit	USACE, 2000
130	86	TP1SUOV	0'-2'	Unsaturated	ND	Test Pit	USACE, 2000
131	87	TP1SUUP	2'-6'	Unsaturated	ND	Test Pit	USACE, 2000
132	88	TP1TRLO	6'-9'	Unsaturated	ND	Test Pit	USACE, 2000
133	89	TP1TROV	0'-2'	Unsaturated	ND	Test Pit	USACE, 2000
134	90	TP1TRUP	2'-5'	Unsaturated	ND	Test Pit	USACE, 2000
135	91	TP2RELO	8'-10'	Unsaturated	ND	Test Pit	USACE, 2000
136	92	TP2REOV	0'-1'	Unsaturated	ND	Test Pit	USACE, 2000
137	93	TP2REUP	1'-8'	Unsaturated	ND	Test Pit	USACE, 2000
138	94	TP2SULO	7'-10'	Unsaturated	ND	Test Pit	USACE, 2000
139	95	TP2SUOV	0'-1'	Unsaturated	ND	Test Pit	USACE, 2000
140	96	TP2SUUP	1'-2'	Unsaturated	ND	Test Pit	USACE, 2000
141	97	TP2TRLO	8'-10'	Unsaturated	ND	Test Pit	USACE, 2000
142	98	TP2TROV	0'-1'	Unsaturated	ND	Test Pit	USACE, 2000
143	99	TP2TRUP	1'-8'	Unsaturated	ND	Test Pit	USACE, 2000
144	100	TP3RELO	7'-9'	Unsaturated	ND	Test Pit	USACE, 2000
145	101	TP3REOV	0'-1'	Unsaturated	ND	Test Pit	USACE, 2000
146	102	TP3REUP	0'-8'	Unsaturated	ND	Test Pit	USACE, 2000
147	103	TP3REUP	0'-8'	Unsaturated	ND	Test Pit	USACE, 2000
148	104	TP3SULO	7'-9'	Unsaturated	ND	Test Pit	USACE, 2000
149	105	TP3SUOV	0'-1'	Unsaturated	ND	Test Pit	USACE, 2000
150	106	TP3SUUP	1'-8'	Unsaturated	4300	Test Pit	USACE, 2000
151	107	TP3TRLO	7'-9'	Unsaturated	ND	Test Pit	USACE, 2000
152	108	TP3TROV	0'-1'	Unsaturated	ND	Test Pit	USACE, 2000
153	109	TP3TRUP	1'-3'	Unsaturated	ND	Test Pit	USACE, 2000
154	110	TP4RELO	6'-8'	Unsaturated	640	Test Pit	USACE, 2000
155	111	TP4REOV	0'-1'	Unsaturated	ND	Test Pit	USACE, 2000
156	112	TP4REUP	1'-2'	Unsaturated	ND	Test Pit	USACE, 2000
157	113	TP4SULO	3'-4'	Unsaturated	ND	Test Pit	USACE, 2000
158	114	TP4SUOV	0'-1'	Unsaturated	850	Test Pit	USACE, 2000
159	115	TP4SUUP	1'-3'	Unsaturated	3600	Test Pit	USACE, 2000
160	116	TP4TRLO	3'-4'	Unsaturated	730	Test Pit	USACE, 2000
161	117	TP4TROV	0'-1'	Unsaturated	ND	Test Pit	USACE, 2000
162	118	TP4TRUP	2'-3'	Unsaturated	ND	Test Pit	USACE, 2000
163	119	TP5LWER	6'-8'	Unsaturated	ND	Test Pit	USACE, 2000
164	120	TP5OVER	0'-2'	Unsaturated	ND	Test Pit	USACE, 2000
165	121	TP5UPER	2'-6'	Unsaturated	380000	Test Pit	USACE, 2000
166	122	C207	0'-2'	Unsaturated	ND	Soil Boring	DOE, 1992
167	123	C296	0'-2'	Unsaturated	ND	Soil Boring	DOE, 1992
168	124	C299	0'-2'	Unsaturated	ND	Soil Boring	DOE, 1992

TABLE 1-1

SUMMARY OF HISTORICAL BENZENE SOIL RESULTS

FUSRAP MAYWOOD SUPERFUND SITE, MAYWOOD, NJ

No. of Samples	No. of Sample Location	Boring Name	Sample Depth	Unsaturated/ Saturated Sample	Benzene (µg/kg)	Sample Type	Investigative Program
169	124	C299	2'-4'	Unsaturated	ND	Soil Boring	DOE, 1992
170	124	C299	6'-8'	Unsaturated	ND	Soil Boring	DOE, 1992
171	125	C701	0'-2'	Unsaturated	87	Soil Boring	DOE, 1992
172	125	C701	2'-4'	Unsaturated	ND	Soil Boring	DOE, 1992
173	125	C701	6'-8'	Saturated	ND	Soil Boring	DOE, 1992
174	125	C701	8'-10'	Saturated	87	Soil Boring	DOE, 1992
175	126	TP-22	2'	Unsaturated	ND	Test Pit	Stepan, 1994
176	127	TP-23	3.5	Unsaturated	ND	Test Pit	Stepan, 1994
177	128	TP-25	0.6	Unsaturated	ND	Test Pit	Stepan, 1994
178	129	TP-32	3'	Unsaturated	ND	Test Pit	Stepan, 1994
179	130	C-20	2.5'-4.5'	Unsaturated	ND	Soil Boring	Stepan, 1994
180	130	C-20	4.5'-6.5'	Unsaturated	ND	Soil Boring	Stepan, 1994
181	130	C-20	6.5'-8.5'	Unsaturated	ND	Soil Boring	Stepan, 1994
182	131	C-38	8'-10'	Unsaturated	ND	Soil Boring	Stepan, 1994
183	131	C-38	10'-12'	Unsaturated	ND	Soil Boring	Stepan, 1994
184	131	C-38	12'-14	Unsaturated	ND	Soil Boring	Stepan, 1994
185	132	C-39	0'-2'	Unsaturated	ND	Soil Boring	Stepan, 1994
186	132	C-39	4'-6'	Unsaturated	ND	Soil Boring	Stepan, 1994
187	132	C-39	6'-8'	Unsaturated	ND	Soil Boring	Stepan, 1994
188	133	C-40	2'-4'	Unsaturated	ND	Soil Boring	Stepan, 1994
189	133	C-40	4'-6'	Unsaturated	ND	Soil Boring	Stepan, 1994
190	133	C-40	6'-8'	Unsaturated	ND	Soil Boring	Stepan, 1994
191	134	C-41	0'-2'	Unsaturated	ND	Soil Boring	Stepan, 1994
192	134	C-41	4'-6'	Unsaturated	2	Soil Boring	Stepan, 1994
193	134	C-41	6'-8'	Unsaturated	ND	Soil Boring	Stepan, 1994
194	135	C-42	4'-6'	Unsaturated	ND	Soil Boring	Stepan, 1994
195	135	C-42	6'-8'	Unsaturated	ND	Soil Boring	Stepan, 1994
196	135	C-42	10'-12'	Unsaturated	ND	Soil Boring	Stepan, 1994
197	136	C-43	3'-5'	Unsaturated	ND	Soil Boring	Stepan, 1994
198	136	C-43	7'-9'	Unsaturated	ND	Soil Boring	Stepan, 1994
199	136	C-43	11'-13'	Unsaturated	ND	Soil Boring	Stepan, 1994
200	137	C-44	4'-6'	Unsaturated	4700	Soil Boring	Stepan, 1994
201	137	C-44	6'-8'	Unsaturated	8	Soil Boring	Stepan, 1994
202	137	C-44	10'-12'	Unsaturated	890	Soil Boring	Stepan, 1994

Legend

µg/kg = micrograms per kilogram
ND = Non-Detect

DOE 1992. Remedial Investigation Report Prepared for the U.S. Department of Energy by Bechtel National, Inc., October 1992.

Stepan 1994. Final Remedial Investigation Report. Prepared by CH2M Hill, November 1994

USACE 2000. Final Pilot Demonstration Work Plan, Volume 5, Results of Engineering Test Pits Program At MISS. Prepared by Stone & Webster Engineering Technology & Services, June 2000

USACE 2003. Groundwater Remedial Investigation Report. Prepared by Shaw Environmental, Inc., June 2003.

Table 2-1
Well Construction Data Table

FUSRAP Maywood Superfund Site, Maywood, NJ

Well Name	Installation Date	Permit No.	Driller	Aquifer Type	Depth to Bedrock(ft bgs)	Drilling Method	Riser Type (Steel/PVC)	Riser I.D. (inch)	Screen Type	Screen Length (ft)	Top of Screen, ft BGS	Bottom of Screen, ft BGS	Well Depth (ft BGS)	Surface Construction
MW-27D	8/6-8/9/02	26-65219	B&B Drilling	Bedrock	20	Air Rotary	Steel	6	Open	25	33.5	58.5	58.5	Stick-up
MW-28D	8/7-8/12/02	26-65220	B&B Drilling	Bedrock	20	Air Rotary	Steel	6	Open	25	32.0	57.0	57	Stick-up
MW-31D	2/12-2/14/03	26-66774	B&B Drilling	Bedrock	10	Air Rotary	Steel	6	Open	25	20.0	45.0	45	Flush-Mount
MW-32D	5/2-5/5/03	26-67268	B&B Drilling	Bedrock	18	Air Rotary	Steel	6	Open	25	32.0	57.0	57	Flush-Mount
MW-33D	9/10-9/12/02	26-65221	B&B Drilling	Bedrock	20	Air Rotary	PVC	2	10-slot PVC	20	45.5	65.5	68	Stick-up
MW-34D	9/12-9/16/02	26-65218	B&B Drilling	Bedrock	18	Air Rotary	Steel	6	Open	25	28.0	53.0	53	Stick-up

Legend
BGS = Below Ground Surface

Table 2-2

Well Survey Data Table

FUSRAP Maywood Superfund Site, Maywood, NJ

Site Name	Surveyor	Northing	Easting	Ground Surface Elv. (NGVD)	Top of Inner Casing, where Applicable (NGVD)	Top of Outer Protective Casing (NGVD)	Survey Date
MW-27D	Garden State Surveyors	752837.122	2164483.608	62.68	N/A	65.16	06/25/2003
MW-28D	Garden State Surveyors	752687.422	2164516.466	61.90	N/A	64.50	06/25/2003
MW-31D	Garden State Surveyors	752208.120	2163533.829	49.08	48.62	49.08	06/25/2003
MW-32D	Garden State Surveyors	752117.873	2163781.760	49.18	48.83	49.18	06/25/2003
MW-33D	Garden State Surveyors	752771.805	2164339.602	59.44	62.00	62.24	06/25/2003
MW-34D	Garden State Surveyors	752623.464	2164426.546	58.35	N/A	60.63	06/25/2003

NGVD = National Geodetic Vertical Datum, 1929

N/A = Not Applicable

Table 2-3
Field Parameters Measured Prior to Groundwater Sampling
FUSRAP Maywood Superfund Site, Maywood, NJ

No. of Groundwater Samples	Well	Sample Date	Sample Time	pH (S.U.)	Temp (deg. C)	Specific Conductivity (uS/cm)	Eh (mv)	DO (mg/L)	Field Qualifier	Turbidity (NTU)
1	B38W02D	7/17/2002	9:55	6.70	15.40	534.00	113.90	0.30		2.60
2	B38W07B	7/25/2002	13:35	6.59	15.57	427.00	133.40	0.32		2.20
3	B38W14D	7/24/2002	14:00	6.90	18.01	1228.00	-19.40	0.31		4.90
4	B38W15D	3/18/2003	12:55	7.43	13.95	2050.00	218.30	0.04		0.00
5	B38W17B	7/2/2002	10:35	6.87	17.24	2796.00	-82.80	0.22		0.00
6	B38W18D	7/18/2002	9:15	5.54	19.39	724.00	332.60	0.50		10.90
7	B38W19D	7/9/2002	13:35	6.30	17.02	3749.00	1.30	12.90	R	0.00
8	B38W24D	7/15/2002	10:45	5.96	19.64	717.00	-15.40	0.28		2.20
9	B38W25D	7/10/2002	11:20	6.33	16.91	1160.00	-15.80	15.50	R	0.00
10	BRPW-1DRE	8/13/2002	15:05	6.68	16.16	3027.00	-254.70	0.64		25.20
11	BRPZ-3RE	8/13/2002	10:55	6.14	18.05	6685.00	-578.00	0.48		43.20
12	BRPZ-4	8/6/2002	11:05	6.01	15.64	14309.00	-55.40	0.04		NR
13	BRPZ-5RE	8/7/2002	17:30	5.69	18.63	21948.00	-332.60	1.58		21.00
14	BRPZ-9	8/7/2002	10:25	6.26	15.84	10839.00	-72.80	0.07		NR
15	MISS-02B	7/8/2002	14:10	6.64	16.10	4889.00	-20.10	11.67	R	8.80
16	MISS03B	7/29/2002	9:45	6.25	16.46	1364.00	-3.80	0.30		11.80
17	MISS04B	7/29/2002	11:05	6.58	16.73	1553.00	-70.80	0.31		37.00
18	MISS05B	7/31/2002	11:45	6.18	16.57	13128.00	-88.90	1.16		31.60
19	MISS07B	7/11/2002	14:00	6.91	17.70	7785.00	-40.90	0.26		29.10
20	MISS01B	7/18/2002	14:55	7.28	20.68	682.00	136.00	2.24		87.70
21	MW-20D	8/5/2002	14:45	6.81	15.89	4184.00	-72.30	0.11		NR
22	MW-23D	7/26/2002	13:00	6.58	17.02	2230.00	-10.30	0.46		24.90
23	MW-24D	7/25/2002	9:35	6.47	15.74	4835.00	-39.70	0.34		1.20
24	MW-24DD	7/25/2002	10:25	6.94	15.77	3685.00	-103.80	0.77		17.60
25	MW-25D	7/26/2002	10:35	7.49	15.48	2305.00	-212.80	0.18		35.20
26	MW-26D	8/15/2002	13:25	6.90	19.60	8858.00	-626.30	1.67		3.20
27	MW-27D	10/14/2002	16:15	6.84	16.38	3870.00	-64.40	0.92		7.30
28	MW-28D	10/15/2002	10:55	6.75	15.70	2980.00	-71.10	0.73		7.70
29	MW-2D	7/30/2002	15:00	7.33	20.37	1831.00	-74.20	0.20		31.10
30	MW-31D	3/13/2003	12:15	6.75	13.97	2940.00	-71.40	0.02		38.40
31	MW-32D	5/28/2003	12:00	7.37	14.60	3460.00	-68.30	0.05		14.20
32	MW-33D	10/15/2002	14:10	6.49	14.76	8110.00	-47.20	0.80		1.00
33	MW-34D	10/15/2002	16:30	6.66	16.20	4110.00	-71.30	0.59		1.70
34	MW-3D	8/8/2002	15:30	6.37	14.86	8458.00	-31.70	0.52		9.90
35	MW-4D	8/1/2002	15:25	6.99	18.34	587.00	-40.10	0.66		55.10
36	MW-5D	8/2/2002	13:30	7.30	20.49	572.00	149.30	4.02		12.60
37	MW-6D	8/14/2002	14:30	7.21	20.59	819.00	-164.70	0.56		660.90
38	MW-7D	8/5/2002	10:45	6.72	16.69	1422.00	-85.80	0.08		NR

Legend
S.U. = Standard Units
Temp = Temperature
deg. C = Degrees Centigrade
uS/cm = Microsiemens per centimeter
Eh = Oxidation-Reduction Potential
mv = Millivolts
DO = Dissolved Oxygen
mg/L = Milligrams per Liter
NTU = Nephelometric Turbidity Unit
R = Data was rejected since reported result exceeded theoretical limit of dissolved oxygen in groundwater
NR = Not Recorded

Table 3-1
Synoptic Water Level Measurements for Bedrock Monitoring Wells
FUSRAP Maywood Superfund Site, Maywood, NJ

GWRI Site Name	Well Type	Top of Measuring Point, ft NGVD	Water Level, ft BTOMP	GW Elv. NGVD	Top of Screen, ft NGVD	Bottom of Screen, ft. NGVD	Top of Screen, ft BGS	Bottom of Screen, ft BGS	Well Depth (ft BGS)	MeasurementDate
B38W02D	Bedrock	78.04	13.01	65.03	37.94	32.94	37.00	42.00	43	6/23/2003
B38W03B	Bedrock	58.27	7.4	50.87	27.13	17.43	29.80	39.50	40.5	6/23/2003
B38W04B	Bedrock	65.64	8.02	57.62	40.01	35.01	22.70	27.70	36.3	6/23/2003
B38W05B	Bedrock	70.98	7.6	63.38	45.56	35.26	22.70	33.00	44.5	6/23/2003
B38W07B	Bedrock	54.98	6.04	48.94	34.09	23.79	18.50	28.80	39.2	6/23/2003
B38W14D	Bedrock	43.79	0	43.79	-1.84	-7.34	46.00	51.50	51.5	6/23/2003
B38W15D	Bedrock	47.04	3.12	43.92	6.47	1.47	41.00	46.00	46	6/24/2003
B38W17B	Bedrock	53.28	6.43	46.85	31.98	21.68	18.70	29.00	44.4	6/23/2003
B38W18D	Bedrock	57.85	2.46	55.39	23.02	18.02	35.00	40.00	41	6/23/2003
B38W19D	Bedrock	59.98	13.4	46.58	35.79	25.59	21.70	31.90	47.9	6/23/2003
B38W24D	Bedrock	54.91	6.05	48.86	33.29	28.29	22.00	27.00	28	6/23/2003
B38W25D	Bedrock	57.66	4.65	53.01	34.05	29.05	21.60	26.60	27.6	6/23/2003
BRMW1	Bedrock	49.06	4.31	44.75	12.35	2.35	37.00	47.00	47	6/24/2003
BRMW10	Bedrock	59.33	7.82	51.51	29.78	19.78	30.00	40.00	40	6/23/2003
BRMW14	Bedrock	46.20	3.14	43.06	19.50	9.50	27.00	37.00	37	6/24/2003
BRMW15	Bedrock	71.63	7.4	64.23	50.31	40.31	20.00	30.00	30	6/23/2003
BRMW16	Bedrock	67.94	6.82	61.12	47.60	37.60	20.00	30.00	30	6/23/2003
BRMW17	Bedrock	62.02	3.6	58.42	35.49	25.49	25.00	35.00	35	6/23/2003
BRPW-1DRE	Bedrock	56.30	8.4	47.90	-33.58	-53.58	90.00	110.00	110	6/23/2003
BRPZ-2RE	Bedrock	55.74	7.02	48.72	13.89	-6.11	42.00	62.00	62	6/23/2003
BRPZ-3RE	Bedrock	56.90	7.8	49.10	19.92	-0.08	37.00	57.00	57	6/23/2003
BRPZ-4	Bedrock	55.58	7.55	48.03	15.30	-5.70	40.00	61.00	61	6/23/2003
BRPZ-5RE	Bedrock	55.37	7.1	48.27	13.25	-6.75	42.00	62.00	62	6/23/2003
BRPZ-9	Bedrock	55.97	8.02	47.95	24.07	0.07	32.00	56.00	56	6/23/2003
MISS01B	Bedrock	61.98	13.93	48.05	37.42	6.92	23.00	53.50	53.5	6/23/2003
MISS02B	Bedrock	61.38	9.85	51.53	32.70	2.70	28.50	58.50	58.5	6/23/2003
MISS03B	Bedrock	57.66	7.28	50.38	36.78	6.78	20.00	50.00	50	6/23/2003
MISS04B	Bedrock	56.42	8.6	47.82	38.38	8.38	17.00	47.00	47	6/23/2003
MISS05B	Bedrock	59.76	12.97	46.79	33.09	3.09	25.00	55.00	55	6/23/2003
MISS07B	Bedrock	55.77	8.58	47.19	34.99	4.99	19.00	49.00	49	6/23/2003
MW-13D	Bedrock	46.12	3.99	42.13	21.30	-3.70	25.00	50.00	50	6/23/2003
MW-19D	Bedrock	55.96	5.82	50.14	39.17	14.17	17.00	42.00	42	6/23/2003
MW-19DD	Bedrock	55.81	6.36	49.45	4.64	-19.86	51.50	76.00	76	6/23/2003
MW-20D	Bedrock	58.88	7.7	51.18	28.46	3.46	30.00	55.00	55	6/23/2003
MW-23D	Bedrock	56.19	9	47.19	5.11	-14.89	51.00	71.00	71	6/23/2003
MW-23DD	Bedrock	56.98	10.17	46.81	-25.15	-45.15	82.00	102.00	102	6/23/2003
MW-24D	Bedrock	57.28	9.93	47.35	7.33	-12.67	47.70	67.70	67.7	6/23/2003
MW-24DD	Bedrock	57.08	9.82	47.26	-24.93	-49.93	80.00	105.00	105	6/23/2003
MW-25D	Bedrock	58.13	9.84	48.29	23.11	-1.89	33.00	58.00	59	6/23/2003
MW-26D	Bedrock	60.12	8.07	52.05	23.33	-1.67	33.50	58.50	59	6/23/2003
MW-27D	Bedrock	65.16	14.3	50.86	29.18	4.18	33.50	58.50	58.5	6/23/2003
MW-28D	Bedrock	64.50	14.29	50.21	29.90	4.90	32.00	57.00	57	6/23/2003
MW-2D	Bedrock	46.91	3.2	43.71	25.66	-1.34	21.50	48.50	48.5	6/23/2003
MW-31D	Bedrock	48.62	4.41	44.21	29.08	4.08	20.00	45.00	45	6/23/2003
MW-32D	Bedrock	48.83	2.45	46.38	17.18	-7.82	32.00	57.00	57	6/23/2003
MW-33D	Bedrock	62.00	13.27	48.73	13.94	-6.06	45.50	65.50	68	6/23/2003
MW-34D	Bedrock	60.63	6.76	53.87	30.35	5.35	28.00	53.00	53	6/23/2003
MW-3D	Bedrock	54.77	5.25	49.52	25.06	0.06	30.00	55.00	55	6/23/2003
MW-5D	Bedrock	45.15	5.1	40.05	13.43	-6.57	32.00	52.00	52	6/23/2003
MW-6D	Bedrock	42.34	3.66	38.68	13.84	-11.16	29.00	54.00	54	6/23/2003
MW-7D	Bedrock	53.73	5.21	48.52	32.99	7.99	21.00	46.00	46	6/23/2003
MW-8D	Bedrock	54.15	5	49.15	27.34	2.34	27.00	52.00	52	6/23/2003
PT-1DA	Bedrock	55.92	8.4	47.52	27.26	17.26	29.00	39.00	13	6/24/2003
PT-1DB	Bedrock	55.79	8.5	47.29	4.26	-5.74	52.00	62.00	13	6/24/2003

Legend
ft NGVD = Feet relative to the National Geodetic Vertical Datum
El. = Elevation
BTOMP = Below Top of Measuring Point
BGS = Below Ground Surface

Table 3-2
Summary of Hydraulic Conductivity Values Obtained from Specific Capacity Tests
FUSRAP Maywood Superfund Site

Well	Specific Capacity, Q/s (gpm/ft)	Transmissivity (ft^2/day)	Saturated Thickness (ft)	Hydraulic Conductivity (cm/sec)	Date of Test
MW-27D	0.09	197.37	25.00	2.79E-03	8/15/2002
MW-28D	0.16	307.87	25.00	4.34E-03	8/14/2002
MW-31D	2.55	2133.05	25.00	3.01E-02	2/21/2003
MW-32D	1.24	1312.99	29.00	1.60E-02	5/6/2003
MW-33D	0.16	339.21	22.00	5.44E-03	9/16/2002
MW-34D	0.13	275.12	25.00	3.88E-03	9/17/2002
Minimum	0.09	197.37	22.00	2.79E-03	
Maximum	2.55	2133.05	29.00	3.01E-02	
Geometric Mean	0.31	501.36	N/A	7.05E-03	

Legend
Q/s = Specific Capacity
Q = Flow rate in gallons per minute (gpm)
s = Drawdown in feet (ft)

Table 3-3
Summary of Benzene Results for Bedrock Groundwater Samples - RI Addendum
FUSRAP Maywood Superfund Site, Maywood, NJ

Well	Sample ID:	Analysis Name:	Result (µg/L)	Result Qualifier	Detection Limit (µg/L)	Sample Type	Collection Date
B38W17B	20a-024645	Benzene	5	U	5	REG	7/2/2002
MISS02B	12b-024633	Benzene	0.2	J	0.5	REG	7/8/2002
B38W19D	12b-024648	Benzene	0.7		0.5	REG	7/9/2002
B38W25D	12b-024652	Benzene	0.5	U	0.5	REG	7/10/2002
MISS07B	12b-024638	Benzene	0.5	U	0.5	REG	7/11/2002
B38W24D	10a-024650	Benzene	0.5	U	0.5	REG	7/15/2002
B38W02D	12a-024639	Benzene	0.5	U	0.5	REG	7/17/2002
B38W18D	12b-024681	Benzene	0.5	U	0.5	REG	7/18/2002
MISS01B	12b-024631	Benzene	0.5	U	0.5	REG	7/18/2002
B38W14D	19a-024641	Benzene	0.5	U	0.5	REG	7/24/2002
B38W07B	12b-021647	Benzene	0.5	U	0.5	REG	7/25/2002
MW-24D	12b-021645	Benzene	29		0.5	REG	7/25/2002
MW-24DD	12b-021646	Benzene	9		0.5	REG	7/25/2002
MW-23D	12b-021651	Benzene	0.5	U	0.5	REG	7/26/2002
MW-25D	12b-021652	Benzene	0.4	J	0.5	REG	7/26/2002
MISS03B	10a-021655	Benzene	0.5	U	0.5	REG	7/29/2002
MISS04B	10a-021656	Benzene	5		2	DIL	7/29/2002
MW-2D	23b-021661	Benzene	1	U	1	DIL	7/30/2002
MISS05B	12b-024635	Benzene	680		25	DIL	7/31/2002
MW-4D	23b-021666	Benzene	0.5	U	0.5	REG	8/1/2002
MW-5D	23b-021667	Benzene	0.5	U	0.5	REG	8/2/2002
MW-20D	12a-021680	Benzene	0.5	U	0.5	REG	8/5/2002
MW-7D	23b-021669	Benzene	0.4	J	0.5	REG	8/5/2002
BRPZ-4	12b-021684	Benzene	760		20	DIL	8/6/2002
BRPZ-5	12b-021671	Benzene	9500	J	200	DIL	8/7/2002
BRPZ-9	12b-021672	Benzene	1800	J	50	DIL	8/7/2002
MW-3D	12a-021665	Benzene	15		2	DIL	8/8/2002
BRPW-1DRE	12b-021664	Benzene	0.5	U	0.5	REG	8/13/2002
BRPZ-3	12b-021670	Benzene	130		5	DIL	8/13/2002
MW-6D	23b-021668	Benzene	1	U	1	DIL	8/14/2002
MW-26D	12b-021703	Benzene	180		5	DIL	8/15/2002
MW-27D	12b-021721	Benzene	5		0.5	REG	10/14/2002
MW-28D	12b-021722	Benzene	6		0.5	REG	10/15/2002
MW-33D	12b-021725	Benzene	10		0.5	REG	10/15/2002
MW-34D	12b-021726	Benzene	16		0.5	REG	10/15/2002
MW-31D	23b-021734	Benzene	0.5	U	0.5	REG	3/13/2003
B38W15D	20a-021738	Benzene	0.42	J		REG	3/18/2003
MW-32D	23b-021742	Benzene	1	U	1	DIL	5/28/2003

Legend:
ug/L = Micrograms per Liter
U = Non-Detect
J = Estimated Result
Reg = Regular Sample (Non-Diluted) Result
Dil = Diluted Sample Result

Table 3-4
Summary of Benzene Results Exceeding Groundwater Standards - RI Addendum
FUSRAP Maywood Superfund Site, Maywood, NJ

Well	Sample ID	Analysis Name:	Result (ug/L)	Result Qualifier	Detection Limit (ug/L)	Sample Type:	Greater of NJ GWQC or NJ PQL (ug/L)	NJ MCL (ug/L)	Federal MCL (ug/L)	Collection Date:
BRPZ-3	12b-021670	Benzene	130		5	DIL	1	1	5	8/13/2002
BRPZ-4	12b-021684	Benzene	760		20	DIL	1	1	5	8/6/2002
BRPZ-5	12b-021671	Benzene	9500	J	200	DIL	1	1	5	8/7/2002
BRPZ-9	12b-021672	Benzene	1800	J	50	DIL	1	1	5	8/7/2002
MISS04B	10a-021656	Benzene	5		2	DIL	1	1	5	7/29/2002
MISS05B	12b-024635	Benzene	680		25	DIL	1	1	5	7/31/2002
MW-24D	12b-021645	Benzene	29		0.5	REG	1	1	5	7/25/2002
MW-24DD	12b-021646	Benzene	9		0.5	REG	1	1	5	7/25/2002
MW-26D	12b-021703	Benzene	180		5	DIL	1	1	5	8/15/2002
MW-27D	12b-021721	Benzene	5		0.5	REG	1	1	5	10/14/2002
MW-28D	12b-021722	Benzene	6		0.5	REG	1	1	5	10/15/2002
MW-33D	12b-021725	Benzene	10		0.5	REG	1	1	5	10/15/2002
MW-34D	12b-021726	Benzene	16		0.5	REG	1	1	5	10/15/2002
MW-3D	12a-021665	Benzene	15		2	DIL	1	1	5	8/8/2002

Legend:
µg/L = Micrograms per Liter
J = Estimated Result
Reg = Regular Sample (Non-Diluted) Result
Dil = Diluted Sample Result
NJ GWQC = New Jersey Groundwater Quality Criteria
MCL = Maximum Contaminant Level

Table 3-5
Summary of Detectable TCL VOCs - RI Addendum
FUSRAP Maywood Superfund Site, Maywood, NJ

Well	Sample I.D.	Analysis Name	Result (ug/L)	Detection Limit (ug/L)	Result Qualifier	Result Type	Date of Sample Collection
B38W02D	12a-024639	Chloromethane	0.7	0.5		REG	7/17/2002
B38W14D	19a-024641	1,1-Dichloroethane	1	0.5		REG	7/24/2002
B38W14D	19a-024641	1,1-Dichloroethene	3	0.5		REG	7/24/2002
B38W14D	19a-024641	1,2-Dichloroethene (trans)	1	0.5		REG	7/24/2002
B38W14D	19a-024641	1,2-Dichloropropane	0.5	0.5		REG	7/24/2002
B38W14D	19a-024641	Chloromethane	0.4	0.5	J	REG	7/24/2002
B38W14D	19a-024641	cis-1,2-Dichloroethene	100	25		DIL	7/24/2002
B38W14D	19a-024641	Tetrachloroethene	640	25		DIL	7/24/2002
B38W14D	19a-024641	Trichloroethene	160	25		DIL	7/24/2002
B38W14D	19a-024641	Vinyl Chloride	0.3	0.5	J	REG	7/24/2002
B38W15D	20a-021738	1,1,1-Trichloroethane	0.45	0.5	J	REG	3/18/2003
B38W15D	20a-021738	1,1-Dichloroethene	2.1	0.5		REG	3/18/2003
B38W15D	20a-021738	1,2-Dichloroethene (cis)	43	0.5	J	REG	3/18/2003
B38W15D	20a-021738	1,2-Dichloroethene (total)	76	0.5	J	REG	3/18/2003
B38W15D	20a-021738	1,2-Dichloroethene (trans)	32	0.5	J	REG	3/18/2003
B38W15D	20a-021738	1,2-Dichloropropane	0.25	0.5	J	REG	3/18/2003
B38W15D	20a-021738	Benzene	0.42	0.5	J	REG	3/18/2003
B38W15D	20a-021738	Chloroform	0.16	0.5	J	REG	3/18/2003
B38W15D	20a-021738	Tetrachloroethene	150	0.5	J	REG	3/18/2003
B38W15D	20a-021738	Toluene	0.68	0.5	J	REG	3/18/2003
B38W15D	20a-021738	Trichloroethene	37	0.5	J	REG	3/18/2003
B38W15D	20a-021738	Vinyl chloride	1.1	0.5		REG	3/18/2003
B38W17B	20a-021659	Acetone	89	250	J	DIL	7/30/2002
B38W17B	20a-024645	cis-1,2-Dichloroethene	0.5	5	J	REG	7/2/2002
B38W18D	12b-024681	Acetone	3	5	J	REG	7/18/2002
B38W19D	12b-024648	Benzene	0.7	0.5		REG	7/9/2002
B38W19D	12b-024648	Chlorobenzene	0.2	0.5	J	REG	7/9/2002
B38W19D	12b-024648	cis-1,2-Dichloroethene	0.2	0.5	J	REG	7/9/2002
B38W24D	10a-024650	Chloromethane	0.3	0.5	J	REG	7/15/2002
B38W25D	12b-024652	Chloromethane	0.2	0.5	J	REG	7/10/2002
BRPW-1DRE	12b-021664	1,1-Dichloroethane	0.2	0.5	J	REG	8/13/2002
BRPW-1DRE	12b-021664	cis-1,2-Dichloroethene	0.5	0.5		REG	8/13/2002
BRPW-1DRE	12b-021664	Tetrachloroethene	4	0.5		REG	8/13/2002
BRPW-1DRE	12b-021664	Trichloroethene	0.8	0.5		REG	8/13/2002
BRPZ-3	12b-021670	Benzene	130	5		DIL	8/13/2002
BRPZ-3	12b-021670	Chlorobenzene	17	5		DIL	8/13/2002
BRPZ-3	12b-021670	Ethylbenzene	1	5	J	DIL	8/13/2002
BRPZ-3	12b-021670	Toluene	5	5	J	DIL	8/13/2002
BRPZ-3	12b-021670	Total Xylene	5	10	J	DIL	8/13/2002
BRPZ-4	12b-021684	Benzene	760	20		DIL	8/6/2002
BRPZ-4	12b-021684	Toluene	10	20	J	DIL	8/6/2002
BRPZ-5	12b-021671	Benzene	9500	200	J	DIL	8/7/2002

Table 3-5
Summary of Detectable TCL VOCs - RI Addendum
FUSRAP Maywood Superfund Site, Maywood, NJ

Well	Sample I.D.	Analysis Name	Result (ug/L)	Detection Limit (ug/L)	Result Qualifier	Result Type	Date of Sample Collection
BRPZ-5	12b-021671	Toluene	610	200		DIL	8/7/2002
BRPZ-9	12b-021672	Benzene	1800	50	J	DIL	8/7/2002
MISS01B	12b-024631	Acetone	5	5	J	REG	7/18/2002
MISS01B	12b-024631	Bromodichloromethane	3	0.5		REG	7/18/2002
MISS01B	12b-024631	Chloroform	7	0.5		REG	7/18/2002
MISS01B	12b-024631	Chloromethane	0.6	0.5	J	REG	7/18/2002
MISS01B	12b-024631	cis-1,2-Dichloroethene	0.4	0.5	J	REG	7/18/2002
MISS01B	12b-024631	Dibromochloromethane	0.9	0.5		REG	7/18/2002
MISS01B	12b-024631	Tetrachloroethene	4	0.5		REG	7/18/2002
MISS01B	12b-024631	Total Xylene	0.4	1	J	REG	7/18/2002
MISS01B	12b-024631	Trichloroethene	0.3	0.5	J	REG	7/18/2002
MISS02B	12b-024633	1,1-Dichloroethane	0.1	0.5	J	REG	7/8/2002
MISS02B	12b-024633	Benzene	0.2	0.5	J	REG	7/8/2002
MISS03B	10a-021655	Chloromethane	0.2	0.5	J	REG	7/29/2002
MISS04B	10a-021656	Benzene	5	2		DIL	7/29/2002
MISS04B	10a-021656	cis-1,2-Dichloroethene	7	2		DIL	7/29/2002
MISS04B	10a-021656	Vinyl chloride	57	2		DIL	7/29/2002
MISS05B	12b-024635	Benzene	680	25		DIL	7/31/2002
MISS05B	12b-024635	Toluene	6	25	J	DIL	7/31/2002
MISS07B	12b-024638	1,1-Dichloroethane	0.6	0.5		REG	7/11/2002
MISS07B	12b-024638	1,1-Dichloroethene	0.3	0.5	J	REG	7/11/2002
MISS07B	12b-024638	cis-1,2-Dichloroethene	2	0.5		REG	7/11/2002
MISS07B	12b-024638	Tetrachloroethene	4	0.5		REG	7/11/2002
MISS07B	12b-024638	trans-1,2-Dichloroethene	3	0.5		REG	7/11/2002
MISS07B	12b-024638	Trichloroethene	1	0.5		REG	7/11/2002
MISS07B	12b-024638	Vinyl chloride	0.9	0.5		REG	7/11/2002
MW-24D	12b-021645	1,1-Dichloroethane	0.2	0.5	J	REG	7/25/2002
MW-24D	12b-021645	Acetone	2	5	J	REG	7/25/2002
MW-24D	12b-021645	Benzene	29	0.5		REG	7/25/2002
MW-24D	12b-021645	Chlorobenzene	4	0.5		REG	7/25/2002
MW-24D	12b-021645	cis-1,2-Dichloroethene	2	0.5		REG	7/25/2002
MW-24D	12b-021645	Tetrachloroethene	0.1	0.5	J	REG	7/25/2002
MW-24D	12b-021645	trans-1,2-Dichloroethene	0.6	0.5		REG	7/25/2002
MW-24DD	12b-021646	1,1-Dichloroethane	0.2	0.5	J	REG	7/25/2002
MW-24DD	12b-021646	Acetone	12	5	J	REG	7/25/2002
MW-24DD	12b-021646	Benzene	9	0.5		REG	7/25/2002
MW-24DD	12b-021646	Chlorobenzene	0.9	0.5		REG	7/25/2002
MW-24DD	12b-021646	cis-1,2-Dichloroethene	2	0.5		REG	7/25/2002
MW-24DD	12b-021646	Tetrachloroethene	0.1	0.5	J	REG	7/25/2002
MW-24DD	12b-021646	trans-1,2-Dichloroethene	0.8	0.5		REG	7/25/2002
MW-24DD	12b-021646	Trichloroethene	0.4	0.5	J	REG	7/25/2002
MW-25D	12b-021652	Benzene	0.4	0.5	J	REG	7/26/2002

Table 3-5
Summary of Detectable TCL VOCs - RI Addendum
FUSRAP Maywood Superfund Site, Maywood, NJ

Well	Sample I.D.	Analysis Name	Result (ug/L)	Detection Limit (ug/L)	Result Qualifier	Result Type	Date of Sample Collection
MW-26D	12b-021703	Benzene	180	5		DIL	8/15/2002
MW-26D	12b-021703	Chloroform	1	5	J	DIL	8/15/2002
MW-27D	12b-021721	1,1-Dichloroethane	0.2	0.5	J	REG	10/14/2002
MW-27D	12b-021721	Acetone	1	5	J	REG	10/14/2002
MW-27D	12b-021721	Benzene	5	0.5		REG	10/14/2002
MW-27D	12b-021721	cis-1,2-Dichloroethene	0.8	0.5		REG	10/14/2002
MW-27D	12b-021721	Toluene	0.2	0.5	J	REG	10/14/2002
MW-27D	12b-021721	Trichloroethene	1	0.5		REG	10/14/2002
MW-28D	12b-021722	1,1-Dichloroethane	0.2	0.5	J	REG	10/15/2002
MW-28D	12b-021722	Benzene	6	0.5		REG	10/15/2002
MW-28D	12b-021722	cis-1,2-Dichloroethene	0.3	0.5	J	REG	10/15/2002
MW-28D	12b-021722	Trichloroethene	0.5	0.5		REG	10/15/2002
MW-2D	23b-021661	1,1-Dichloroethane	0.4	1	J	DIL	7/30/2002
MW-2D	23b-021661	1,1-Dichloroethene	0.5	1	J	DIL	7/30/2002
MW-2D	23b-021661	cis-1,2-Dichloroethene	11	1		DIL	7/30/2002
MW-2D	23b-021661	Tetrachloroethene	46	1		DIL	7/30/2002
MW-2D	23b-021661	trans-1,2-Dichloroethene	6	1		DIL	7/30/2002
MW-2D	23b-021661	Trichloroethene	4	1		DIL	7/30/2002
MW-2D	23b-021661	Vinyl chloride	0.7	1	J	DIL	7/30/2002
MW-31D	23b-021734	1,1-Dichloroethane	0.8	0.5		REG	3/13/2003
MW-31D	23b-021734	cis-1,2-Dichloroethene	14	0.5		REG	3/13/2003
MW-31D	23b-021734	Tetrachloroethene	7	0.5		REG	3/13/2003
MW-31D	23b-021734	trans-1,2-Dichloroethene	20	0.5		REG	3/13/2003
MW-31D	23b-021734	Trichloroethene	3	0.5		REG	3/13/2003
MW-31D	23b-021734	Vinyl chloride	5	0.5		REG	3/13/2003
MW-32D	23b-021742	1,1-Dichloroethane	0.6	1		REG	5/28/2003
MW-32D	23b-021742	cis-1,2-Dichloroethene	2	1		REG	5/28/2003
MW-32D	23b-021742	Tetrachloroethene	2	1		REG	5/28/2003
MW-32D	23b-021742	Toluene	0.4	1	J	REG	5/28/2003
MW-32D	23b-021742	trans-1,2-Dichloroethene	0.7	1		REG	5/28/2003
MW-32D	23b-021742	Trichloroethene	0.3	1	J	REG	5/28/2003
MW-32D	23b-021742	Vinyl chloride	3	1		REG	5/28/2003
MW-33D	12b-021725	Benzene	10	0.5		REG	10/15/2002
MW-33D	12b-021725	cis-1,2-Dichloroethene	1	0.5		REG	10/15/2002
MW-33D	12b-021725	Ethylbenzene	0.2	0.5	J	REG	10/15/2002
MW-33D	12b-021725	Toluene	0.1	0.5	J	REG	10/15/2002
MW-33D	12b-021725	Total Xylene	0.2	1	J	REG	10/15/2002
MW-34D	12b-021726	Benzene	16	0.5		REG	10/15/2002
MW-34D	12b-021726	cis-1,2-Dichloroethene	0.2	0.5	J	REG	10/15/2002
MW-34D	12b-021726	Ethylbenzene	0.1	0.5	J	REG	10/15/2002
MW-34D	12b-021726	Toluene	3	0.5		REG	10/15/2002
MW-34D	12b-021726	Total Xylene	0.2	1	J	REG	10/15/2002
MW-3D	12a-021665	Benzene	15	2		DIL	8/8/2002

Table 3-5
Summary of Detectable TCL VOCs - RI Addendum
FUSRAP Maywood Superfund Site, Maywood, NJ

Well	Sample I.D.	Analysis Name	Result (ug/L)	Detection Limit (ug/L)	Result Qualifier	Result Type	Date of Sample Collection
MW-3D	12a-021665	cis-1,2-Dichloroethene	0.9	2	J	DIL	8/8/2002
MW-3D	12a-021665	Total Xylene	0.6	1	J	REG	8/8/2002
MW-3D	12a-021665	Trichloroethene	0.9	2	J	DIL	8/8/2002
MW-4D	23b-021666	1,1-Dichloroethene	0.7	0.5		REG	8/1/2002
MW-4D	23b-021666	Chloroform	0.3	0.5	J	REG	8/1/2002
MW-4D	23b-021666	Tetrachloroethene	13	0.5		REG	8/1/2002
MW-4D	23b-021666	Trichloroethene	0.4	0.5	J	REG	8/1/2002
MW-5D	23b-021667	Chloroform	1	0.5		REG	8/2/2002
MW-5D	23b-021667	Tetrachloroethene	0.8	0.5		REG	8/2/2002
MW-6D	23b-021668	1,1-Dichloroethane	0.3	1	J	DIL	8/14/2002
MW-6D	23b-021668	1,1-Dichloroethene	1	1		DIL	8/14/2002
MW-6D	23b-021668	Chloroform	2	1		DIL	8/14/2002
MW-6D	23b-021668	cis-1,2-Dichloroethene	1	1		DIL	8/14/2002
MW-6D	23b-021668	Tetrachloroethene	39	1		DIL	8/14/2002
MW-6D	23b-021668	Trichloroethene	3	1		DIL	8/14/2002
MW-7D	23b-021669	1,1,1-Trichloroethene	4	0.5		REG	8/5/2002
MW-7D	23b-021669	1,1-Dichloroethane	4	0.5		REG	8/5/2002
MW-7D	23b-021669	1,2-Dichloropropane	1	0.5		REG	8/5/2002
MW-7D	23b-021669	1,1-Dichloroethene	3	0.5		REG	8/5/2002
MW-7D	23b-021669	Benzene	0.4	0.5	J	REG	8/5/2002
MW-7D	23b-021669	Chloroform	1	0.5		REG	8/5/2002
MW-7D	23b-021669	Chloromethane	0.2	0.5	J	REG	8/5/2002
MW-7D	23b-021669	cis-1,2-Dichloroethene	320	25		DIL	8/5/2002
MW-7D	23b-021669	Tetrachloroethene	1300	25		DIL	8/5/2002
MW-7D	23b-021669	trans-1,2-dichloroethene	2	0.5		REG	8/5/2002
MW-7D	23b-021669	Trichloroethene	300	25		DIL	8/5/2002
MW-7D	23b-021669	Vinyl Chloride	1	0.5		REG	8/5/2002

Legend:
ug/L = Micrograms per Liter
J = Estimated Result
Reg = Regular Sample (Non-Diluted) Result
Dil = Diluted Sample Result

Table 3-6
Summary of TCL VOCs Exceeding Groundwater Standards - RI Addendum
FUSRAP Maywood Superfund Site, Maywood, NJ

Well	Sample I.D.	Analysis Name	Result (ug/L)	Detection Limit (ug/L)	Result Qualifier	Sample Type	Greater of NJ GWQC or NJ PQL (ug/L)	NJ MCL (ug/L)	Federal MCL (ug/L)	Collection Date
B38W14D	19a-024641	Tetrachloroethene	640	25		DIL	1	1	5	7/24/2002
B38W14D	19a-024641	Trichloroethene	160	25		DIL	1	1	5	7/24/2002
B38W15D	20a-021738	1,1-Dichloroethene	2.1	0.5		REG	2	2	7	3/18/2003
B38W15D	20a-021738	1,2-Dichloroethene (cis)	43	0.5	J	REG	10	70	70	3/18/2003
B38W15D	20a-021738	1,2-Dichloroethene (total)	76	0.5	J	REG	10	70	70	3/18/2003
B38W15D	20a-021738	Tetrachloroethene	150	0.5	J	REG	1	1	5	3/18/2003
B38W15D	20a-021738	Trichloroethene	37	0.5	J	REG	1	1	5	3/18/2003
BRPW-1DRE	12b-021664	Tetrachloroethene	4	0.5		REG	1	1	5	8/13/2002
BRPZ-3	12b-021670	Benzene	130	5		DIL	1	1	5	8/13/2002
BRPZ-4	12b-021684	Benzene	760	20		DIL	1	1	5	8/6/2002
BRPZ-5	12b-021671	Benzene	9500	200	J	DIL	1	1	5	8/7/2002
BRPZ-9	12b-021672	Benzene	1800	50	J	DIL	1	1	5	8/7/2002
MISS01B	12b-024631	Bromodichloromethane	3	0.5		REG	1	NA	NA	7/18/2002
MISS01B	12b-024631	Chloroform	7	0.5		REG	6	NA	NA	7/18/2002
MISS01B	12b-024631	Tetrachloroethene	4	0.5		REG	1	1	5	7/18/2002
MISS04B	10a-021656	Benzene	5	2		DIL	1	1	5	7/29/2002
MISS04B	10a-021656	Vinyl chloride	57	2		DIL	5	2	2	7/29/2002
MISS05B	12b-024635	Benzene	680	25		DIL	1	1	5	7/31/2002
MISS07B	12b-024638	Tetrachloroethene	4	0.5		REG	1	1	5	7/11/2002
MISS07B	12b-024638	Trichloroethene	1	0.5		REG	1	1	5	7/11/2002
MW-24D	12b-021645	Benzene	29	0.5		REG	1	1	5	7/25/2002
MW-24DD	12b-021646	Benzene	9	0.5		REG	1	1	5	7/25/2002
MW-26D	12b-021703	Benzene	180	5		DIL	1	1	5	8/15/2002
MW-27D	12b-021721	Benzene	5	0.5		REG	1	1	5	10/14/2002
MW-27D	12b-021721	Trichloroethene	1	0.5		REG	1	1	5	10/14/2002
MW-28D	12b-021722	Benzene	6	0.5		REG	1	1	5	10/15/2002

Table 3-6
Summary of TCL VOCs Exceeding Groundwater Standards - RI Addendum
FUSRAP Maywood Superfund Site, Maywood, NJ

Well	Sample I.D.	Analysis Name	Result (ug/L)	Detection Limit (ug/L)	Result Qualifier	Sample Type	Greater of NJ GWQC or NJ PQL (ug/L)	NJ MCL (ug/L)	Federal MCL (ug/L)	Collection Date
MW-2D	23b-021661	Tetrachloroethene	46	1		DIL	1	1	5	7/30/2002
MW-2D	23b-021661	Trichloroethene	4	1		DIL	1	1	5	7/30/2002
MW-31D	23b-021734	Tetrachloroethene	7	0.5		REG	1	1	5	3/13/2003
MW-31D	23b-021734	Trichloroethene	3	0.5		REG	1	1	5	3/13/2003
MW-31D	23b-021734	Vinyl chloride	5	0.5		REG	5	2	2	3/13/2003
MW-32D	23b-021742	Tetrachloroethene	2	1		DIL	1	1	5	5/28/2003
MW-32D	23b-021742	Vinyl chloride	3	1		DIL	5	2	2	5/28/2003
MW-33D	12b-021725	Benzene	10	0.5		REG	1	1	5	10/15/2002
MW-34D	12b-021726	Benzene	16	0.5		REG	1	1	5	10/15/2002
MW-3D	12a-021665	Benzene	15	2		DIL	1	1	5	8/8/2002
MW-4D	23b-021666	Tetrachloroethene	13	0.5		REG	1	1	5	8/1/2002
MW-6D	23b-021668	Tetrachloroethene	39	1		DIL	1	1	5	8/14/2002
MW-6D	23b-021668	Trichloroethene	3	1		DIL	1	1	5	8/14/2002
MW-7D	23b-021669	Tetrachloroethene	1300	25		DIL	1	1	5	8/5/2002
MW-7D	23b-021669	Trichloroethene	300	25		DIL	1	1	5	8/5/2002
MW-7D	23b-021669	1,1-Dichloroethene	3	0.5		REG	2	2	7	8/5/2002

Legend:
ug/L = Micrograms per Liter
J = Estimated Result
Reg = Regular Sample (Non-Diluted) Result
Dil = Diluted Sample Result
NJ GWQC = New Jersey Groundwater Quality Criteria
NJ PQL = New Jersey Practical Quantitation Limit
MCL = Maximum Contaminant Level

Table 3-7
Field Parameters Measured Prior to Groundwater Sampling
FUSRAP Maywood Superfund Site, Maywood, NJ

No. of Groundwater Samples	Well	Sample Date	Sample Time	pH (S.U.)	Temp (deg. C)	Specific Conductivity (uS/cm)	Eh (mv)	DO (mg/L)	Turbidity (NTU)
1	B38W02D	7/17/2002	9:55	6.70	15.40	534.00	113.90	0.30	2.60
2	B38W07B	7/25/2002	13:35	6.59	15.57	427.00	133.40	0.32	2.20
3	B38W14D	7/24/2002	14:00	6.90	18.01	1228.00	-19.40	0.31	4.90
4	B38W15D	3/18/2003	12:55	7.43	13.95	2050.00	218.30	0.04	0.00
5	B38W17B	7/2/2002	10:40	6.87	6.78	2322.00	-20.80	31.64	-0.30
6	B38W18D	7/18/2002	9:15	5.54	19.39	724.00	332.60	0.50	10.90
7	B38W19D	7/9/2002	13:35	6.30	17.02	3749.00	1.30	12.90	0.00
8	B38W24D	7/15/2002	10:45	5.96	19.64	717.00	-15.40	0.28	2.20
9	B38W25D	7/10/2002	11:20	6.33	16.91	1160.00	-15.80	15.50	-1.20
10	BRPW-1DRE	8/13/2002	15:05	6.68	16.16	3027.00	-254.70	0.64	25.20
11	BRPZ-3RE	8/13/2002	10:55	6.14	18.05	6685.00	-578.00	0.48	43.20
12	BRPZ-4	8/6/2002	11:05	6.01	15.64	14309.00	-55.40	0.04	NR
13	BRPZ-5RE	8/7/2002	17:30	5.69	18.63	21948.00	-332.60	1.58	21.00
14	BRPZ-9	8/7/2002	10:25	6.26	15.84	10839.00	-72.80	0.07	NR
15	MISS-02B	7/8/2002	14:10	6.64	16.10	4889.00	-20.10	11.67	8.80
16	MISS03B	7/29/2002	9:45	6.25	16.46	1364.00	-3.80	0.30	11.80
17	MISS04B	7/29/2002	11:05	6.58	16.73	1553.00	-70.80	0.31	37.00
18	MISS-05B	7/31/2002	11:45	6.18	16.57	13128.00	-88.90	1.16	31.60
19	MISS07B	7/11/2002	14:00	6.91	17.70	7785.00	-40.90	0.26	29.10
20	MISS-1B	7/18/2002	14:55	7.28	20.68	682.00	136.00	2.24	87.70
21	MW-20D	8/5/2002	14:45	6.81	15.89	4184.00	-72.30	0.11	NR
22	MW-23D	7/26/2002	13:00	6.58	17.02	2230.00	-10.30	0.46	24.90
23	MW-24D	7/25/2002	9:35	6.47	15.74	4835.00	-39.70	0.34	1.20
24	MW-24DD	7/25/2002	10:25	6.94	15.77	3685.00	-103.80	0.77	17.60
25	MW-25D	7/26/2002	10:35	7.49	15.48	2305.00	-212.80	0.18	35.20
26	MW-26D	8/15/2002	13:25	6.90	19.60	8858.00	-626.30	1.67	3.20
27	MW-27D	10/14/2002	16:15	6.84	16.38	3870.00	-64.40	0.92	7.30
28	MW-28D	10/15/2002	10:55	6.75	15.70	2980.00	-71.10	0.73	7.70
29	MW-2D	7/30/2002	15:00	7.33	20.37	1831.00	-74.20	0.20	31.10
30	MW-31D	3/13/2003	12:15	6.75	13.97	2940.00	-71.40	0.02	38.40
31	MW-32D	5/28/2003	12:00	7.37	14.60	3460.00	-68.30	0.05	14.20
32	MW-33D	10/15/2002	14:10	6.49	14.76	8110.00	-47.20	0.80	1.00
33	MW-34D	10/15/2002	16:30	6.66	16.20	4110.00	-71.30	0.59	1.70
34	MW-3D	8/8/2002	15:30	6.37	14.86	8458.00	-31.70	0.52	9.90
35	MW-4D	8/1/2002	15:25	6.99	18.34	587.00	-40.10	0.66	55.10
36	MW-5D	8/2/2002	13:30	7.30	20.49	572.00	149.30	4.02	12.60
37	MW-6D	8/14/2002	14:30	7.21	20.59	819.00	-164.70	0.56	660.90
38	MW-7D	8/5/2002	10:45	6.72	16.69	1422.00	-85.80	0.08	NR

Legend
S.U. = Standard Units
Temp = Temperature
deg. C = Degrees Centigrade
uS/cm = Microsiemens per centimeter
Eh = Oxidation-Reduction Potential
mv = Millivolts
DO = Dissolved Oxygen
mg/L = Milligrams per Liter
NTU = Nephelometric Turbidity Unit

Table 3-8
Electron Acceptor Data - RI Addendum
FUSRAP Maywood Superfund Site, Maywood, NJ

Well	Sample I.D.	Analysis Name	Result	Result Qualifier	IDL	Units	Date of Sample Collection
B38W15D	20A-021731	Nitrate, nitrogen	0.11		0.1	mg/L	3/12/2003
B38W17B	20a-021659	Nitrate, nitrogen	0.1	U	0.1	mg/L	7/30/2002
BRPZ-4	12b-021684	Nitrate, nitrogen	0.067	B	0.1	mg/L	8/6/2002
BRPZ-9	12b-021729	Nitrate, nitrogen	0.1	U	0.1	mg/L	10/17/2002
MISS05B	12b-024635	Nitrate, nitrogen	0.1	U	0.1	mg/L	7/31/2002
MW-26D	12b-021703	Nitrate, nitrogen	0.1	U	0.1	mg/L	8/15/2002
MW-2D	23b-021661	Nitrate, nitrogen	0.14		0.1	mg/L	7/30/2002
MW-31D	23b-021734	Nitrate, nitrogen	0.1	U	0.1	mg/L	3/13/2003
MW-32D	23b-021742	Nitrate, nitrogen	0.04		0.1	mg/L	5/28/2003
B38W15D	20A-021731	Ammonia, nitrogen	2		0.04	mg/L	3/12/2003
B38W17B	20a-021659	Ammonia, nitrogen	9.6		0.04	mg/L	7/30/2002
BRPZ-4	12b-021684	Ammonia, nitrogen	2.2		0.04	mg/L	8/6/2002
BRPZ-9	12b-021729	Ammonia, nitrogen	2.9		0.04	mg/L	10/17/2002
MISS05B	12b-024635	Ammonia, nitrogen	19		0.04	mg/L	7/31/2002
MW-26D	12b-021703	Ammonia, nitrogen	5.3		0.04	mg/L	8/15/2002
MW-2D	23b-021661	Ammonia, nitrogen	0.88		0.04	mg/L	7/30/2002
MW-31D	23b-021734	Ammonia, nitrogen	2.5		0.04	mg/L	3/13/2003
MW-32D	23b-021742	Ammonia, nitrogen	2.1		0.04	mg/L	5/28/2003
B38W15D	20A-024737	Manganese, Total	1.06		5.4	mg/L	7/1/2003
B38W17B	20a-021659	Manganese, Total	3.01		15	mg/L	7/30/2002
BRPZ-4	12b-021684	Manganese, Total	9.39		15	mg/L	8/6/2002
BRPZ-9	12b-021729	Manganese, Total	4.73	J	15	mg/L	10/17/2002
MISS05B	12b-024635	Manganese, Total	3.01		15	mg/L	7/31/2002
MW-26D	12b-021703	Manganese, Total	1.42		15	mg/L	8/15/2002
MW-2D	23b-021661	Manganese, Total	0.379		15	mg/L	7/30/2002
MW-31D	23b-024788	Manganese, Total	0.871		5.4	mg/L	7/1/2003
MW-32D	23b-021742	Manganese, Total	0.971		15	mg/L	5/28/2003
B38W15D	20A-024790	Manganese (Filtered)	0.991		5.4	mg/L	7/1/2003
B38W17B	20a-021660	Manganese (Filtered)	2.89		15	mg/L	7/30/2002
BRPZ-4	12b-021686	Manganese (Filtered)	5.26		15	mg/L	8/6/2002
BRPZ-9	12b-021729	Manganese (Filtered)	5.15	J	15	mg/L	10/17/2002
MISS05B	12b-024723	Manganese (Filtered)	2.91		15	mg/L	7/31/2002

Table 3-8
Electron Acceptor Data - RI Addendum
FUSRAP Maywood Superfund Site, Maywood, NJ

Well	Sample I.D.	Analysis Name	Result	Result Qualifier	IDL	Units	Date of Sample Collection
MW-26D	12b-021704	Manganese (Filtered)	1.39		15	mg/L	8/15/2002
MW-2D	23b-021662	Manganese (Filtered)	0.358		15	mg/L	7/30/2002
MW-31D	23b-024789	Manganese (Filtered)	0.868		5.4	mg/L	7/1/2003
MW-32D	N/A	Manganese (Filtered)	NA		NA	NA	NA
B38W15D	20A-024737	Iron, Total	ND	U	104	mg/L	7/1/2003
B38W17B	20a-021659	Iron, Total	5.55		200	mg/L	7/30/2002
BRPZ-4	12b-021684	Iron, Total	13.9		200	mg/L	8/6/2002
BRPZ-9	12b-021729	Iron, Total	11.5	J	200	mg/L	10/17/2002
MISS05B	12b-024635	Iron, Total	6.22		200	mg/L	7/31/2002
MW-26D	12b-021703	Iron, Total	63.6		200	mg/L	8/15/2002
MW-2D	23b-021661	Iron, Total	5		200	mg/L	7/30/2002
MW-31D	23b-024788	Iron, Total	0.19		104	mg/L	7/1/2003
MW-32D	23b-021742	Iron, Total	1.42		200	mg/L	5/28/2003
B38W15D	20A-024790	Iron (Filtered)	ND	U	104	mg/L	7/1/2003
B38W17B	20a-021660	Iron (Filtered)	5.14		200	mg/L	7/30/2002
BRPZ-4	12b-021686	Iron (Filtered)	7.07		200	mg/L	8/6/2002
BRPZ-9	12b-021729	Iron (Filtered)	9.07	J	200	mg/L	10/17/2002
MISS05B	12b-024723	Iron (Filtered)	2.82		200	mg/L	7/31/2002
MW-26D	12b-021704	Iron (Filtered)	62.7		200	mg/L	8/15/2002
MW-2D	23b-021662	Iron (Filtered)	0.44		200	mg/L	7/30/2002
MW-31D	23b-024789	Iron (Filtered)	ND		104	mg/L	7/1/2003
MW-32D	N/A	Iron (Filtered)	NA		NA	NA	NA
B38W15D	20A-021731	Sulfate	1	U	1	mg/L	3/12/2003
B38W17B	20a-021659	Sulfate	670		1	mg/L	7/30/2002
BRPZ-4	12b-021684	Sulfate	1500		1	mg/L	8/6/2002
BRPZ-9	12b-021729	Sulfate	1400		1	mg/L	10/17/2002
MISS05B	12b-024635	Sulfate	800		1	mg/L	7/31/2002
MW-26D	12b-021703	Sulfate	3000		1	mg/L	8/15/2002
MW-2D	23b-021661	Sulfate	350		1	mg/L	7/30/2002
MW-31D	23b-021734	Sulfate	890		1	mg/L	3/13/2003
MW-32D	23b-021742	Sulfate	1100		1	mg/L	5/28/2003

Table 3-8
Electron Acceptor Data - RI Addendum
FUSRAP Maywood Superfund Site, Maywood, NJ

Well	Sample I.D.	Analysis Name	Result	Result Qualifier	IDL	Units	Date of Sample Collection
B38W15D	20A-021731	Sulfide	1	U	1	mg/L	3/12/2003
B38W17B	20a-021659	Sulfide	1	U	1	mg/L	7/30/2002
BRPZ-4	12b-021684	Sulfide	0.2	J	1	mg/L	8/6/2002
BRPZ-9	12b-021729	Sulfide	1		1	mg/L	10/17/2002
MISS05B	12b-024635	Sulfide	1	U	1	mg/L	7/31/2002
MW-26D	12b-021703	Sulfide	1	U	1	mg/L	8/15/2002
MW-2D	23b-021661	Sulfide	1	U	1	mg/L	7/30/2002
MW-31D	23b-021734	Sulfide	1	U	1	mg/L	3/13/2003
MW-32D	23b-021742	Sulfide	0.5		1	mg/L	5/28/2003
B38W15D	20A-021731	Methane	0.002	NV	2	mg/L	3/12/2003
B38W17B	20a-021659	Methane	0.059	D	10	mg/L	7/30/2002
BRPZ-4	12b-021684	Methane	3.1	D	40	mg/L	8/6/2002
BRPZ-9	12b-021729	Methane	2.9	NV	40	mg/L	10/17/2002
MISS05B	12b-024635	Methane	0.22		2	mg/L	7/31/2002
MW-26D	12b-021703	Methane	1.8	D	40	mg/L	8/15/2002
MW-2D	23b-021661	Methane	0.28		2	mg/L	7/30/2002
MW-31D	23b-021734	Methane	0.0046	NV	2	mg/L	3/13/2003
MW-32D	23b-021742	Methane	0.038	NV	2	mg/L	3/13/2003

Legend
mg/L = Milligrams per Liter
U = Non-Detect Result
D = Diluted Sample Result
NV = Not Validated
J = Estimated Result Concentration
B = Detected in Blank Sample

Table 3-9
Nutrient Results - RI Addendum
FUSRAP Maywood Superfund Site, Maywood, NJ

Well	Sample I.D.	Analysis Name	Result (mg/L)	Result Qualifier	Detection Limit (mg/L)	Collection Date
MISS05B	12b-024635	Nitrate, nitrogen	0.1	U	0.1	7/31/2002
MISS05B	12b-024635	Phosphorous, Total	0.604		0.1	7/31/2002
MISS05B	12b-024635	Total Organic Carbon	3.5		1	7/31/2002
B38W15D	20A-021731	Nitrate, nitrogen	0.11		0.1	3/12/2003
B38W15D	20A-021731	Phosphorous, total	0.0579	J	0.1	3/12/2003
B38W15D	20A-021731	Total Organic Carbon	2.2		1	3/12/2003
B38W17B	20a-021659	Nitrate, Nitrogen	0.1	U	0.1	7/30/2002
B38W17B	20a-021659	Phosphorous, total	0.474		0.1	7/30/2002
B38W17B	20a-021659	Total Organic Carbon	2.2	U	1	7/30/2002
BRPZ-4	12b-021684	Nitrate, nitrogen	0.067	J	0.1	8/6/2002
BRPZ-4	12b-021684	Phosphorous, total	1.37		0.5	8/6/2002
BRPZ-4	12b-021684	Total Organic Carbon	0.38	J	1	8/6/2002
BRPZ-9	12b-021729	Nitrate, nitrogen	0.1	U	0.1	10/17/2002
BRPZ-9	12b-021729	Phosphorous, total	0.0059	U	0.1	10/17/2002
BRPZ-9	12b-021729	Total Organic Carbon	25		1	10/17/2002
MW-26D	12b-021703	Nitrate, nitrogen	0.1	U	0.1	8/15/2002
MW-26D	12b-021703	Phosphorous, total	0.201		0.1	8/15/2002
MW-26D	12b-021703	Total Organic Carbon	34		1	8/15/2002
MW-2D	23b-021661	Nitrate, Nitrogen	0.14	U	0.1	7/30/2002
MW-2D	23b-021661	Phosphorous, total	0.0952	J	0.1	7/30/2002
MW-2D	23b-021661	Total Organic Carbon	0.41	U	1	7/30/2002
MW-31D	23b-021734	Nitrate, nitrogen	0.1	U	0.1	3/13/2003
MW-31D	23b-021734	Phosphorous, total	0.125		0.1	3/13/2003
MW-31D	23b-021734	Total Organic Carbon	0.78	U	1	3/13/2003
MW-32D	23b-021742	Nitrate, nitrogen	0.04		0.1	5/28/2003
MW-32D	23b-021742	Phosphorous, total	0.302		0.1	5/28/2003
MW-32D	23b-021742	Total Organic Carbon	3.3	U	1	5/28/2003

Legend
mg/L = Milligrams per Liter

Table 3-10
Summary of Benzene Groundwater Results for Wells Presented in Figure 3-3
FUSRAP Maywood Superfund Site, Maywood, NJ

Well	Benzene Result (ppb)	Result Qualifier	Detection Limit (ppb)	Collection Date
B38W02D	0.7	J	1	11/8/2000
B38W05B	ND	U	1	11/17/2000
B38W06B	ND	UJ	1	11/29/2000
B38W07B	0.1	J	1	11/7/2000
B38W07B	ND	U	0.5	7/25/2002
B38W14D	0.1	J	1	11/16/2000
B38W14D	ND		0.5	7/24/2002
B38W15D	0.7	J	1	11/9/2000
B38W15D	0.42	J	1	3/18/2003
B38W15D	ND	U	1	3/18/2003
B38W17B	ND	U	10	11/1/2000
B38W17B	ND	U	25	7/30/2002
B38W18D	ND	U	1	11/13/2000
B38W19D	1		1	11/7/2000
B38W24D	0.2	J	1	11/15/2000
B38W25D	0.4	J	1	11/27/2000
BRPW-1DRE	8		1	8/15/2001
BRPW-1DRE	ND	U	0.5	8/13/2002
BRPZ-2RE	850	D	50	8/14/2001
BRPZ-3RE	200	D	100	8/14/2001
BRPZ-3RE	130		5	8/13/2002
BRPZ-4	890		25	7/19/2001
BRPZ-4	760		20	8/6/2002
BRPZ-5 (Deep Packer Sample)	290		10	6/19/2001
BRPZ-5 (Middle Packer Zone Sample)	480		25	6/19/2001
BRPZ-5 (Shallow Packer Zone Sample)	5000		200	6/19/2001
BRPZ-5	9500	J	200	8/7/2002
BRPZ-7	210		10	6/4/2001
BRPZ-9	1500		50	7/19/2001

Table 3-10
Summary of Benzene Groundwater Results for Wells Presented in Figure 3-3
FUSRAP Maywood Superfund Site, Maywood, NJ

Well	Benzene Result (ppb)	Result Qualifier	Detection Limit (ppb)	Collection Date
BRPZ-9	1800	J	50	8/7/2002
MISS01B	ND	U	0.9	6/20/2000
MISS01B	ND	U	1	12/21/2000
MISS01B	ND	U	1	6/19/2001
MISS01B	ND	U	0.5	7/18/2002
MISS01B	ND	U	0.2	7/9/2003
MISS02B	150		NA	1/1/1985
MISS02B	180		NA	1/1/1986
MISS02B	150		NA	1/1/1987
MISS02B	62		NA	1/1/1988
MISS02B	70		NA	1/1/1989
MISS02B	180		NA	1/1/1990
MISS02B	ND	U	NA	1/1/1991
MISS02B	3	J	5	10/15/1992
MISS02B	7		5	7/20/1993
MISS02B	2	J	5	5/13/1994
MISS02B	1	J	5	5/9/1995
MISS02B	1		1	5/14/1996
MISS02B	1		0.5	6/23/2000
MISS02B	0.6	J	1	11/21/2000
MISS02B	0.7	J	1	11/21/2000
MISS02B	0.3	J	1	7/5/2001
MISS02B	0.2	J	0.5	7/8/2002
MISS02B	0.2		0.08	6/30/2003
MISS03B	ND	U	NA	1/1/1985
MISS03B	47		NA	1/1/1986
MISS03B	ND	U	NA	1/1/1987
MISS03B	ND	U	NA	1/1/1988
MISS03B	ND	U	NA	1/1/1989
MISS03B	ND	U	NA	1/1/1990
MISS03B	ND	U	NA	1/1/1991
MISS03B	ND	U	1	11/13/2000
MISS03B	ND	U	1	7/12/2001
MISS03B	ND	U	0.5	7/29/2002
MISS04B	6	J	1	11/14/2000
MISS04B	5		2	7/29/2002
MISS05B	660		NA	1/1/1985
MISS05B	ND	U	NA	1/1/1986
MISS05B	ND	U	NA	1/1/1987
MISS05B	ND	U	NA	1/1/1988
MISS05B	ND	U	NA	1/1/1990
MISS05B	ND	U	NA	1/1/1991
MISS05B	200		5	10/14/1992

Table 3-10
Summary of Benzene Groundwater Results for Wells Presented in Figure 3-3
FUSRAP Maywood Superfund Site, Maywood, NJ

Well	Benzene Result (ppb)	Result Qualifier	Detection Limit (ppb)	Collection Date
MISS05B	83		5	8/12/1993
MISS05B	170		5	5/17/1994
MISS05B	89		5	5/11/1995
MISS05B	97		2	5/16/1996
MISS05B	62		5	5/14/1997
MISS05B	15		5	6/30/1998
MISS05B	6		5	7/11/2000
MISS05B	3500	D	100	11/6/2000
MISS05B	330	D	25	6/18/2001
MISS05B	680		25	7/31/2002
MISS07B	7		NA	1/1/1985
MISS07B	31		NA	1/1/1986
MISS07B	77		NA	1/1/1987
MISS07B	ND	U	NA	1/1/1988
MISS07B	ND	U	NA	1/1/1990
MISS07B	ND	U	NA	1/1/1991
MISS07B	ND	U	5	7/12/2000
MISS07B	0.2	J	1	11/6/2000
MISS07B	0.2	J	1	6/11/2001
MISS07B	ND	U	0.5	7/11/2002
MW-19D	ND	U	1	2/28/2001
MW-19DD	0.1	J	1	3/1/2001
MW-20D	0.4	J	1	3/14/2001
MW-20D	ND	U	0.5	8/5/2002
MW-23D	ND	U	1	7/9/2001
MW-23D	ND	U	0.5	7/26/2002
MW-23DD	ND	U	1	7/9/2001
MW-24D	78		10	9/6/2001
MW-24D	29		0.5	7/25/2002
MW-24DD	33		5	9/6/2001
MW-24DD	9		0.5	7/25/2002
MW-25D	0.3	J	1	1/3/2002
MW-25D	0.4	J	0.5	7/26/2002
MW-26D	520	D	25	1/3/2002
MW-26D	180		5	8/15/2002
MW-27D	5		0.5	10/14/2002
MW-28D	6		0.5	10/15/2002

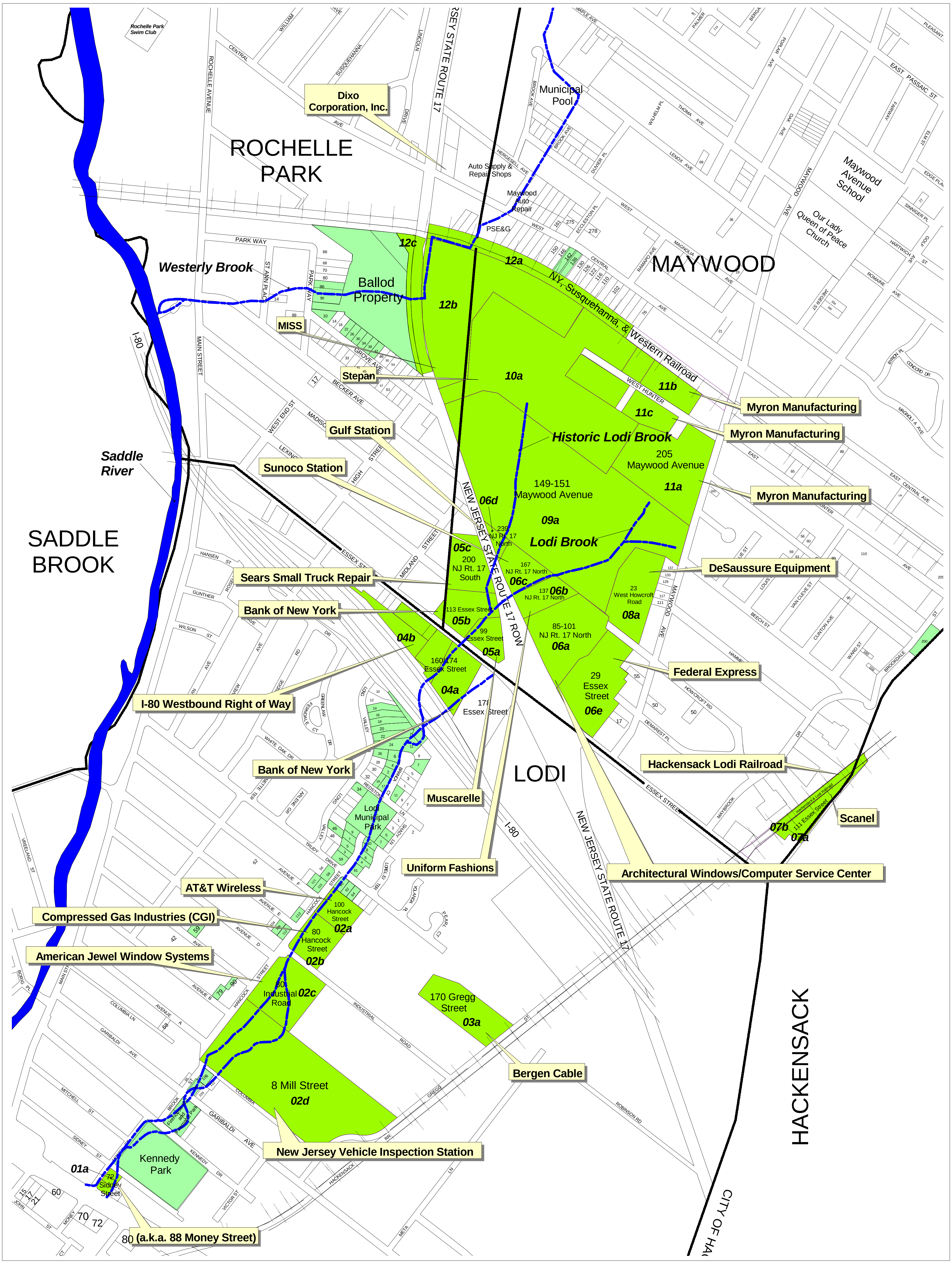
Table 3-10
Summary of Benzene Groundwater Results for Wells Presented in Figure 3-3
FUSRAP Maywood Superfund Site, Maywood, NJ

Well	Benzene Result (ppb)	Result Qualifier	Detection Limit (ppb)	Collection Date
MW-2D	ND	U	1	2/14/2001
MW-2D	ND	U	1	7/30/2002
MW-31D	ND	U	0.5	3/13/2003
MW-32D	0.2	J	0.5	5/28/2003
MW-33D	10		0.5	10/15/2002
MW-34D	16		0.5	10/15/2002
MW-3D	5		1	4/19/2001
MW-3D	15		2	8/8/2002
MW-4D	ND	U	1	2/20/2001
MW-4D	ND	U	0.5	8/1/2002
MW-5D	ND	U	1	2/15/2001
MW-5D	ND	U	0.5	8/2/2002
MW-6D	ND	U	1	2/21/2001
MW-6D	ND	U	1	8/14/2002
MW-7D	0.3	J	1	2/28/2001
MW-7D	0.4	J	0.5	8/5/2002

Legend

ppb - parts per billion
ND - Not Detected
U - Non-Detect Qualifier, result reported at the detection limit
NA - Historical Detection Limits not readily available
D - Diluted Sample Result
J - Estimated Concentration

FIGURES



Phase 1 Properties
Remediated

Phase II Properties
Scheduled for remediation

Figure 1-1
Location of FMSS Properties

N
W E
S

0 600 1200 Feet

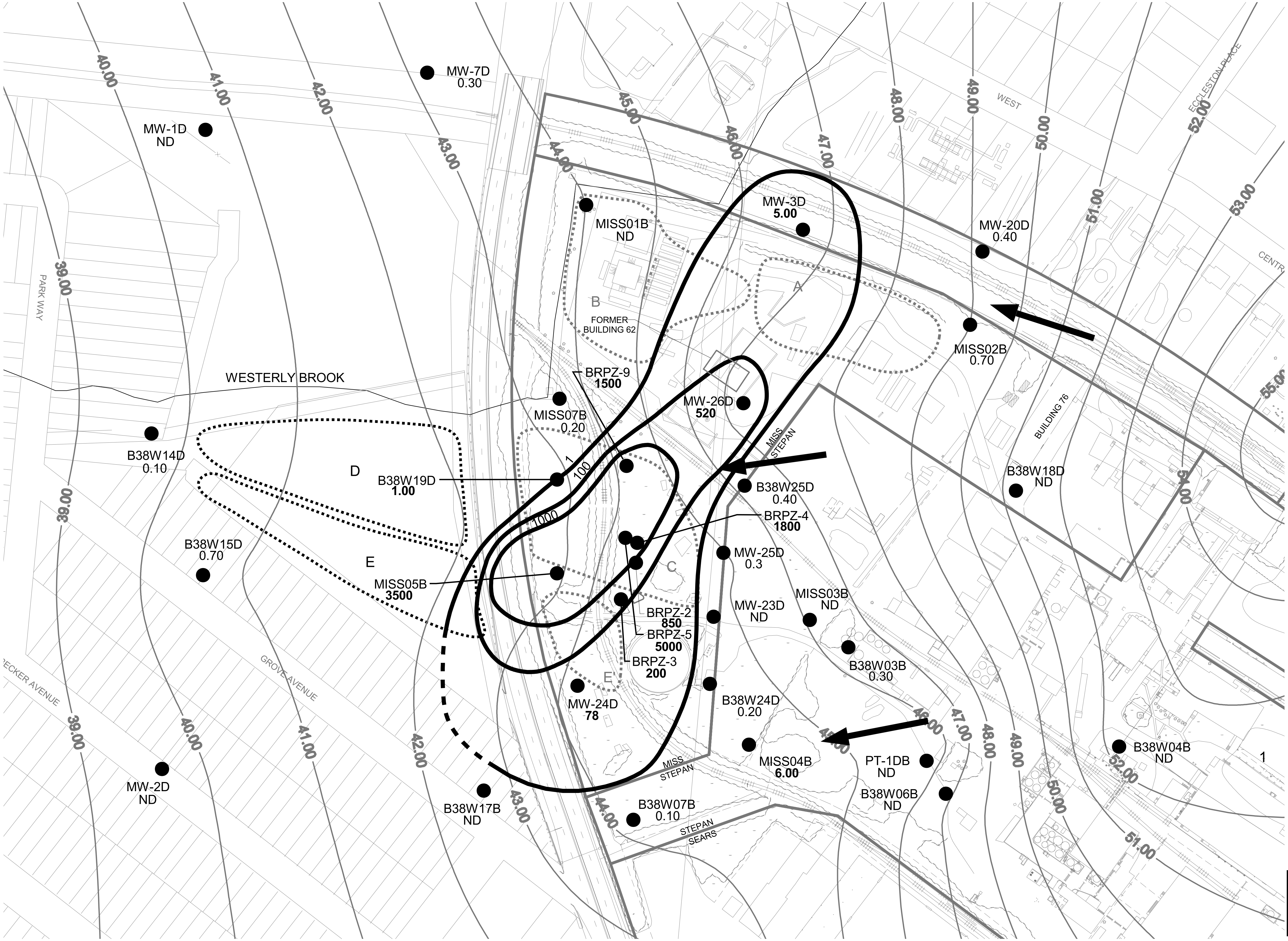
Note: The location and status of the vicinity properties shown on this map are for general reference only. The USACE is reviewing historical archives to confirm the accuracy of the property locations and status depicted on the map. If you have specific questions about a particular property, please contact the USACE Public Information Center at 75A West Pleasant Avenue, Maywood, New Jersey or call 201-843-7466. Or, visit the FUSRAP Maywood Chemical Company Superfund Site website at <www.fusrapmaywood.com>.

US Army Corps of Engineers®

FUSRAP
Maywood Superfund Site

Shaw Shaw Environmental, Inc

BOSFS01\maywood\task0205\gis\0205.apr - Location of FMSS Properties - 0515_Fig 1-1 - July 23, 2003



N
W E
S

LEGEND:

- BRPZ-5 5000 ug/L — WELL IDENTIFICATION WITH BENZENE CONCENTRATION
- 100 — LINE OF EQUAL BENZENE CONCENTRATION
- 100 — DASHED WHERE INFERRED
- 50 — EQUIPOTENTIAL CONTOUR (DECEMBER 2001)
- GROUNDWATER FLOW DIRECTION
- A — FORMER RETENTION POND
- D — FORMER RETENTION POND - REMEDIATED
- NRC BURIAL PIT
- ND — NON-DETECT
- NA — NOT ANALYZED

BOLD CONCENTRATION DENOTES EXCEEDANCE OF STATE MCL OF 1 ug/L

FEDERAL MCL = 5
NJDEP MCL = 1

SOURCE: FIGURE 5-17 FROM GWRI REPORT (USACE 2003)

Note: The location and status of the vicinity properties shown on this map are for general reference only. The USACE is reviewing historical archives to confirm the accuracy of the property locations and status depicted on the map. If you have specific questions about a particular property, please contact the USACE Public Information Center at 75A West Pleasant Avenue, Maywood, New Jersey or call 201-843-7466. Or, visit the FUSRAP Maywood Chemical Company Superfund Site website at <www.fusrapmaywood.com>.

80 0 80 160 Feet

FIGURE 1-2
BENZENE RESULTS FOR BEDROCK
MONITORING WELL GROUNDWATER SAMPLES
(2000 - 2002)

US Army Corps of Engineers
FUSRAP Maywood Superfund Site
Shaw Shaw Environmental, Inc.

\\Bosfs01\Maywood\Maywood\Task0515\drawings\Contours-Bedrock.apr LAYOUT: Benzene-Bedrock-17x11 21 August 2003

LEGEND:

CP10 2 ug/kg	BORING IDENTIFICATION WITH DETECTED BENZENE CONCENTRATION WHERE:
CP12	BECHTEL CHEMICAL SOIL PILE SAMPLE
C023	BECHTEL CHEMICAL SOIL SAMPLE (NON-SOIL PILE)
10a007	SWEC PHASE I SOIL SAMPLE
TP5UPER (OR SIMILAR NOMENCLATURE)	SWEC PILOT PROGRAM TEST PIT SAMPLE
TP-32	STEPAN TEST PIT SAMPLE
C-20	STEPAN CHEMICAL SOIL BORING REFER TO TABLE A-2 FOR SAMPLE DEPTHS. MAXIMUM CONCENTRATIONS DEPICTED ON FIGURE FOR A PARTICULAR BORING LOCATION.
ND	NON-DETECT

RESULTS IN MICROGRAMS PER KILOGRAM (ug/kg)

NJ SOIL IMPACT TO GROUNDWATER STANDARD FOR BENZENE = 1,000 ug/kg

BOLDED CONCENTRATION DENOTES EXCEEDANCE OF NJ SOIL IMPACT TO GROUNDWATER STANDARD

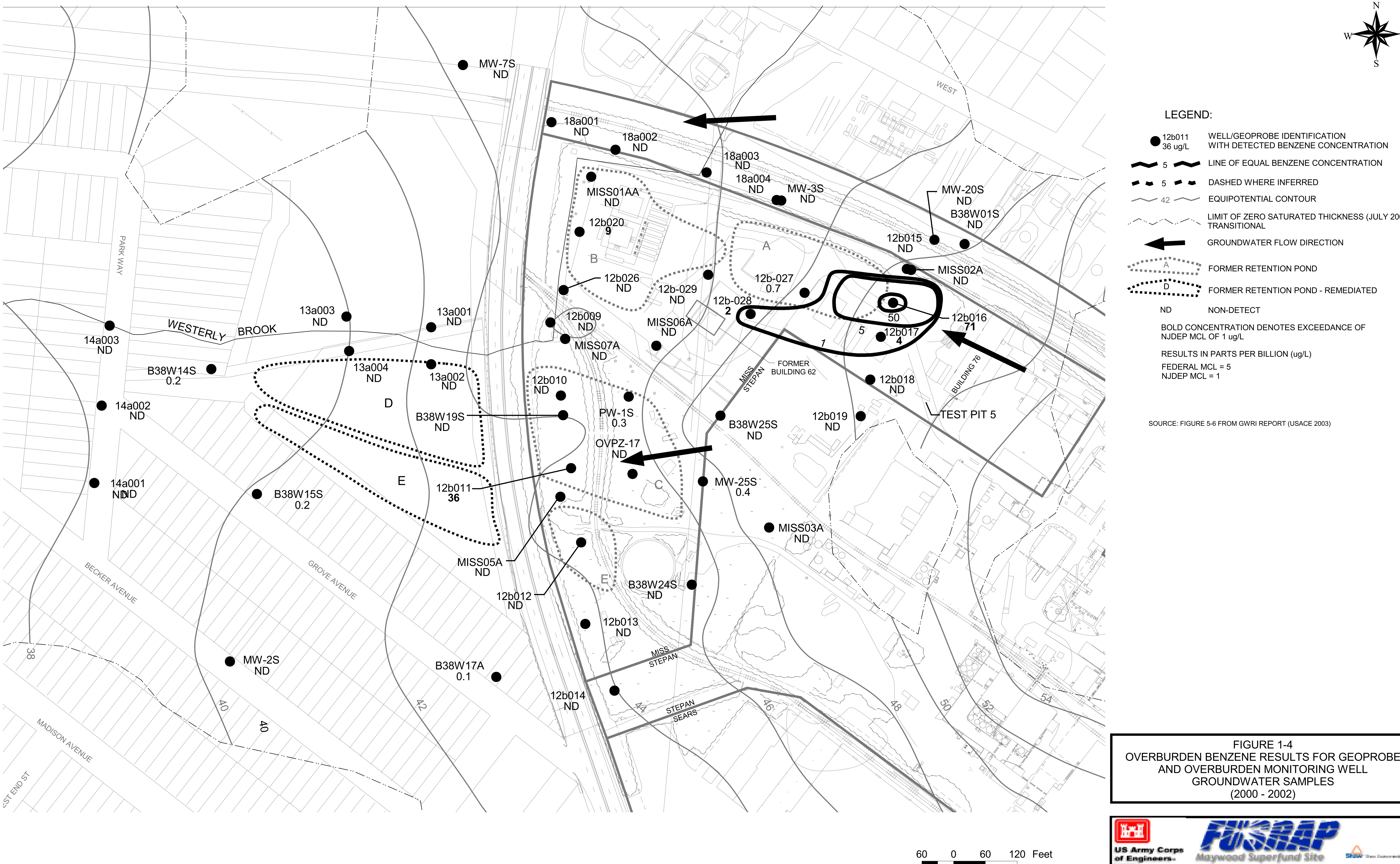
POTENTIAL SOURCE AREA

Note: The location and status of the vicinity properties shown on this map are for general reference only. The USACE is reviewing historical archives to confirm the accuracy of the property locations and status depicted on the map. If you have specific questions about a particular property, please contact the USACE Public Information Center at 75A West Pleasant Avenue, Maywood, New Jersey or call 201-843-7466. Or, visit the FUSRAP Maywood Chemical Company Superfund Site website at <www.fusrapmaywood.com>.

FIGURE 1-3
BENZENE IN OVERBURDEN SOILS

US Army Corps of Engineers
FUSRAP Maywood Superfund Site
Shaw Environmental, Inc.

\\Bosfs01\Maywood\Maywood\Task0514\Drawings\GWRI_rev2.apr LAYOUT: BENZENE-OB-SOILS - 22x17 21 August 2003



LEGEND:

- 12b011 36 ug/L — WELL/GEOPROBE IDENTIFICATION WITH DETECTED BENZENE CONCENTRATION
- 5 — LINE OF EQUAL BENZENE CONCENTRATION
- 5 — DASHED WHERE INFERRED
- 42 — EQUIPOTENTIAL CONTOUR
- LIMIT OF ZERO SATURATED THICKNESS (JULY 2001) TRANSITIONAL
- GROUNDWATER FLOW DIRECTION
- A — FORMER RETENTION POND
- D — FORMER RETENTION POND - REMEDIATED
- ND — NON-DETECT

BOLD CONCENTRATION DENOTES EXCEEDANCE OF NJDEP MCL OF 1 ug/L

RESULTS IN PARTS PER BILLION (ug/L)

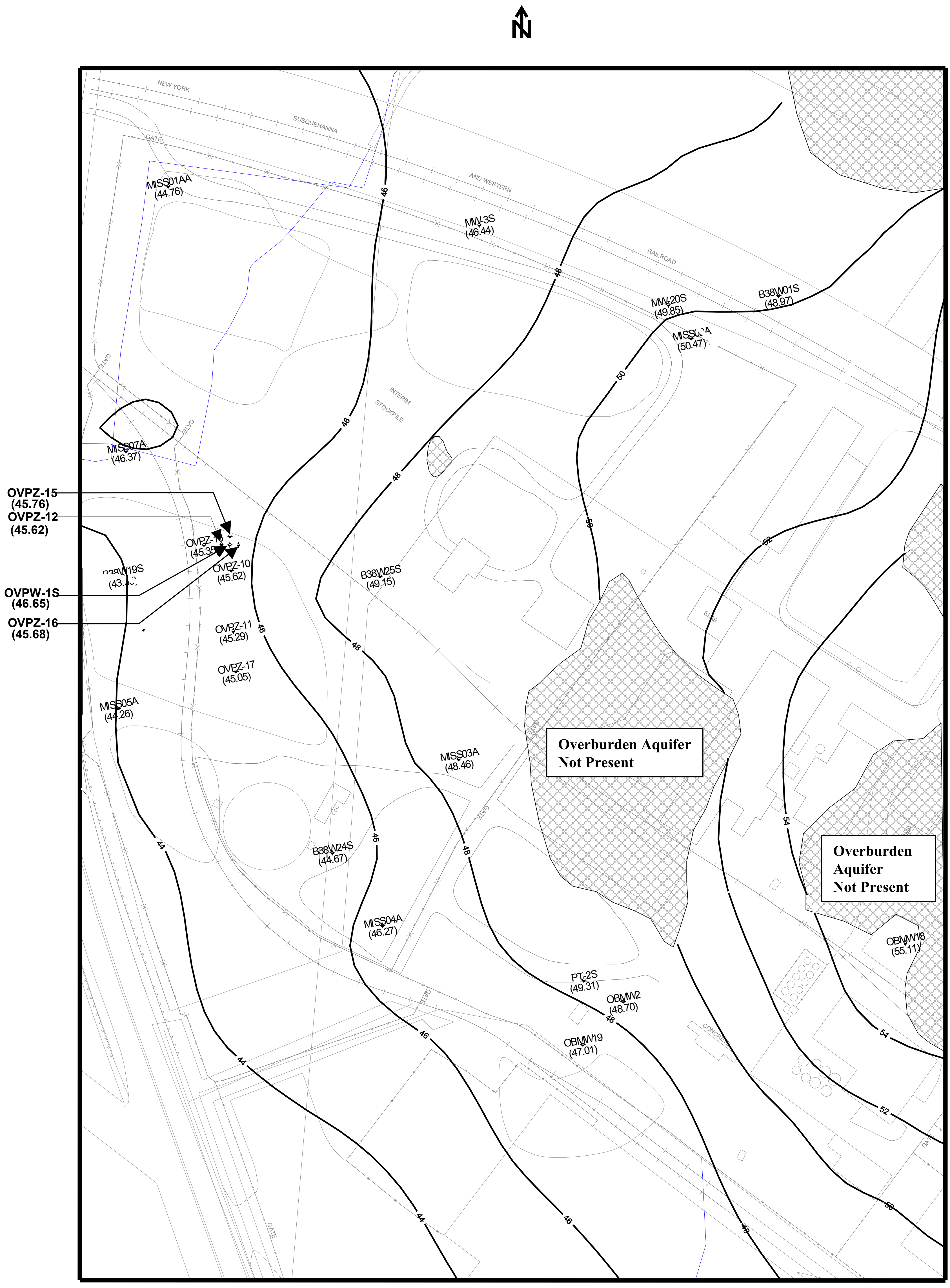
FEDERAL MCL = 5
NJDEP MCL = 1

SOURCE: FIGURE 5-6 FROM GWRI REPORT (USACE 2003)

FIGURE 1-4
OVERBURDEN BENZENE RESULTS FOR GEOPROBE AND OVERBURDEN MONITORING WELL GROUNDWATER SAMPLES
(2000 - 2002)

US Army Corps of Engineers
FUSRAP
Maywood Superfund Site
Shaw

\\Bosfs01\Maywood\Maywood\Task0515\drawings\Contours-Overburden.apr LAYOUT: Benzene-Overburden-17x11 9 September 2003



Legend:

MISS-04A (46.27) Overburden Monitoring Well

Zone of 0 ft. Saturated Thickness (i.e., Overburden Aquifer not Present).

32 Equipotential Contour in feet above Mean Sea Level (MSL). Contour Interval = 2 feet.

Horizontal Scale in feet

0 50 100 150 200

Note: The location and status of the vicinity properties shown on this map are for general reference only. The USACE is reviewing historical archives to confirm the accuracy of the property locations and status depicted on the map. If you have specific questions about a particular property, please contact the USACE Public Information Center at 75A West Pleasant Avenue, Maywood, New Jersey or call 201-843-7466. Or, visit the FUSRAP Maywood Chemical Company Superfund Site website at <www.fusrapmaywood.com>.

Figure 1-5: Overburden Groundwater Surface Elevation Map of MISS based on July 2001 Synoptic Event

US Army Corps of Engineers®

FUSRAP Maywood Superfund Site

Shaw Stone & Webster, Inc.

Source: GWRI Figure 3-19b (USACE 2003)

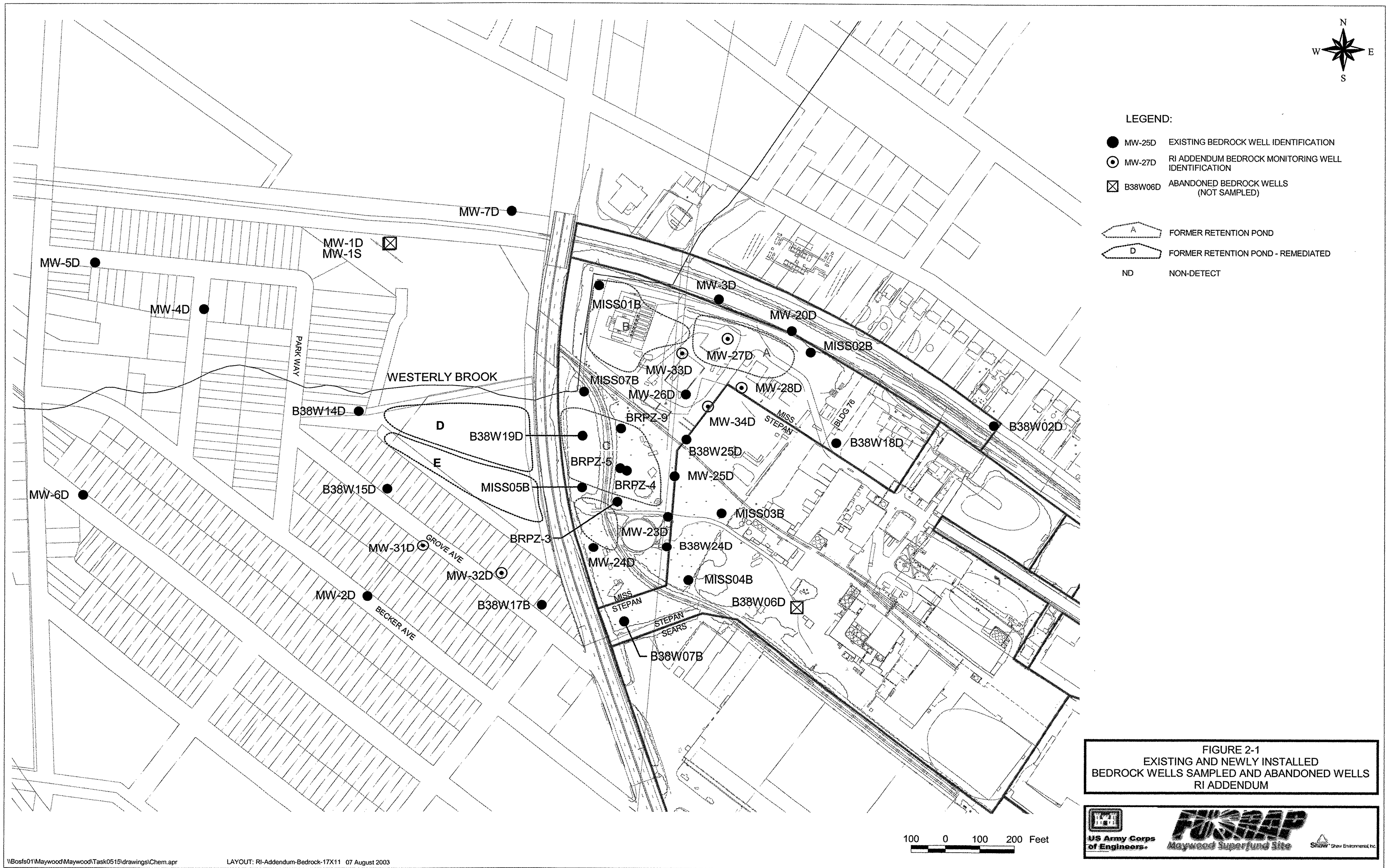
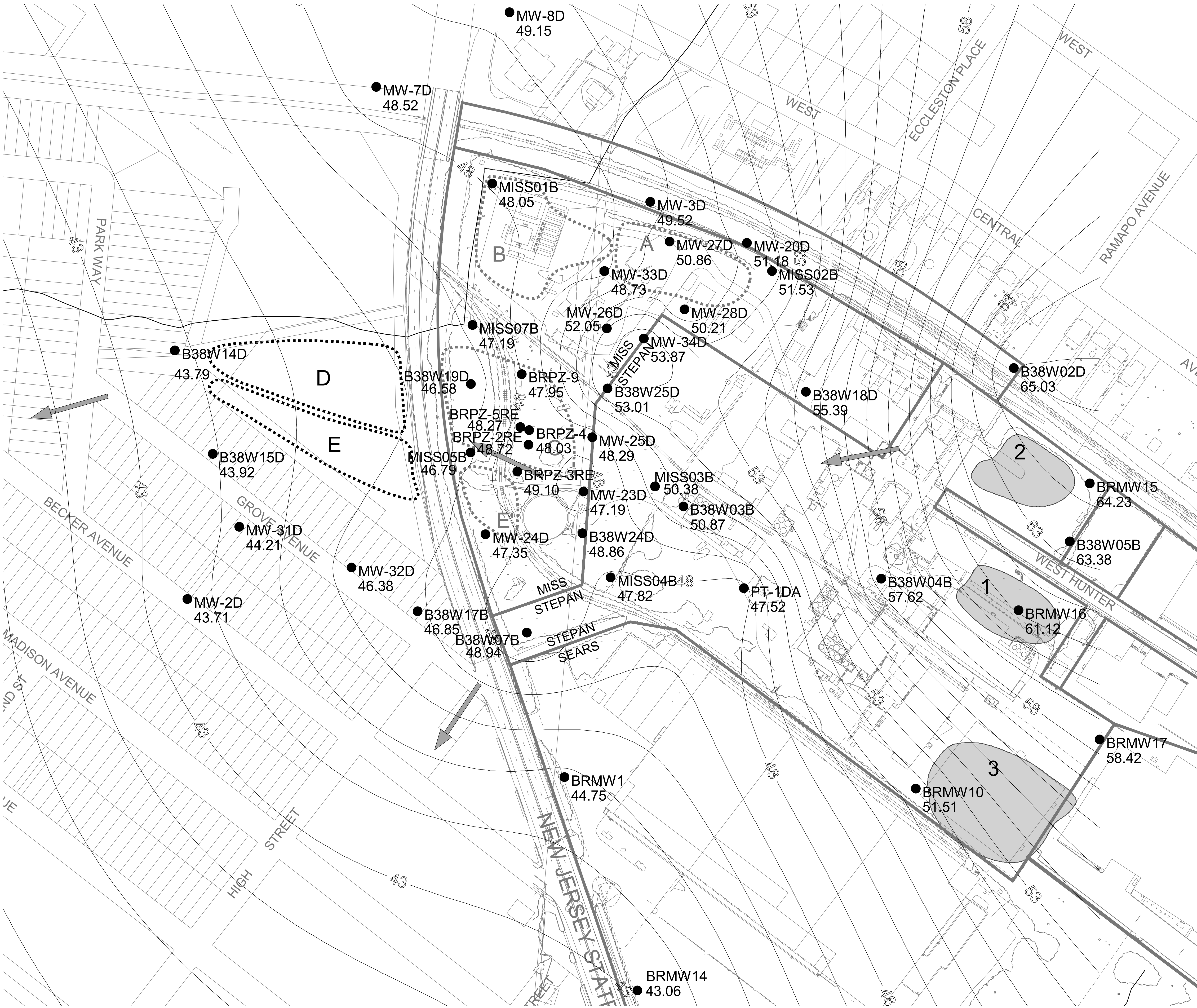


FIGURE 2-1
EXISTING AND NEWLY INSTALLED
BEDROCK WELLS SAMPLED AND ABANDONED WELLS
RI ADDENDUM



N
W E
S

LEGEND:

B38W02D 65.03 — BEDROCK MONITORING WELL DEPICTING TOTAL HYDRAULIC HEAD

GROUNDWATER FLOW DIRECTION

52 — LINE OF EQUAL HYDRAULIC HEAD

A — FORMER RETENTION POND

D — FORMER RETENTION POND - REMEDIATED

NRC BURIAL PIT

200 0 200 400 Feet

Note: The location and status of the vicinity properties shown on this map are for general reference only. The USACE is reviewing historical archives to confirm the accuracy of the property locations and status depicted on the map. If you have specific questions about a particular property, please contact the USACE Public Information Center at 75A West Pleasant Avenue, Maywood, New Jersey or call 201-843-7466. Or, visit the FUSRAP Maywood Chemical Company Superfund Site website at <www.fusrapmaywood.com>.

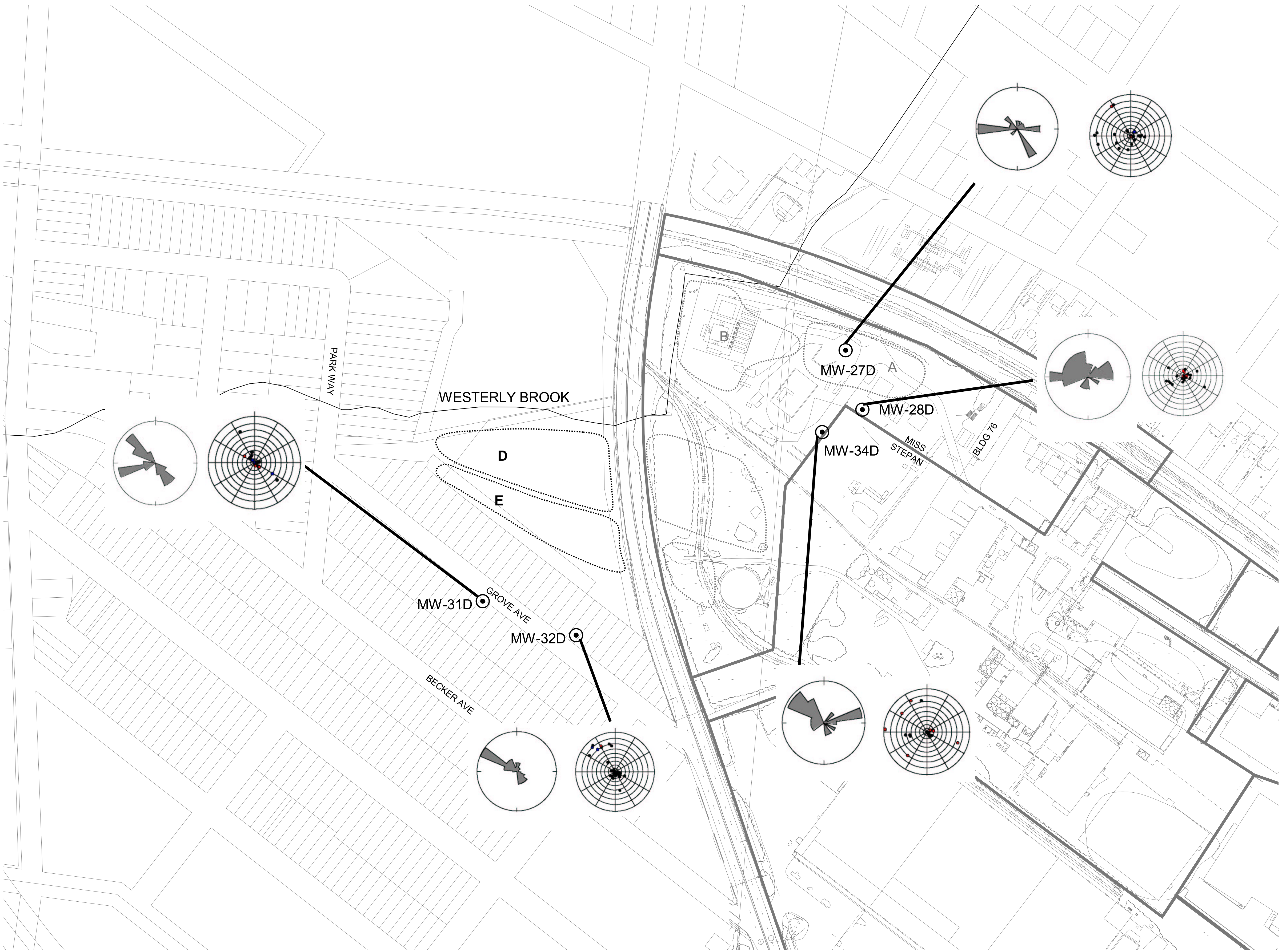
FIGURE 3-1
POTENTIOMETRIC SURFACE MAP -
BEDROCK MONITORING WELLS - JUNE 23 & 24, 2003

US Army Corps of Engineers

FUSRAP Maywood Superfund Site

Shaw Shaw Environmental, Inc.

\\Bosfs01\Maywood\Maywood\Task0515\drawings\june2003_rw.apr LAYOUT: june2003_rw 17x11 26 September 2003



LEGEND:

MW-27D RI ADDENDUM BEDROCK MONITORING WELL IDENTIFICATION

A FORMER RETENTION POND

D FORMER RETENTION POND - REMEDIATED

ND NON-DETECT

Summary stereonet is a lower hemisphere, equal angle, polar projection. Summary stereonet diagram displays the dominant down-dip fracture azimuth and angle of fracture dip observed within borehole geophysical data in all FMSS boreholes logged. Black stereonet pole plots indicate less open fractures. Red stereonet pole plots indicate more open fractures. Blue stereonet pole plots indicate water filled fractures.

Summary rose plot diagram displays the dominant down-dip fracture azimuth observed within borehole geophysical data in all FMSS boreholes logged.

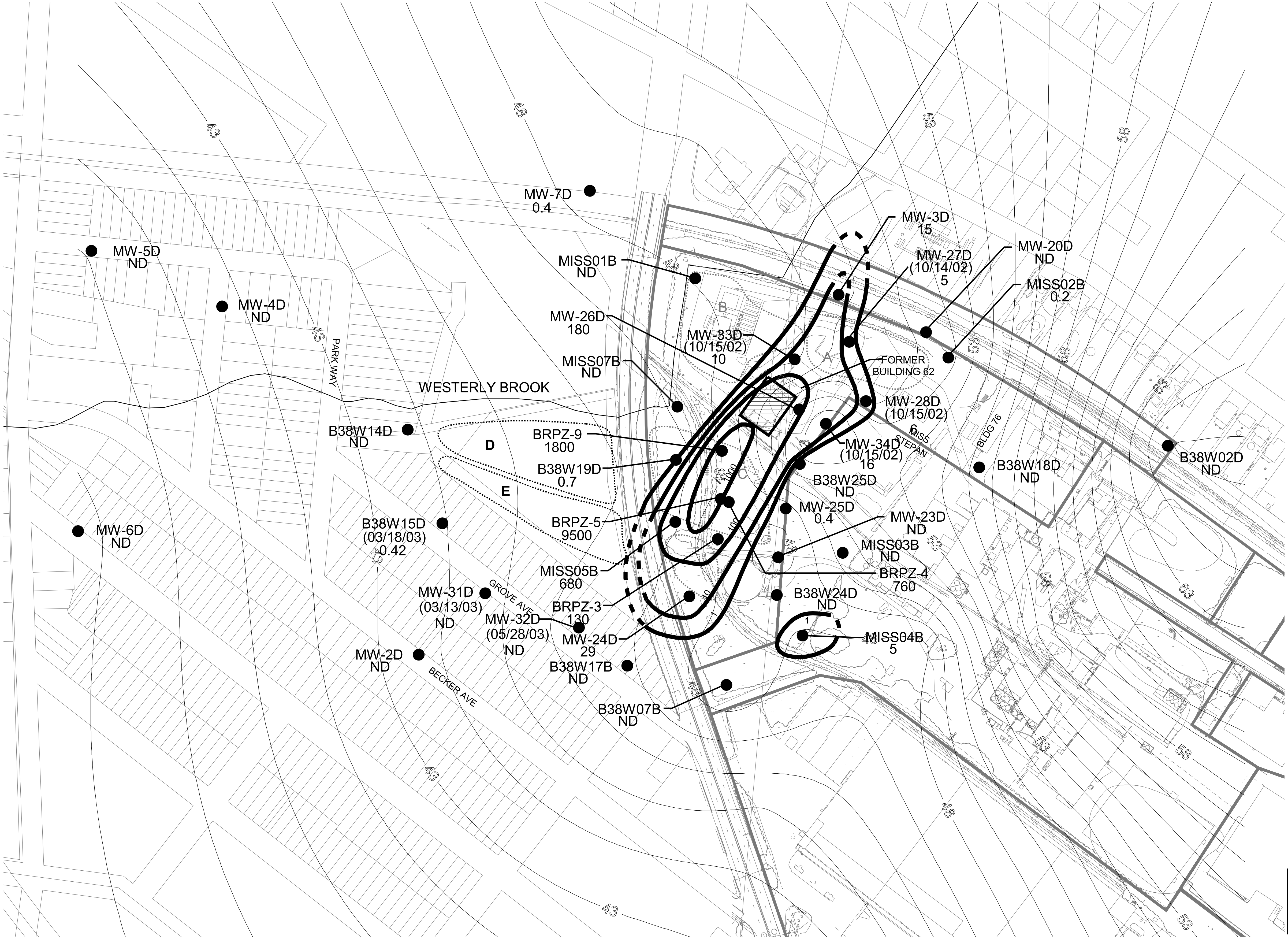
Magnetic north is located to the top of each diagram.

100 0 100 200 Feet

FIGURE 3-2
SUMMARY OF BEDROCK FRACTURE ORIENTATION
RI ADDENDUM WELLS

US Army Corps of Engineers
FUSRAP
Maywood Superfund Site
Shaw Shaw Environmental, Inc.

\\Bosfs01\Maywood\Maywood\Task0515\drawings\Chem.apr LAYOUT: RI-Addendum-Summary-Bedrock-17X11 August 12, 2003



N
W
E
S

LEGEND:

MW-27D 5 ug/L	BEDROCK WELL IDENTIFICATION WITH BENZENE CONCENTRATION
A	FORMER RETENTION POND
D	FORMER RETENTION POND - REMEDIATED
ND	NON-DETECT
RESULTS IN MICROGRAMS PER LITER (ug/L)	
10	LINE OF EQUAL BENZENE CONCENTRATION
10	DASHED WHERE INFERRED
47	LINE OF EQUAL HYDRAULIC HEAD (JUNE 2003)
	POTENTIAL SOURCE AREA

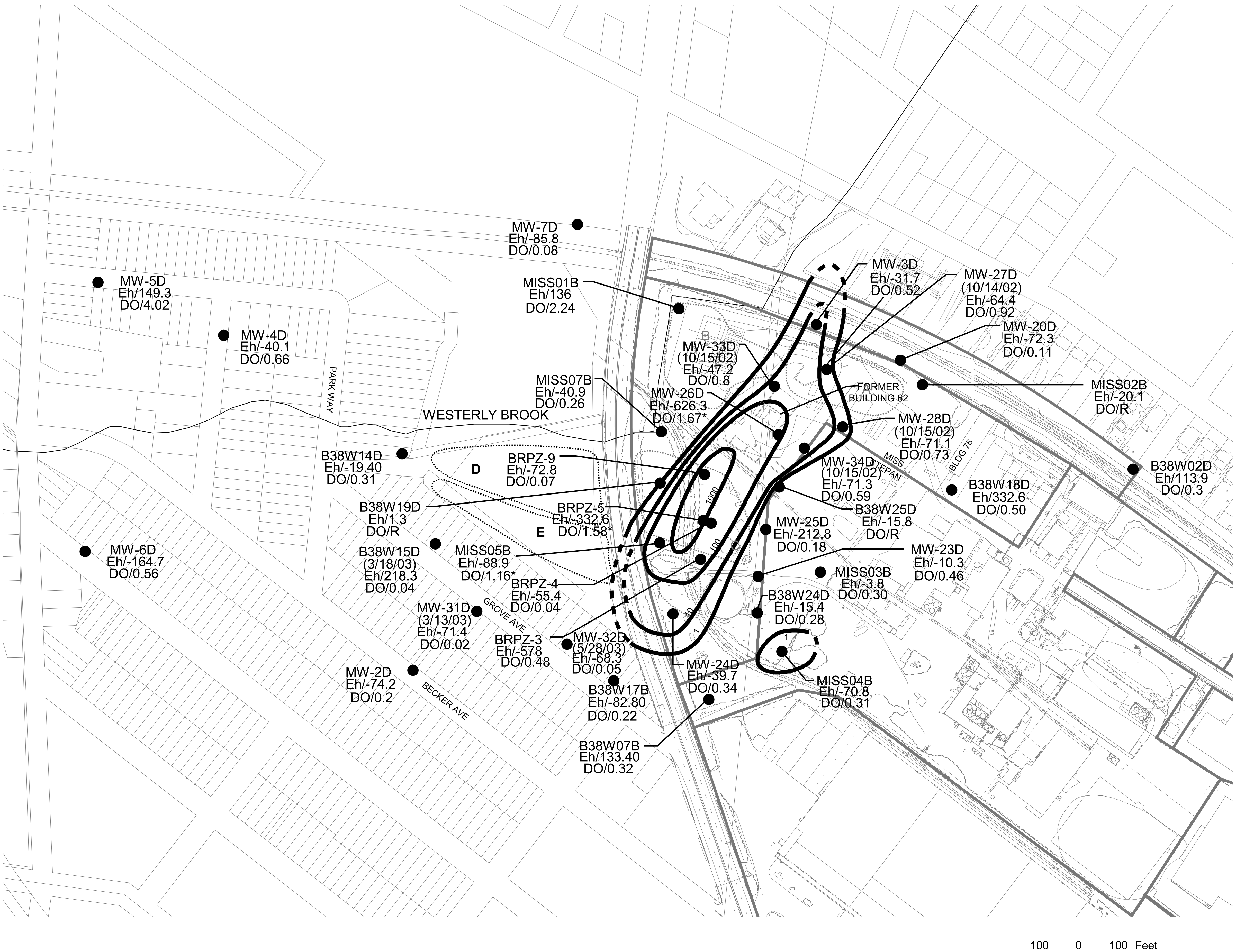
Note: The location and status of the vicinity properties shown on this map are for general reference only. The USACE is reviewing historical archives to confirm the accuracy of the property locations and status depicted on the map. If you have specific questions about a particular property, please contact the USACE Public Information Center at 75A West Pleasant Avenue, Maywood, New Jersey or call 201-843-7466. Or, visit the FUSRAP Maywood Chemical Company Superfund Site website at <www.fusrapmaywood.com>.

FIGURE 3-3
BENZENE RESULTS FOR
BEDROCK WELL GROUNDWATER SAMPLES
RI ADDENDUM INVESTIGATION

80 0 80 160 Feet

US Army Corps of Engineers
FUSRAP
Maywood Superfund Site
Shaw Shaw Environmental, Inc.

\\Bosfs01\Maywood\Maywood\Task0515\drawings\Chem.apr LAYOUT: Benzene-17x11 26 September 2003



N
W E
S

LEGEND:

MW-4D 149.3 mV 4.02 mg/L	BEDROCK WELL IDENTIFICATION EH FIELD MEASURMENT DO FIELD MEASURMENT
A	FORMER RETENTION POND
D	FORMER RETENTION POND - REMEDIATED
ND	NON-DETECT
R	MEASURMENT REJECTED

RESULTS IN MILLIGRAMS PER LITER (mg/L) FOR DO AND MILLIVOLTS (mV) FOR Eh.

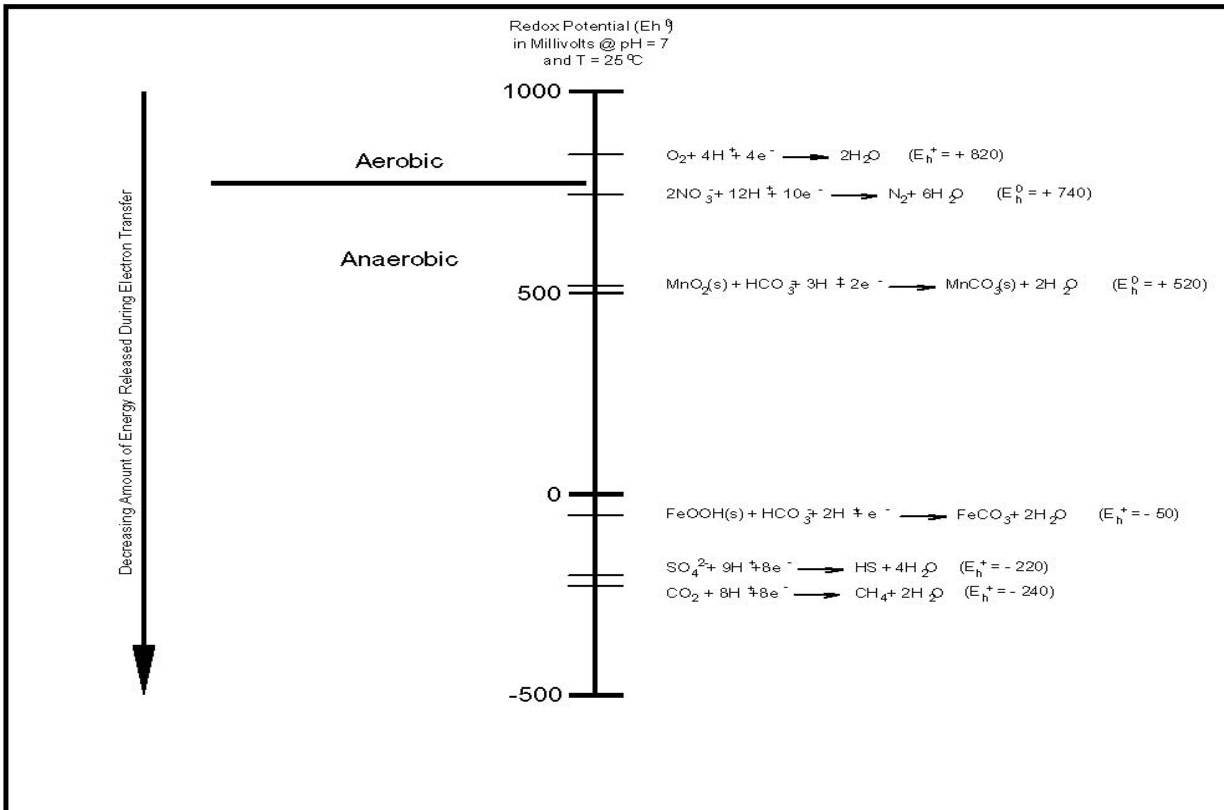
10	LINE OF EQUAL BENZENE CONCENTRATION
10	DASHED WHERE INFERRED
*	THESE VALUES ARE INCONSISTENT WITH OTHER SAMPLING DATA SHOWING DEEPLY REDUCED CONDITIONS AT THESE WELLS AND MAY REFLECT D.O. METER ERROR.

FIGURE 3-4
Eh AND DO FIELD DATA
BEDROCK WELLS - RI ADDENDUM

US Army Corps of Engineers
FUSRAP
Maywood Superfund Site
Shaw Environmental, Inc

\\Bosfs01\Maywood\Maywood\Task0515\drawings\Chem.apr LAYOUT: Eh-Do-17x11 01 October 2003

OXIDATION-REDUCTION POTENTIALS FOR VARIOUS OXIDATION-REDUCTION REACTIONS



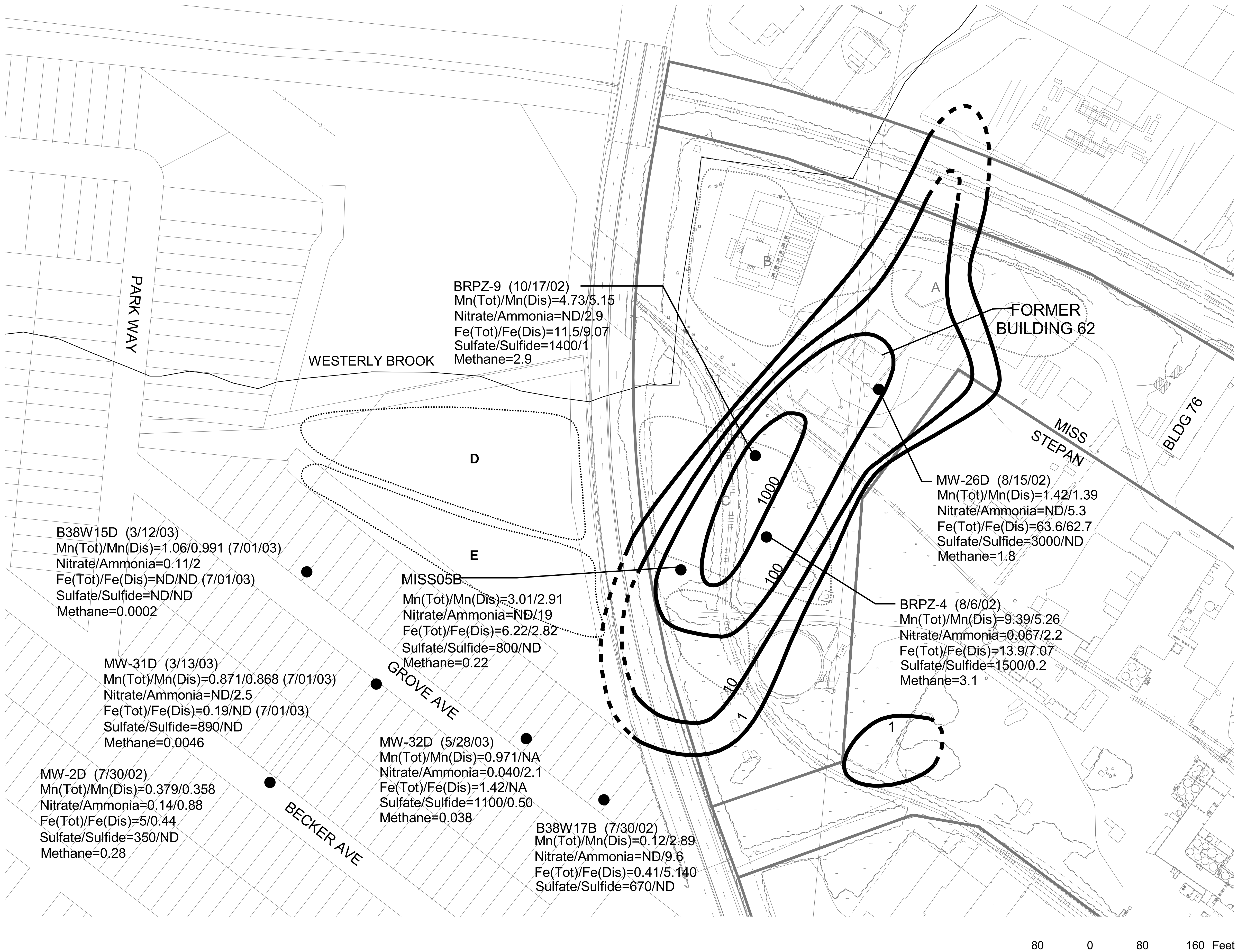
Modified From Bouwer (1994)

Figure 3-5
Oxidation-Reduction Potential for Various Oxidation-Reduction Reactions

US Army Corps of Engineers

FUSRAP Maywood Superfund Site

Shaw Environmental, Inc.



LEGEND:

MW-26D (8/15/02)
Mn(Tot)/Mn(Dis)=1.42/1.39 mg/L
Nitrate/Ammonia=ND/5.3 mg/L
Fe(Tot)/Fe(Dis)=63.6/62.7 mg/L
Sulfate/Sulfide=3000/ND mg/L
Methane=1.8 mg/L

BEDROCK WELL IDENTIFICATION WITH RESULTS

TOTAL AND FIELD FILTERED SAMPLES WERE COLLECTED FOR IRON AND MANGANESE. THE DISSOLVED IRON/MANGANESE ARE ASSUMED TO APPROXIMATE Fe+2 AND Mn+2 GROUNDWATER CONCENTRATIONS AT THE TIME OF COLLECTION.

A	FORMER RETENTION POND
D	FORMER RETENTION POND - REMEDIATED
ND	NON-DETECT
NA	NOT ANALYZED
NC	NOT CALCULATED

RESULTS IN MILLIGRAMS PER LITER (mg/L)

10	LINE OF EQUAL BENZENE CONCENTRATION
10	DASHED WHERE INFERRED

FIGURE 3-6
ELECTRON ACCEPTOR REDUCTION DATA
BEDROCK WELLS - RI ADDENDUM

US Army Corps of Engineers
FUSRAP
Maywood Superfund Site
Shaw

\\Bosfs01\Maywood\Maywood\Task0515\drawings\Chem.apr LAYOUT: Electron-Acceptors-17x11 15 December 2003

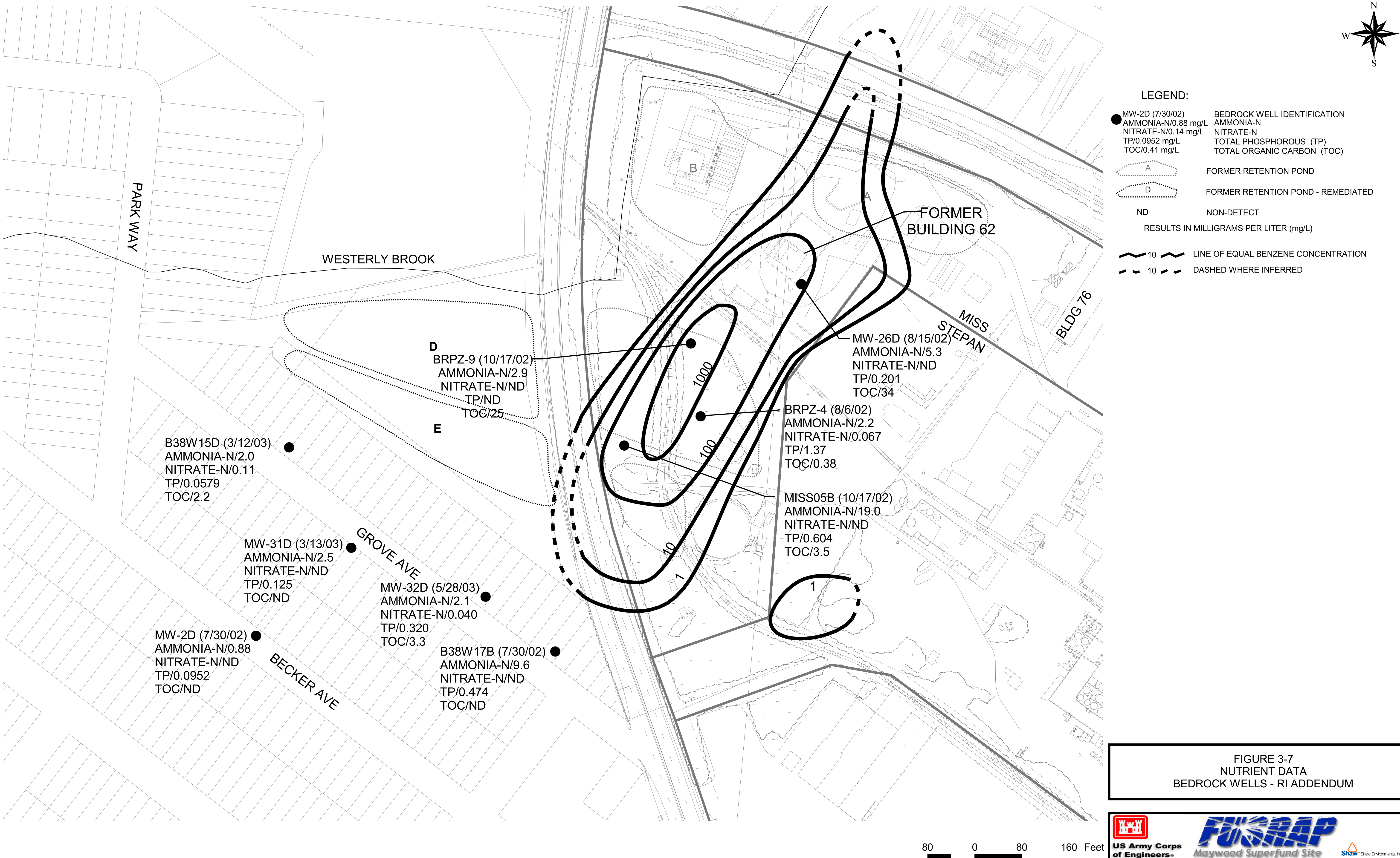


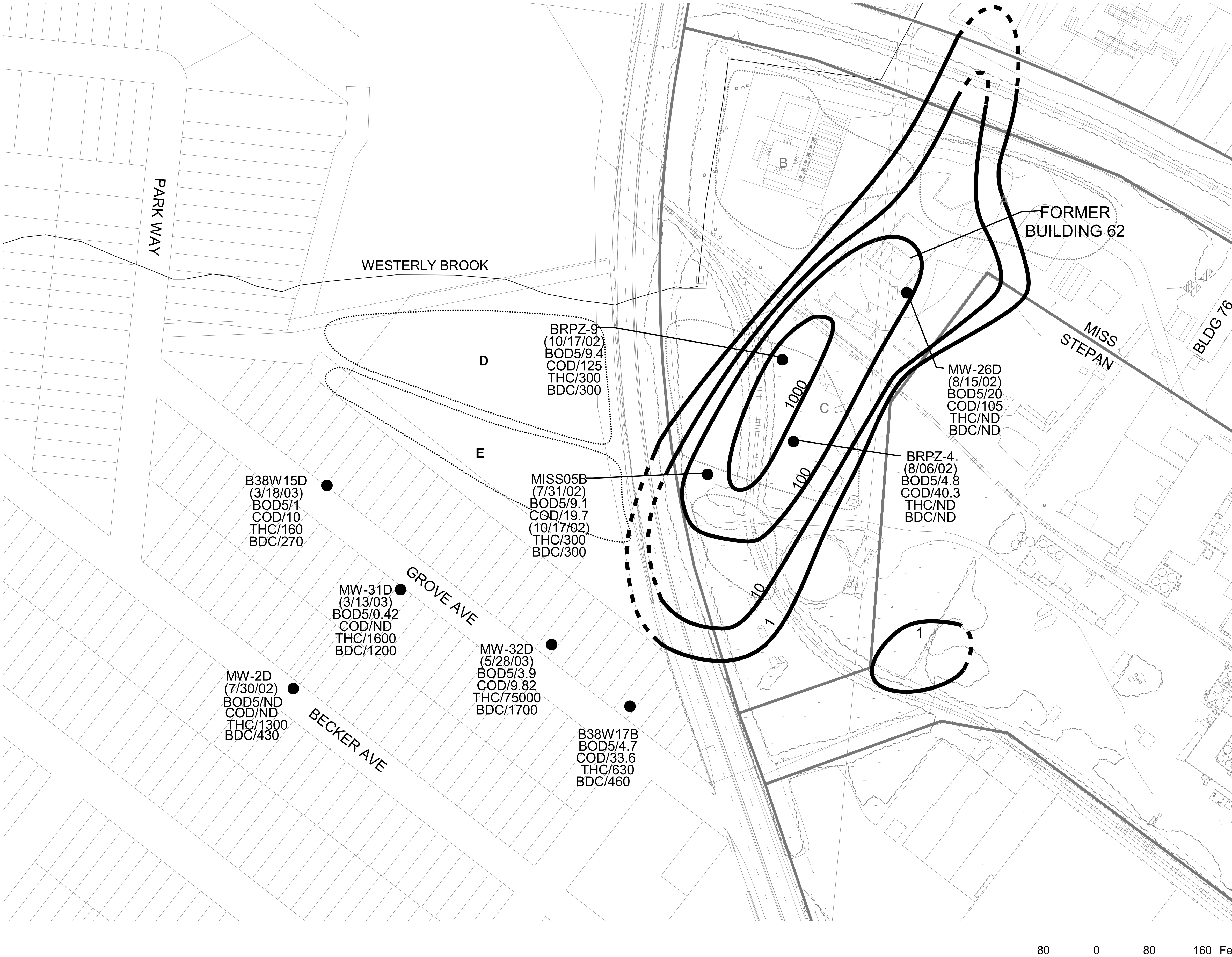
FIGURE 3-7
NUTRIENT DATA
BEDROCK WELLS - RI ADDENDUM

US Army Corps of Engineers

FUSRAP Maywood Superfund Site

Shaw Shaw Environmental, Inc

\\Bosfs01\Maywood\Maywood\Task0515\drawings\Chem.apr LAYOUT: Nutrient-17x11 21 August 2003



N
W E
S

LEGEND:

MW-26D	BEDROCK WELL IDENTIFICATION
BOD5/20 mg/L	BOD5
COD/105 mg/L	CHEMICAL OXYGEN DEMAND (COD)
THC/ND CFU/mL	TOTAL HETEROTROPH COUNT (THC)
BDC/ND CFU/mL	BTEX DEGRADER COUNT (BDC)
A	FORMER RETENTION POND
D	FORMER RETENTION POND - REMEDIATED
ND	NON-DETECT
NA	NOT ANALYZED

RESULTS IN MILLIGRAMS PER LITER (mg/L) FOR BOD5 AND COD
CFUs/mL [COLONY FORMING UNITS] FOR TOTAL HETEROTROPHS
AND BTEX DEGRADER

10	LINE OF EQUAL BENZENE CONCENTRATION
10	DASHED WHERE INFERRED

FIGURE 3-8
OXYGEN DEMAND AND MICROBIOLOGIC DATA
BEDROCK MONITORING WELLS - RI ADDENDUM

US Army Corps of Engineers
FUSRAP
Maywood Superfund Site
Shaw Shaw Environmental, Inc.

\\Bosfs01\Maywood\Maywood\Task0515\drawings\Chem.apr LAYOUT: Biological-Activity-17x11 21 August 2003

APPENDIX A

RI ADDENDUM – PROPOSED SOURCE AND PLUME DELINEATION WORK PLAN

RI ADDENDUM - PROPOSED SOURCE AND PLUME DELINEATION

Introduction

The USACE has completed the additional Phase II Field Activities and data evaluation as proposed in the September 24, 2001 Memo. Field activities included the installation and sampling of two bedrock wells (MW-25D and MW-26D) to delineate the benzene source area. Benzene (520 ppb) was detected at monitoring well MW-26D, and will require further upgradient source area delineation. The results of the Additional Phase II activities will be included in the Draft Remedial Investigation (RI), which is scheduled for submission to regulators in December 02/January 03.

The USEPA has since requested further source area and downgradient delineation of benzene contamination on the MISS and offsite properties. The following scope of work is prepared as an addendum to the Groundwater Remedial Investigation Work Plan, December 2000. In this addendum, the USACE proposes to install and sample additional bedrock monitoring wells to complete the delineation of both the benzene source area and downgradient plume. Bioremediation sampling is proposed, and will provide baseline data for evaluation of monitored natural attenuation and other remedial alternatives. The field program is expected to start in August 2002 and last approximately three (3) to four (4) months. Results of the field investigation would be presented in a RI Addendum.

Background

Elevated benzene concentrations on the MISS were first identified in May 2001, and have been partially delineated by sampling of former bedrock test wells and other monitoring wells. Benzene sampling results from the Phase II and Additional Phase II investigation is presented in Figure 1. Figure 1 shows benzene concentration isopleths superimposed over the December 2001 bedrock groundwater elevation data. As shown, a contiguous benzene plume is plotted on site, extending NE-SW from upgradient wells MW-26D to MISS-5B, which is located at the downgradient property boundary. Maximum detected benzene concentrations within the plume were recorded at wells BRPZ-5 (5000 ppb) and MISS-5B (3500 ppb). Benzene was also detected in deep packer samples collected at bedrock wells BRPZ-5 (480 ppb) and BRPZ-7 (270 ppb duplicate sample). The sampling results indicate that the highest benzene concentrations are found in shallow bedrock, and that benzene concentrations decrease roughly an order of magnitude between shallow (35 to 60 feet bgs open interval) wells and deep (90 to 115 feet bgs open interval) wells.

The upper portion of the plume appears to be aligned with local groundwater flow, however, this changes further downgradient as bedrock groundwater flow turns west. Benzene transport is therefore expected to shift further west with the prevailing groundwater flow at downgradient plume locations. Benzene transport may also be impacted (or controlled) by aquifer anisotropy in the Passaic Formation. Aquifer anisotropy and permeability are typically greatest along bedrock strike which locally trends NNE. Both groundwater flow and potential aquifer anistropy elements were considered during selection of monitoring well locations.

Monitored natural attenuation (MNA) will be evaluated for remediation of the benzene plume. MNA is considered an attractive remedy because of (1) the low detected concentrations (<5ppm) of benzene, (2) distance (1750 feet) to the receptor (Saddle River), and (3) degradability of benzene in groundwater. The benzene source area will be delineated during the proposed investigation, with identification of any ongoing source areas. Bioremediation sampling is proposed to provide specific information about the utilization and availability of electron acceptors and nutrients in groundwater.

Recommendations for Additional Field Work

Installation of Source Area/Plume Delineation Wells MW-27D, MW-28D, MW-29D and MW-30D

Proposed bedrock well locations are shown in Figure 1. Bedrock well MW-27D (proposed) will be installed first and located approximately 200 feet northeast from well MW-26D, along the apparent plume axis. MW-28D (proposed) will be located approximately 160 feet northeast and upgradient (flow) of MW-26D. Screening VOC groundwater samples will be collected from each well during development and analyzed on an expedited turn around time (TAT). Based upon the screening results from MW-27D and MW-28D, wells Alt "A" and/or Alt "B" may be installed. For additional well installation data and rationale, see Table 1.

All source area wells will be inspected for product during installation and development. Prior to grouting the 6" well casing, the water column (within the bedrock or 10" drive casing) shall be inspected for product using a clear weighted bailer. This procedure would be repeated prior to and after well development.

Proposed downgradient well location MW-29D is located approximately 250 feet from MISS-5B and is oriented along the apparent plume axis. Proposed well MW-30D is located 160 feet northwest of MW-29D and 170 feet downgradient (flow) from MISS-5B. The relative concentrations of benzene at these locations, if present, may help determine the offsite plume orientation. If screening (VOC) groundwater samples detect benzene at MW-29D and/or MW-30D, a third well will be installed along the projected plume direction on Grove Ave. or other appropriate downgradient location.

All proposed wells will be installed using the air rotary method and will be completed as shallow bedrock wells with 25 feet of open borehole. Wells will be air developed by the rig for a minimum 45 minutes after completion to remove sediment and rock fragments from the bottom of the well. After a minimum 24 hour period, the wells will be developed by pumping until a minimum 50 NTU turbidity (and required 3X well volume evacuation) is achieved.

VOC and Bioremediation Sampling

Collection of a new round of VOC samples is proposed in the delineation study area. VOC sampling will be conducted at 20 bedrock wells and at all newly installed wells commencing early FY03. In addition, bedrock well VOC data collected during the Annual Environmental Sampling round (July 2002) will be utilized for plume delineation. Proposed sampling and compliance wells that will contribute to the VOC interpretation are listed in Table 2. As shown in Figure 2, all available bedrock wells in the plume and downgradient areas are proposed for sampling.

Bioremediation sampling is proposed at a total of eight bedrock monitoring wells (see Table 2) to determine the capacity of the bedrock aquifer to support intrinsic bioremediation. Proposed sampling wells are located within the mapped extent of the plume and projected downgradient areas. The bioremedial sampling parameters include dissolved oxygen, alternate electron acceptors (nitrate, manganese, iron, sulfate), nutrients and benzene degraders. The complete list of proposed sampling parameters and methods are shown in Table 3.

All wells would be sampled using the USEPA low flow sampling methodology and analyzed for VOCs using USEPA method 8260B. Quality assurance/quality control (QA/QC) samples will be collected as described in the Work Plan, excluding the bioremedial parameters.

Well Logging/Slug Testing

All new bedrock wells and three (3) existing wells (MW-26D, BRPZ-9 and MW-2D) shall be slug tested to measure bulk permeability. This data may be utilized in a groundwater flow and fate/transport numerical model. Borehole logging is proposed at five (5) new well locations, and would include caliper, SPR, SP, natural gamma, fluid temperature, fluid resistivity, acoustic televiewer and heat-pulse flowmeter logging. Evaluation of the data shall provide fracture orientations and determine distribution of water bearing fractures.

Water Level Measurements

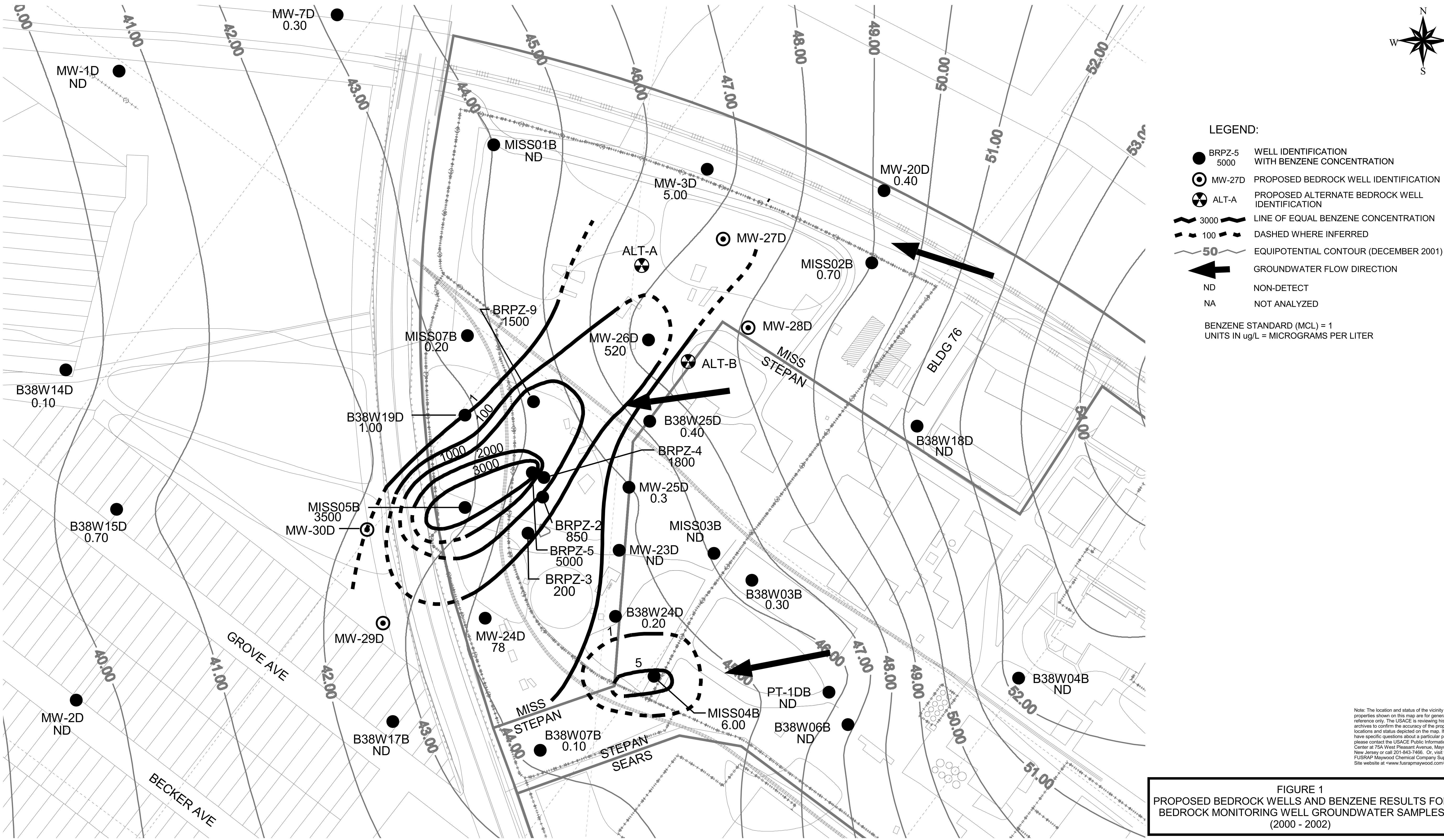
A partial synoptic water level round will be performed at 48 (existing) bedrock wells and five (5) or more newly installed bedrock wells. Proposed existing wells for measurement are listed in Table 4. As shown in Figure 2, all bedrock wells in and adjacent to the delineated/projected benzene plume are included for measurement. Deep bedrock monitoring wells PT-1DB, MW-23DD, MW-24DD, PW-1D and MW-19DD will be included in the synoptic round. All water level measurements will be conducted over a maximum eight (8) hour period to reduce the effect of water level changes on the data.

Data Evaluation and Report

All field data and laboratory data shall be presented in a stand-alone RI Addendum, which will include evaluation of the data, conclusions and recommendations.

Schedule

- Site Access and Mobilization - June and July 2002
- Annual Compliance Sampling - July 2002
- Well Installation and Development - August 2002
- Existing Monitoring Well and Newly Installed Well Sampling - September/October 2002
- Submittal to Regulators of Draft RI Addendum Report - April 2003



LEGEND:

BRPZ-5 5000	WELL IDENTIFICATION WITH BENZENE CONCENTRATION
MW-27D	PROPOSED BEDROCK WELL IDENTIFICATION
ALT-A	PROPOSED ALTERNATE BEDROCK WELL IDENTIFICATION
3000	LINE OF EQUAL BENZENE CONCENTRATION
100	DASHED WHERE INFERRED
50	EQUIPOTENTIAL CONTOUR (DECEMBER 2001)
	GROUNDWATER FLOW DIRECTION
ND	NON-DETECT
NA	NOT ANALYZED

BENZENE STANDARD (MCL) = 1
UNITS IN ug/L = MICROGRAMS PER LITER

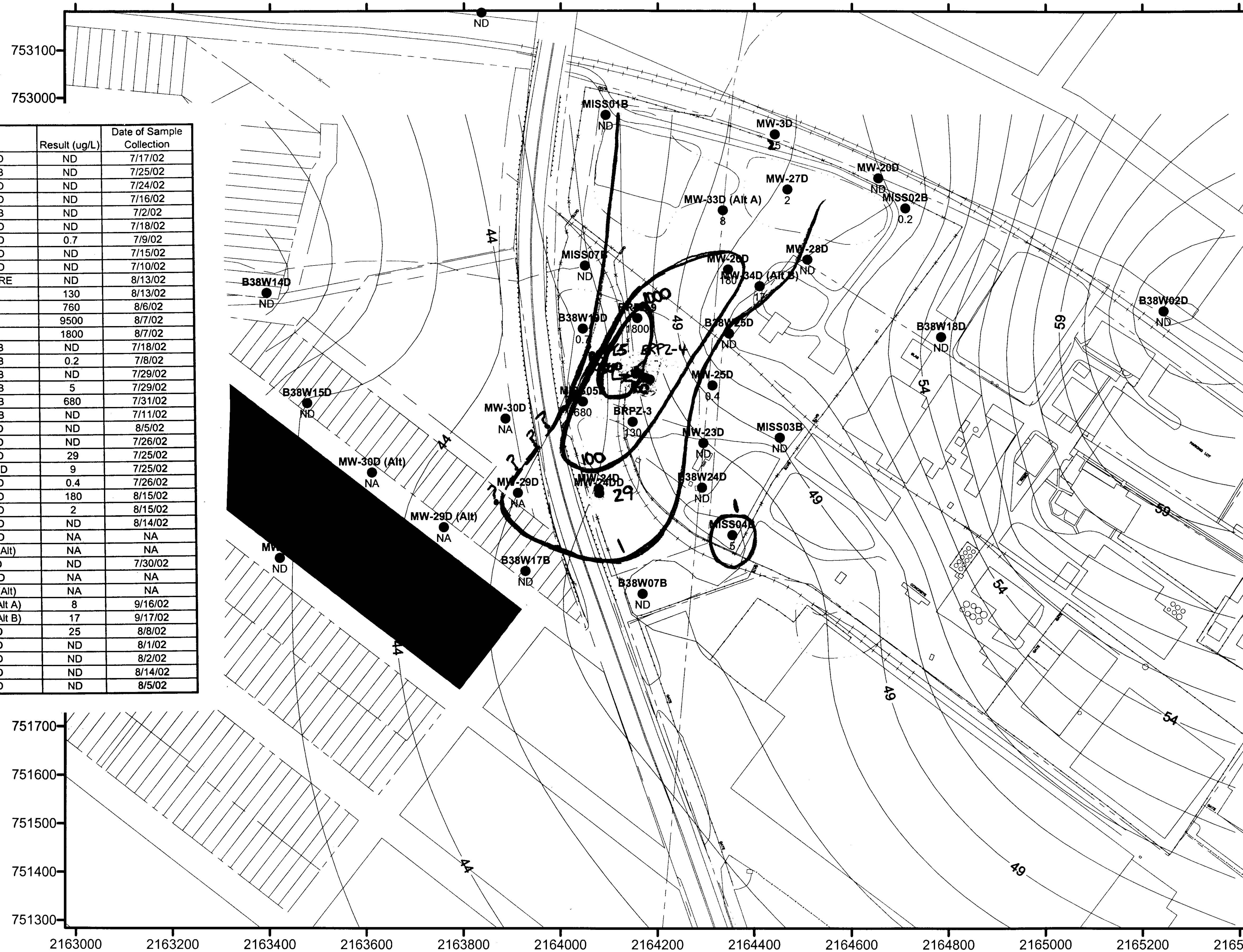
Note: The location and status of the vicinity properties shown on this map are for general reference only. The USACE is reviewing historical archives to confirm the accuracy of the property locations and status depicted on the map. If you have specific questions about a particular property, please contact the USACE Public Information Center at 75A West Pleasant Avenue, Maywood, New Jersey or call 201-843-7466. Or, visit the FUSRAP Maywood Chemical Company Superfund Site website at <www.fusrapmaywood.com>.

FIGURE 1
PROPOSED BEDROCK WELLS AND BENZENE RESULTS FOR BEDROCK MONITORING WELL GROUNDWATER SAMPLES (2000 - 2002)

US Army Corps of Engineers
FUSRAP
Maywood Superfund Site
Stone & Webster

\\Bosfs01\Maywood\Maywood\Task0510\drawings\Contours-Bedrock.apr LAYOUT: Benzene-Proposed-Bedrock-17x11 7 May 2002

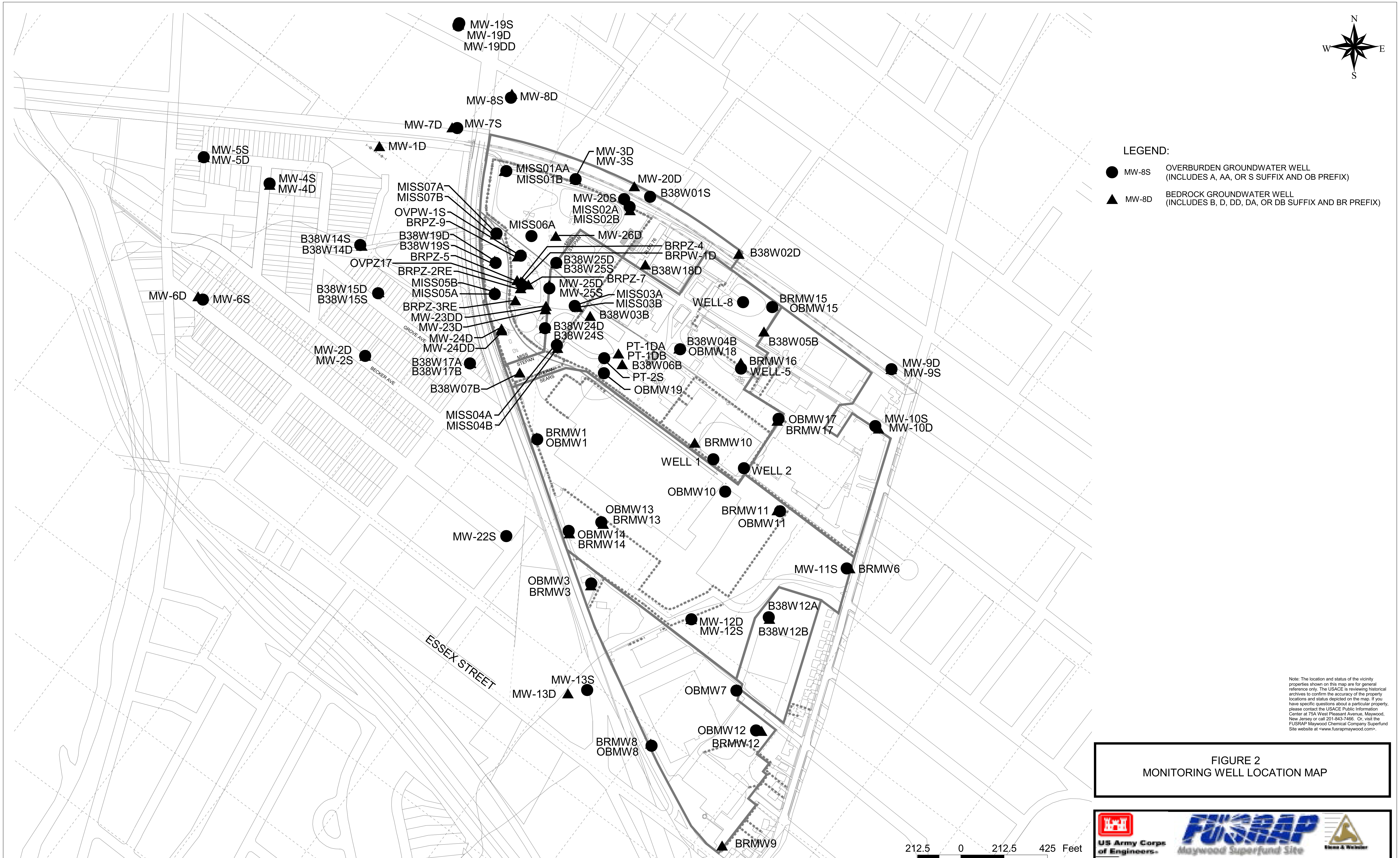
Well	Result (ug/L)	Date of Sample Collection
B38W02D	ND	7/17/02
B38W07B	ND	7/25/02
B38W14D	ND	7/24/02
B38W15D	ND	7/16/02
B38W17B	ND	7/2/02
B38W18D	ND	7/18/02
B38W19D	0.7	7/9/02
B38W24D	ND	7/15/02
B38W25D	ND	7/10/02
BRPW-1DRE	ND	8/13/02
BRPZ-3	130	8/13/02
BRPZ-4	760	8/6/02
BRPZ-5	9500	8/7/02
BRPZ-9	1800	8/7/02
MISS01B	ND	7/18/02
MISS02B	0.2	7/8/02
MISS03B	ND	7/29/02
MISS04B	5	7/29/02
MISS05B	680	7/31/02
MISS07B	ND	7/11/02
MW-20D	ND	8/5/02
MW-23D	ND	7/26/02
MW-24D	29	7/25/02
MW-24DD	9	7/25/02
MW-25D	0.4	7/26/02
MW-26D	180	8/15/02
MW-27D	2	8/15/02
MW-28D	ND	8/14/02
MW-29D	NA	NA
MW-29D (Alt)	NA	NA
MW-2D	ND	7/30/02
MW-30D	NA	NA
MW-30D (Alt)	NA	NA
MW-33D (Alt A)	8	9/16/02
MW-34D (Alt B)	17	9/17/02
MW-3D	25	8/8/02
MW-4D	ND	8/1/02
MW-5D	ND	8/2/02
MW-6D	ND	8/14/02
MW-7D	ND	8/5/02



RI Addendum - Benzene Investigation

1" ≈ 200'

July - September 2002
Bedrock Monitoring Wells



LEGEND:

- ● MW-8S — OVERBURDEN GROUNDWATER WELL (INCLUDES A, AA, OR S SUFFIX AND OB PREFIX)
- ▲ MW-8D — BEDROCK GROUNDWATER WELL (INCLUDES B, D, DD, DA, OR DB SUFFIX AND BR PREFIX)

Note: The location and status of the vicinity properties shown on this map are for general reference only. The USACE is reviewing historical archives to confirm the accuracy of the property locations and status depicted on the map. If you have specific questions about a particular property, please contact the USACE Public Information Center at 75A West Pleasant Avenue, Maywood, New Jersey or call 201-843-7466. Or, visit the FUSRAP Maywood Chemical Company Superfund Site website at <www.fusrapmaywood.com>.

FIGURE 2
MONITORING WELL LOCATION MAP

US Army Corps of Engineers
FUSRAP
Maywood Superfund Site

\\Bosfs01\Maywood\Maywood\Task0510\drawings\GWRI-Wells.apr   LAYOUT: Monitoring Wells 17x11   2 May 2002

TABLE 1
WELL CONSTRUCTION AND RATIONALE
MAYWOOD FUSRAP SITE

Well Identification/Description	Well Type	Depth (ft.bgs)	Borehole (ft.)	Rationale
Source Delineation Monitoring Wells				
MW-27D	Shallow Bedrock	47	25	Located 200' upgradient along plume axis from MW-26D. If high concentrations of benzene are detected, an additional upgradient well may be installed.
MW-28D	Shallow Bedrock	47	25	Located 160 feet upgradient (flow) from MW-26D and 125 feet South of MW-27D. If high concentrations of benzene are detected, another well may be installed at a further upgradient (ENE) location.
Alternative Well Location -"A"	Shallow Bedrock	47	25	May be installed to delineate a source area/plume northwest of well MW-26D. May be installed if benzene is not detected at MW-27D and MW-28D, or alternatively, if benzene is only detected at MW-27D.
Alternative Well Location -"B"	Shallow Bedrock	47	25	Located 100 feet east of MW-26D, and may be installed to delineate a potential offsite (Stepan) source. May be installed if no benzene is detected at wells MW-27D and Alt A, and ND or low concentration of benzene at MW-28D.
Downgradient Delineation Wells				
MW-29D	Shallow Bedrock	47	25	Located 250 feet downgradient from MISS-5B along the plotted benzene plume axis. An additional downgradient well will be installed if benzene is detected at this location.
MW-30D	Shallow Bedrock	47	25	Located 170 feet downgradient (flow) from MISS-5B. As noted with well MW-29D, an additional well will be installed downgradient if benzene is detected at this well.

TABLE 2

Summary of Bedrock Wells Sampled in Environmental Monitoring Program and Wells Recommended for Sampling as Part of RI Addendum

FUSRAP MAYWOOD SUPERFUND SITE, MAYWOOD, NJ

Well ID	Well Type	Current Bedrock Compliance Wells*	RI Addendum Sampling - VOCs	Proposed Bioremediation Sampling
B38W02D	Shallow Bedrock	√		
B38W07B	Shallow Bedrock		√	
B38W14D	Shallow Bedrock	√		
B38W15D	Shallow Bedrock	√		√
B38W17B	Shallow Bedrock	√		
B38W18D	Shallow Bedrock	√		
B38W19D	Shallow Bedrock	√		
B38W24D	Shallow Bedrock	√		
B38W25D	Shallow Bedrock	√		
BRPW-1D	Deep Bedrock		√	
BRPZ-4	Shallow Bedrock		√	√
BRPZ-3	Shallow Bedrock		√	
BRPZ-5	Shallow Bedrock		√	
BRPZ-9	Shallow Bedrock		√	
MISS01B	Shallow Bedrock	√		
MISS02B	Shallow Bedrock	√		
MISS03B	Shallow Bedrock		√	
MISS04B	Shallow Bedrock		√	
MISS05B	Shallow Bedrock	√		√
MISS07B	Shallow Bedrock	√		
MW-1D	Shallow Bedrock		√	
MW-2D	Shallow Bedrock		√	√
MW-3D	Shallow Bedrock		√	
MW-4D	Shallow Bedrock		√	
MW-5D	Shallow Bedrock		√	
MW-6D	Shallow Bedrock		√	
MW-7D	Shallow Bedrock		√	
MW-23D	Shallow Bedrock		√	
MW-24D	Shallow Bedrock		√	
MW-24DD	Deep Bedrock		√	
MW-25D	Shallow Bedrock		√	
MW-26D	Shallow Bedrock		√	√
Proposed MW-27D	Shallow Bedrock		√	√
Proposed MW-28D	Shallow Bedrock		√	
Proposed MW-29D	Shallow Bedrock		√	√
Proposed MW-30D	Shallow Bedrock		√	√
Proposed Alt-A	Shallow Bedrock		√	
Proposed Alt-B	Shallow Bedrock		√	

* - Parameter list for compliance wells are to consist of: Gross Alpha, Gross Beta
RA-226, RA-228, isotopic thorium and isotopic uranium, TAL Metals, lithium, boron and TCL VOCs

TABLE 3
FIELD AND LABORATORY BIOREMEDIAL PARAMETERS
MAYWOOD FUSRAP SITE

PARAMETER	USEPA METHOD	DISCUSSION
FIELD PARAMETERS		
Dissolved Oxygen	N/A	Measured using a DO meter. Autocalibration to atmosphere.
Dissolved Oxygen	N/A	Test kit using the modified Winkler Method.
Oxidation Reduction Potential (ORP)	N/A	Measured using a ORP meter (multimeter). Calibrated against standard solution.
pH	N/A	Measured using a pH meter. Calibrated against standard solution.
LABORATORY PARAMETERS		
Nitrate-N	353.2	Alternative electron acceptor
Ammonia-N	350.1 OR 350.3	
Manganese (total)	6010A	Alternative electron acceptor
Manganese (dissolved)	6010A	
Iron (total)	6010A	Alternative electronic acceptor
Iron (dissolved)	6010A	
Sulfate	375.4	Alternative electronic acceptor
Sulfide	376.1	
Total Organic Carbon	415.1	
Phosphorus (total)	365.4	Limiting nutrient
Chemical Oxygen Demand (COD)	410.4	
Biological Oxygen Demand (BOD)	405.1	

APPENDIX B

WELL PERMITS AND MONITORING WELL RECORDS

TABLE 4

Bedrock Monitoring Wells Proposed for Water Level Gauging

FUSRAP Maywood Superfund Site, Maywood, NJ

Well ID	Property	Well Owner
BRMW1	149-151 Maywood Ave.	Stepan
B38W03B	Stepan	USACE
B38W04B	Stepan	USACE
B38W05B	Stepan	USACE
B38W06B	Stepan	USACE
B38W07B	Stepan	USACE
B38W24D	Stepan	USACE
B38W25D	Stepan	USACE
MISS03B	Stepan	USACE
MISS04B	Stepan	USACE
BRMW10	Stepan	Stepan
BRMW15	Stepan	Stepan
BRMW16	Stepan	Stepan
BRMW17	Stepan	Stepan
PT-1DA	Stepan	Stepan
PT-1DB	Stepan	Stepan
B38W02D	NYS & WRR	USACE
MW-20D	NYS & WRR	USACE
MW-3D	NYS & WRR	USACE
B38W18D	MISS	USACE
B38W19D	MISS	USACE
MISS01B	MISS	USACE
MISS02B	MISS	USACE
MISS05B	MISS	USACE
MISS07B	MISS	USACE
BRPW-1D	MISS	USACE
BRPZ-2RE	MISS	USACE
BRPZ-3RE	MISS	USACE
BRPZ-4	MISS	USACE
BRPZ-5RE	MISS	USACE
BRPZ-9	MISS	USACE
MW-23D	MISS	USACE
MW-23DD	MISS	USACE
MW-24D	MISS	USACE
MW-24DD	MISS	USACE
MW-25D	MISS	USACE
MW-26D	MISS	USACE
B38W14D	90 Park Way	USACE
B38W15D	26 Grove Ave.	USACE
B38W17B	Grove Ave.	USACE
MW-1D	96 Park Way	USACE
MW-19D	Lincoln Ave.	USACE
MW-19DD	Lincoln Ave.	USACE
MW-2D	Becker Ave.	USACE
MW-5D	Park Way	USACE
MW-6D	Madison Ave.	USACE
MW-7D	141 W. Central Ave.	USACE
MW-8D	161 W. Central Ave.	USACE

DWR-133M
2/00

RECEIVED
JUL 23 2002

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
TRENTON, NJ

MONITORING WELL PERMIT 34

Permit No. 2665219

VALID ONLY AFTER APPROVAL BY THE D.E.P.

Mail To:
NJDEP
BUREAU OF WATER ALLOCATION
PO BOX 426
TRENTON, NJ 08625-0426

COORD #: 26 • 03 • 5 • 36

Owner: US EPA c/o The Shaw Group Inc.
Address: 100 W. Hunter Avenue
Maywood NJ 07607

Driller: B&B Drilling Inc.
Address: P.O. Box 8
Netcong NJ 07857

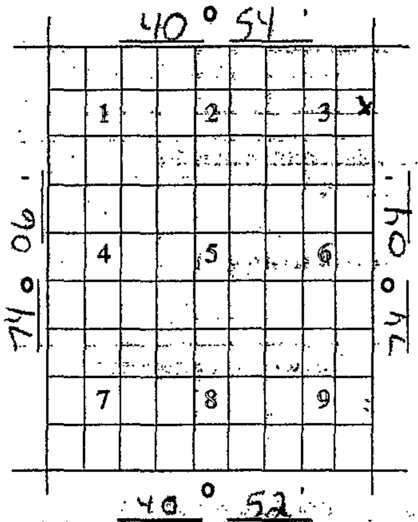
Name of Facility: Maywood Fusrap Superfund Site
Address: 100 W. Hunter Avenue
Maywood NJ 07607

Diameter of Well(s): 6 Inches	Proposed Depth of Well(s): 50 Feet
# of Wells Applied for (max. 10): 1	Will pumping equipment be utilized? YES ☐ NO ☒
Type of Well (see reverse): Monitoring	If Yes, give pump capacity — cumulative GPM

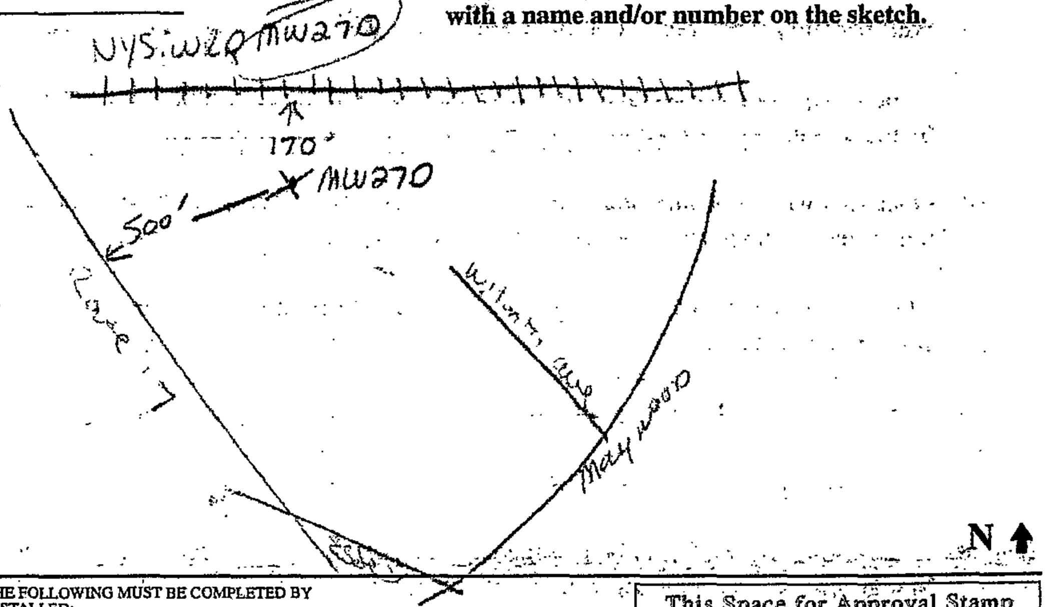
LOCATION OF WELL(S)

Lot #	Block #	Municipality	County
46	125	Maywood Boro	Bergen

State Atlas Map No. 26



Draw sketch of well(s) nearest roads, buildings, etc. with marked distances in feet. Each well MUST be labeled with a name and/or number on the sketch.



FOR MONITORING WELLS, RECOVERY WELLS, OR PIEZOMETERS, THE FOLLOWING MUST BE COMPLETED BY THE APPLICANT. PLEASE INDICATE WHY THE WELLS ARE BEING INSTALLED:

- ☐ Spill Site
- ☐ ISRA Site
- ☒ CERCLA (Superfund) Site
- ☐ RCRA Site
- ☐ Underground Storage Tank Site
- ☐ Operational Ground Water Permit Site
- ☐ Pretreatment and Residuals Site
- ☐ Water and Hazardous Waste Enforcement Case
- ☐ Water Supply Aquifer Test Observation Well
- ☐ Other (explain) ____

CASE I.D. Number ____

This Space for Approval Stamp

WELL PERMIT APPROVED
N.J.D.E.P.
JUL 19 2002
BUREAU OF WATER ALLOCATION

FOR D.E.P. USE	
☐ Issuance of this permit is subject to the conditions attached. (see next page)	☒ The well(s) may not be completed with more than 25 feet of total screen or uncased borehole.
☐ For monitoring purposes only	
☐	

SEE REVERSE SIDE FOR IMPORTANT PROVISIONS PERTAINING TO THIS PERMIT.
In compliance with N.J.S.A.58:4A-14, application is made for a permit to drill a well as described above.

Date: 7/15/02   Signature of Driller: [signature]   Registration No. M1277

Signature of Property Owner: Robert DeMott, for owner, NJ

COPIES: Water Allocation – White   Health Dept. – Yellow   Owner – Blue   Driller – White

DWR-138 M
8/00

New Jersey Department of Environmental Protection
Bureau of Water Allocation
MONITORING WELL RECORD

Well Permit No. 26 - 65219

Atlas Sheet Coordinates 26 - 03 - 536

OWNER IDENTIFICATION - Owner USEPA C/O SHAW GROUP INC
Address 100 W HUNTER AVE
City MAYWOOD State NJ Zip Code 07607

WELL LOCATION - If not the same as owner please give address. Owner's Well No. MW 27D
County BERGEN Municipality MAYWOOD BORO Lot No. 46 Block No. 125
Address 100 W HUNTER AVE

DATE WELL STARTED 8/6/02
DATE WELL COMPLETED 8/9/02

TYPE OF WELL (as per Well Permit Categories) MONITORING
Regulatory Program Requiring Well ______ Case I.D.# ______

CONSULTING FIRM/FIELD SUPERVISOR (if applicable) ______ Tele. # ______

WELL CONSTRUCTION

- Total depth drilled 58.5 ft.
- Well finished to 58.5 ft.
- Borehole diameter: Top 10 in. Bottom 6 in.
- Well was finished: ☒ above grade ☐ flush mounted
- If finished above grade, casing height (stick up) above land surface 2 ft.
- Was steel protective casing installed? ☒ Yes ☐ No
- Static water level after drilling 15.85 ft.
- Water level was measured using ______
- Well was developed for ______ hours at ______ gpm
- Method of development ______
- Was permanent pumping equipment installed? ☐ Yes ☒ No
- Pump capacity ______ gpm
- Pump type: ______
- Drilling Fluid — Type of Rig IRT4W
- Health and Safety Plan submitted? ☒ Yes ☐ No
- Level of Protection used on site (circle one) None D C B A

Note: Measure all depths from land surface	Depth to Top (ft.)	Depth to Bottom (ft.)	Diameter (inches)	Material	Wgt./Rating (lbs/sch no.)
Single/Inner Casing	+2	33.5	6	Steel	19#
Middle Casing (for triple cased wells only)					
Outer Casing (largest diameter)	0	21	10	Steel	sch40
Open Hole or Screen (No. Used)	33.5	58.5	6	Rock	
Blank Casings (No. Used)					
Tail Piece					
Gravel Pack					
Grout	0	33.5	ann	Neat Cement / Bentonite	1000 lbs. / ____ lbs.

Grouting Method Pressure
Drilling Method air Rotary

GEOLOGIC LOG

Note each depth where water was encountered in consolidated formations.

0-20' TN. brn f/c Sand, tr Silt, TR gravel
20-58.5' Bedrock - Silt, Sandstone

I certify that I have constructed the above referenced well in accordance with all well permit requirements and applicable State rules and regulations.

Drilling Company B & B DRILLING, INC
Well Driller (Print) Douglas Myerchin
Driller's Signature Douglas Myerchin
Registration No. M1277 Date 9/21/02

AS-BUILT WELL LOCATION
(NAD 83 HORIZONTAL DATUM)
NJ STATE PLANE COORDINATE IN US SURVEY FEET

NORTHING: ______ EASTING: ______
OR
LATITUDE: __ ° __ ' __ . __ " LONGITUDE: __ ° __ ' __ . __ "

COPIES: White - DEP Canary - Driller Pink - Owner Goldenrod - Health Dept.

DWR-133M
2/00

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
TRENTON, NJ

RECEIVED
JUL 23 2002

26 65220
26 65221

MONITORING WELL PERMIT 34

VALID ONLY AFTER APPROVAL BY THE D.E.P.

Mail To:
NJDEP
BUREAU OF WATER ALLOCATION
PO BOX 426
TRENTON, NJ 08625-0426

Permit No. ____________

COORD #: 26 . 63 . 5 . 36

Owner [illegible]

Address 100 [illegible]
[illegible] NJ 07607

Name of Facility [illegible]

Address [illegible]
[illegible] NJ 07607

Driller [illegible]

Address [illegible]
Netcong NJ 07857

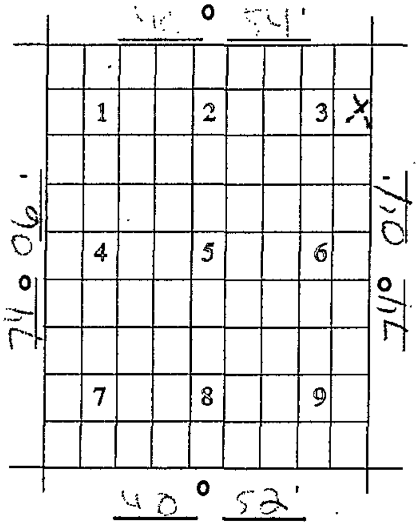
Diameter of Well(s) 6 Inches	Proposed Depth of Well(s) 50 Feet
# of Wells Applied for (max. 10) 2	Will pumping equipment be utilized? YES ☐ NO ☑
Type of Well (see reverse) Monitoring	If Yes, give pump capacity — cumulative GPM

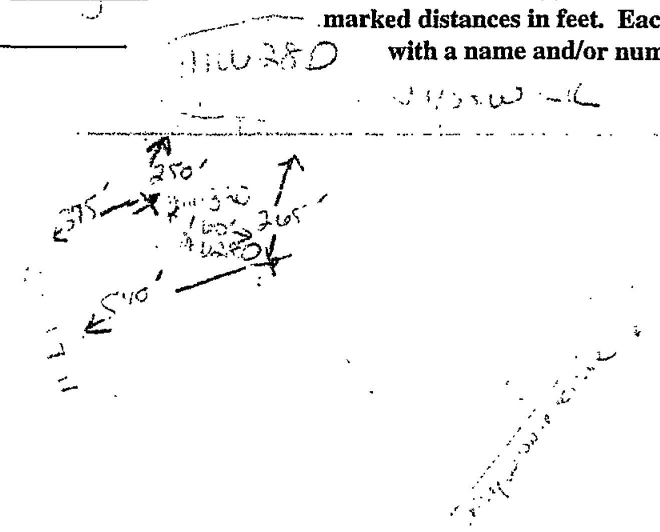
LOCATION OF WELL(S)

Lot #	Block #	Municipality	County
46	124	[illegible]	Bergen

State Atlas Map No. 26

Draw sketch of well(s) nearest roads, buildings, etc. with marked distances in feet. Each well MUST be labeled with a name and/or number on the sketch.





N ↑

FOR MONITORING WELLS, RECOVERY WELLS, OR PIEZOMETERS, THE FOLLOWING MUST BE COMPLETED BY THE APPLICANT. PLEASE INDICATE WHY THE WELLS ARE BEING INSTALLED:

- ☐ Spill Site
- ☐ ISRA Site
- ☑ CERCLA (Superfund) Site
- ☐ RCRA Site
- ☐ Underground Storage Tank Site
- ☐ Operational Ground Water Permit Site
- ☐ Pretreatment and Residuals Site
- ☐ Water and Hazardous Waste Enforcement Case
- ☐ Water Supply Aquifer Test Observation Well
- ☐ Other (explain) ____________

CASE I.D. Number ____________

This Space for Approval Stamp

WELL PERMIT APPROVED
N.J.D.E.P.
JUL 19 2002
BUREAU OF WATER ALLOCATIC

FOR D.E.P. USE	
☐ Issuance of this permit is subject to the conditions attached. (see next page)	☑ The well(s) may not be completed with more than 25 feet of total screen or uncased borehole.
☐ For monitoring purposes only	
☐	

SEE REVERSE SIDE FOR IMPORTANT PROVISIONS PERTAINING TO THIS PERMIT.
In compliance with N.J.S.A.58:4A-14, application is made for a permit to drill a well as described above.

Date 7/15/02 Signature of Driller [signature] Registration No. 11377

Signature of Property Owner [signature]

COPIES: Water Allocation - White Health Dept. - Yellow Owner - Blue Driller - White

DWR-138 M
8/00

New Jersey Department of Environmental Protection
Bureau of Water Allocation
MONITORING WELL RECORD

Well Permit No. 26 - 65220

Atlas Sheet Coordinates 26 : 03 : 536

OWNER IDENTIFICATION - Owner USEPA C/O SHAW GROUP INC
Address 100 W HUNTER AVE
City MAYWOOD State NJ Zip Code 07607

WELL LOCATION - If not the same as owner please give address. Owner's Well No. MW28D
County BERGEN Municipality MAYWOOD BORO Lot No. 46 Block No. 124
Address 100 W HUNTER AVE
DATE WELL STARTED 8/7/02
DATE WELL COMPLETED 8/12/02
TYPE OF WELL (as per Well Permit Categories) MONITORING
Regulatory Program Requiring Well ________ Case I.D.# ________

CONSULTING FIRM/FIELD SUPERVISOR (if applicable) ________ Tele. # ________

WELL CONSTRUCTION

Total depth drilled 57 ft.
Well finished to 57 ft.

Borehole diameter:
Top 10 in.
Bottom 6 in.

Well was finished: ☑ above grade ☐ flush mounted

If finished above grade, casing height (stick up) above land surface 2 ft.

Was steel protective casing installed? ☑ Yes ☐ No

Static water level after drilling 30.82 ft.

Water level was measured using probe

Well was developed for ________ hours at ________ gpm

Note: Measure all depths from land surface	Depth to Top (ft.)	Depth to Bottom (ft.)	Diameter (inches)	Material	Wgt./Rating (lbs/sch no.)
Single/Inner Casing	+2.0	32	6	Steel	19#
Middle Casing (for triple cased wells only)					
Outer Casing (largest diameter)	0	22	10	Steel	sch 40
Open Hole or Screen (No. Used)	32	57	6	Bedrock	
Blank Casings (No. Used)					
Tail Piece					
Gravel Pack					
Grout	0	32	ann	Neat Cement / Bentonite	1000 lbs. / ____ lbs.

Grouting Method Pressure
Drilling Method air Rotary

Method of development ________

Was permanent pumping equipment installed? ☐ Yes ☒ No

Pump capacity ________ gpm

Pump type: ________

Drilling Fluid — Type of Rig IR T4W

Health and Safety Plan submitted? ☒ Yes ☐ No

Level of Protection used on site (circle one) None D C B A

I certify that I have constructed the above referenced well in accordance with all well permit requirements and applicable State rules and regulations.

Drilling Company B & B DRILLING INC

Well Driller (Print) Douglas Myerchin

Driller's Signature Douglas Myerchin

Registration No. M12776 Date 8/21/02

GEOLOGIC LOG

Note each depth where water was encountered in consolidated formations.

0-20' Tn Brn F/C Sand, tr Silt, tr gravel

20-57' Brown Red/Brn Silt & Sandstone

AS-BUILT WELL LOCATION (NAD 83 HORIZONTAL DATUM)
NJ STATE PLANE COORDINATE IN US SURVEY FEET

NORTHING: ________ EASTING: ________
OR
LATITUDE: __ ° __ ' __ . __ " LONGITUDE: __ ° __ ' __ . __ "

COPIES: White - DEP Canary - Driller Pink - Owner Goldenrod - Health Dept.

DWR-138 M
8/00

New Jersey Department of Environmental Protection
Bureau of Water Allocation
MONITORING WELL RECORD

Well Permit No. 26 - 65221

Atlas Sheet Coordinates 26 : 03 : 536

OWNER IDENTIFICATION - Owner USEPA C/O SHAW GROUP INC
Address 100 W HUNTER AVE
City MAYWOOD State NJ Zip Code 07607

WELL LOCATION - If not the same as owner please give address. Owner's Well No. MW33D
County BERGEN Municipality MAYWOOD BORO Lot No. 46 Block No. 124
Address 100 W HUNTER AVE
DATE WELL STARTED 9/10/02
DATE WELL COMPLETED 9/12/02

TYPE OF WELL (as per Well Permit Categories) MONITORING
Regulatory Program Requiring Well ______ Case I.D.# ______

CONSULTING FIRM/FIELD SUPERVISOR (if applicable) ______ Tele. # ______

WELL CONSTRUCTION

Total depth drilled 68 ft.
Well finished to 65.5 ft.

Borehole diameter:
Top 10 in.
Bottom 6 in.

Well was finished: ☑ above grade ☐ flush mounted

If finished above grade, casing height (stick up) above land surface 2 ft.

Was steel protective casing installed? ☑ Yes ☐ No

Static water level after drilling ______ ft.

Water level was measured using ______

Well was developed for ______ hours at ______ gpm

Note: Measure all depths from land surface	Depth to Top (ft.)	Depth to Bottom (ft.)	Diameter (inches)	Material	Wgt./Rating (lbs/sch no.)
Single/Inner Casing	+2	45.5	2	PVC	Sch 40
Middle Casing (for triple cased wells only)	+2	38	6	Steel	19#
Outer Casing (largest diameter)	0	20	10	Steel	Sch 40
Open Hole or Screen (No. Used)	45.5	65.5	2	PVC	Sch 40 .010
Blank Casings (No. Used)					
Tail Piece				PVC CAP	
Gravel Pack	43	68	ann	Morie	#1
Grout	0/0	43/38	ann	Neat Cement / Bentonite	40/100 lbs. / ___ lbs.

Grouting Method Tremie
Drilling Method Air Rotary

Method of development ______

Was permanent pumping equipment installed? ☐ Yes ☑ No

Pump capacity ______ gpm

Pump type: ______

Drilling Fluid — Type of Rig IR T4W

Health and Safety Plan submitted? ☒ Yes ☐ No

Level of Protection used on site (circle one) None D C B A

I certify that I have constructed the above referenced well in accordance with all well permit requirements and applicable State rules and regulations.

Drilling Company B & B DRILLING, INC

Well Driller (Print) Douglas Mercer

Driller's Signature [signature]

Registration No. M1277 Date 9/21/02

GEOLOGIC LOG

Note each depth where water was encountered in consolidated formations.

0-20 Fill crushed stone b n f/c sand silt, wood bricks
20-25 Gray red/brown shale, siltstone
25-68 Gray/green - red/brown silt stone

AS-BUILT WELL LOCATION (NAD 83 HORIZONTAL DATUM)

NJ STATE PLANE COORDINATE IN US SURVEY FEET

NORTHING: ______ EASTING: ______

OR

LATITUDE: __ ° __ ' __ . __ " LONGITUDE: __ ° __ ' __ . __ "

COPIES: White - DEP Canary - Driller Pink - Owner Goldenrod - Health Dept.

DWR-133M
2/00

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
TRENTON, NJ

JAN 3 1 2003

MONITORING WELL PERMIT

34

VALID ONLY AFTER APPROVAL BY THE D.E.P.

Permit No. 2666774

Mail To:
NJDEP
BUREAU OF WATER ALLOCATION
PO BOX 426
TRENTON, NJ 08625-0426

COORD # 26.63.379

Owner [illegible]

Address [illegible]

Driller [illegible] Drilling

Address [illegible]

Name of Facility

Address above

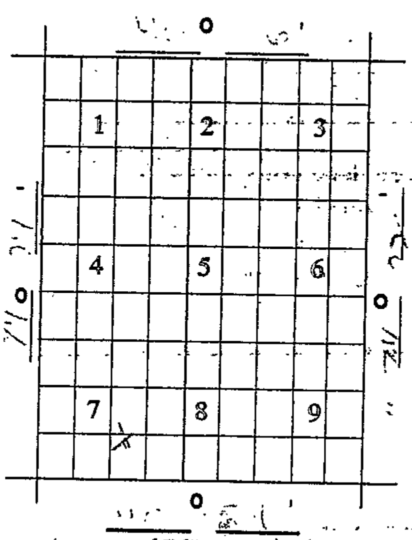
Maywood, NJ

Diameter of Well(s)	4 Inches	Proposed Depth of Well(s)	Feet
# of Wells Applied for (max. 10)	1	Will pumping equipment be utilized?	YES ☐ NO ☒
Type of Well (see reverse)	Monitoring	If Yes, give pump capacity	cumulative GPM

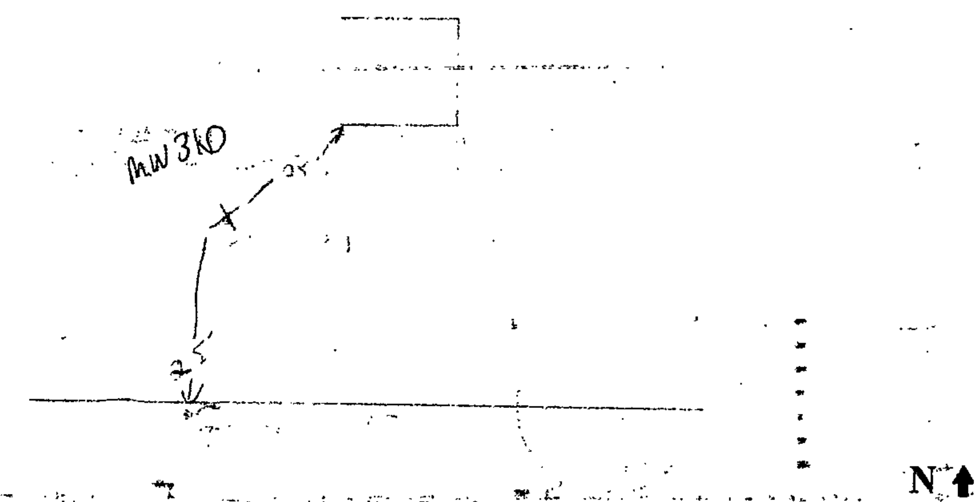
LOCATION OF WELL(S)

Lot #	Block #	Municipality	County
			Bergen

State Atlas Map No. 26



Draw sketch of well(s) nearest roads, buildings, etc. with marked distances in feet. Each well MUST be labeled with a name and/or number on the sketch.



FOR MONITORING WELLS, RECOVERY WELLS, OR PIEZOMETERS, THE FOLLOWING MUST BE COMPLETED BY THE APPLICANT. PLEASE INDICATE WHY THE WELLS ARE BEING INSTALLED:

- ☐ Spill Site
- ☐ ISRA Site
- ☐ CERCLA (Superfund) Site
- ☐ RCRA Site
- ☐ Underground Storage Tank Site
- ☐ Operational Ground Water Permit Site
- ☐ Pretreatment and Residuals Site
- ☐ Water and Hazardous Waste Enforcement Case
- ☐ Water Supply Aquifer Test Observation Well
- ☐ Other (explain)

CASE I.D. Number

This Space for Approval Stamp

WELL PERMIT APPROVED
N.J.D.E.P.
JAN 28 2003
BUREAU OF WATER ALLOCATION

FOR D.E.P. USE
☐ Issuance of this permit is subject to the conditions attached. (see next page)
☐ For monitoring purposes only
☐
☒ The well(s) may not be completed with more than 25 feet of total screen or uncased borehole.

SEE REVERSE SIDE FOR IMPORTANT PROVISIONS PERTAINING TO THIS PERMIT.
In compliance with N.J.S.A. 58:4A-14, application is made for a permit to drill a well as described above.

Date 1/22/03 Signature of Driller [illegible] Registration No. [illegible]

Signature of Property Owner [illegible]

DWR-138 M
8/00

New Jersey Department of Environmental Protection
Bureau of Water Allocation
MONITORING WELL RECORD

Well Permit No. 26 - 66774

Atlas Sheet Coordinates 26 : 03 : 379

OWNER IDENTIFICATION - Owner NICHOLS, MICHAEL & LORIAN
Address 37 GROVE AVE
City ROCHELLE PARK State NJ Zip Code 07607

WELL LOCATION - If not the same as owner please give address. Owner's Well No. MW 3 D
County BERGEN Municipality MAYWOOD BORO Lot No. 15 Block No. 15
Address 37 GROVE AVE

DATE WELL STARTED 2/12/03
DATE WELL COMPLETED 2/14/03

TYPE OF WELL (as per Well Permit Categories) MONITORING
Regulatory Program Requiring Well ______ Case I.D.# ______

CONSULTING FIRM/FIELD SUPERVISOR (if applicable) ______ Tele. # ______

WELL CONSTRUCTION
Total depth drilled 45 ft.
Well finished to 45 ft.

Borehole diameter:
Top 10 in.
Bottom 6 in.

Well was finished: ☐ above grade ☒ flush mounted

If finished above grade, casing height (stick up) above land surface ____ ft.

Was steel protective casing installed? ☒ Yes ☐ No

Static water level after drilling 7 ft.

Water level was measured using tape

Well was developed for ____ hours at ____ gpm

Method of development pump

Was permanent pumping equipment installed? ☐ Yes ☒ No

Pump capacity ____ gpm

Pump type: ____

Drilling Fluid — Type of Rig DRT4W

Health and Safety Plan submitted? ☒ Yes ☐ No

Level of Protection used on site (circle one) None D C B A

Note: Measure all depths from land surface	Depth to Top (ft.)	Depth to Bottom (ft.)	Diameter (inches)	Material	Wgt./Rating (lbs/sch no.)
Single/Inner Casing	+-3	20	6	Steel	19#
Middle Casing (for triple cased wells only)					
Outer Casing (largest diameter)	-3	15	10	Steel	Sch 40
Open Hole or Screen (No. Used)	20	45	6	Rock	
Blank Casings (No. Used)					
Tail Piece					
Gravel Pack					
Grout	0	20	ann	Neat Cement Bentonite	1000 lbs. ____ lbs.

Grouting Method Pressure
Drilling Method air Rotary

GEOLOGIC LOG

Note each depth where water was encountered in consolidated formations.

0-.5 Concrete base
.5-6 Tan/RD Sandy silt
6-9 RD/Brn silt/clay
9-10 weathered rock
10-17 Red Brunswick shale
17-32 Fracture
32-45 Fracture

I certify that I have constructed the above referenced well in accordance with all well permit requirements and applicable State rules and regulations.

Drilling Company B & B DRILLING, INC

Well Driller (Print) Douglas Myerchin

Driller's Signature Douglas Myerchin

Registration No. M1277 Date 3/28/03

AS-BUILT WELL LOCATION
(NAD 83 HORIZONTAL DATUM)
NJ STATE PLANE COORDINATE IN US SURVEY FEET

NORTHING: ______ EASTING: ______
OR
LATITUDE: __ ° __ ' __ . __ " LONGITUDE: __ ° __ ' __ . __ "

COPIES: White - DEP Canary - Driller Pink - Owner Goldenrod - Health Dept.

DWR-133M
11/01

Mail To:
NJDEP
BUREAU OF WATER ALLOCATION
PO BOX 426
TRENTON, NJ 08625-0426

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
TRENTON, NJ

34

MAR 2? 2003

MONITORING WELL PERMIT

VALID ONLY AFTER APPROVAL BY THE D.E.P.

Permit No. 2667268

COORD #: 26.03.379

Owner Scott Belvin

Address 57 Grove avenue

Rochelle Park NJ

Name of Facility Same

Address as above

Maywood [illegible]

Driller B&B Drilling Inc

Address P.O. Box 8U

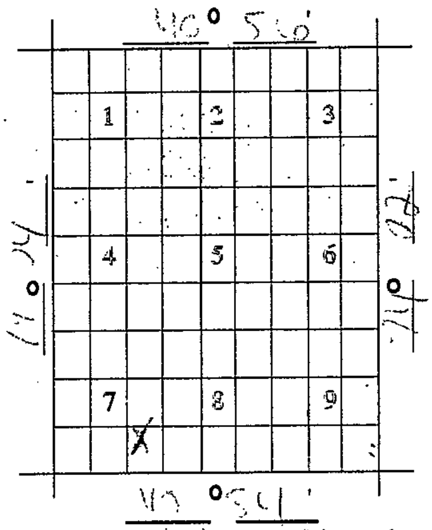
Netcong NJ 07856

Diameter of Well(s) 4 Inches	Proposed Depth of Well(s) 50 Feet		
# of Wells Applied for (max. 10) 1	Will pumping equipment be utilized? YES ☐ NO ☒		
Type of Well (see reverse) [illegible]	If Yes, give pump capacity ____ cumulative GPM		

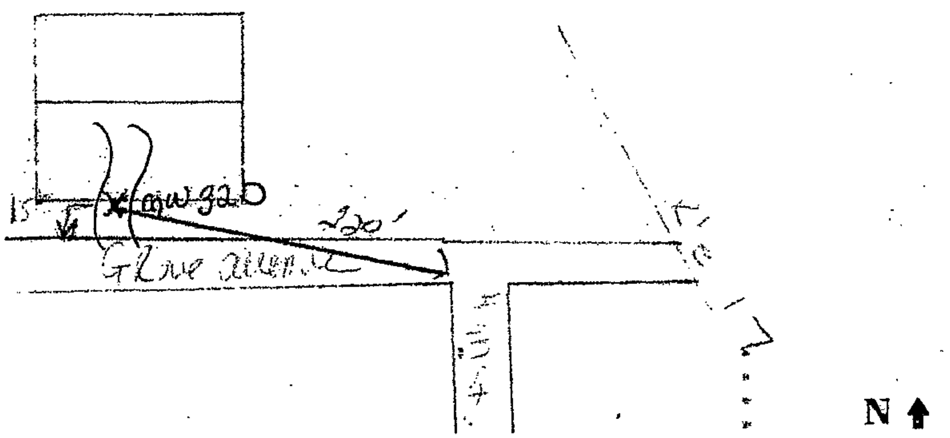
LOCATION OF WELL(S)

Lot #	Block #	Municipality	County
66	17.03	Maywood	Bergen

State Atlas Map No. 26



Draw sketch of well(s) nearest roads, buildings, etc. with marked distances in feet. Each well MUST be labeled with a name and/or number on the sketch.



PROPOSED WELL LOCATION (NAD 83 HORIZONTAL DATUM)
NJ STATE PLANE COORDINATE IN US SURVEY FEET

NORTHING: ________ OR EASTING: ________
LATITUDE: __° __' __" LONGITUDE: __° __' __"

FOR MONITORING WELLS, RECOVERY WELLS, OR PIEZOMETERS, THE FOLLOWING MUST BE COMPLETED BY THE APPLICANT. PLEASE INDICATE WHY THE WELLS ARE BEING INSTALLED:

- ☐ RCRA Site
- ☐ Underground Storage Tank Site
- ☐ Operational Ground Water Permit Site
- ☐ Pretreatment and Residuals Site
- ☐ Water and Hazardous Waste Enforcement Case
- ☐ Water Supply Aquifer Test Observation Well
- ☐ Other (explain) ________
- ☐ Spill Site
- ☐ ISRA Site
- ☒ CERCLA (Superfund) Site

CASE I.D. Number ________

This Space for Approval Stamp

MAR 18 2003
BUREAU OF WATER ALLOC

FOR D.E.P. USE ☐ Issuance of this permit is subject to the conditions attached. (see next page) ☒ For monitoring purposes only
☐ ________

SEE REVERSE SIDE FOR IMPORTANT PROVISIONS PERTAINING TO THIS PERMIT.
In compliance with N.J.S.A.58:4A-14, application is made for a permit to drill a well as described above.

Date 1/13/03 Signature of Driller ________ Registration No. M977

Signature of Property Owner [signature]

COPIES: Water Allocation - White Health Dept. - Yellow Owner - Blue Driller - White

DWR-138 M
8/00

New Jersey Department of Environmental Protection
Bureau of Water Allocation

MONITORING WELL RECORD

Well Permit No. 26 57268

Atlas Sheet Coordinates 26 : 03 : 379

OWNER IDENTIFICATION - Owner BELVIN, SCOTT
Address 58 GROVE AVE
City ROCHELLE PARK State NJ Zip Code

WELL LOCATION - If not the same as owner please give address. Owner's Well No. MW 32D
County BERGEN Municipality MAYWOOD BORO Lot No. 66 Block No. 17.03
Address 58 GROVE AVE
DATE WELL STARTED 5/2/03
DATE WELL COMPLETED 5/5/03

TYPE OF WELL (as per Well Permit Categories) MONITORING
Regulatory Program Requiring Well Case I.D.#

CONSULTING FIRM/FIELD SUPERVISOR (if applicable) Tele. #

WELL CONSTRUCTION

Total depth drilled 57 ft.
Well finished to 57 ft.

Borehole diameter:
Top 10 in.
Bottom 10 in.

Well was finished: ☐ above grade ☐ flush mounted

If finished above grade, casing height (stick up) above land surface ______ ft.

Was steel protective casing installed? ☐ Yes ☐ No

Static water level after drilling ______ ft.

Water level was measured using ______

Well was developed for ______ hours at ______ gpm

Note: Measure all depths – from land surface	Depth to Top (ft.)	Depth to Bottom (ft.)	Diameter (inches)	Material	Wgt./Rating (lbs/sch no.)
Single/Inner Casing	0	32	6	Steel	18#
Middle Casing (for triple cased wells only)					
Outer Casing (largest diameter)	0	20	10	Steel	Sch 40
Open Hole or Screen (No. Used)	32	57	6	open hole	
Blank Casings (No. Used)					
Tail Piece					
Gravel Pack					
Grout	0	32	200	Neat Cement Bentonite	1000 lbs. ______ lbs.

Grouting Method Pressure
Drilling Method air rotary

Method of development ______

Was permanent pumping equipment installed? ☐ Yes ☒ No

Pump capacity ______ gpm

Pump type: ______

Drilling Fluid ______ Type of Rig IITUW

Health and Safety Plan submitted? ☐ Yes ☐ No

Level of Protection used on site (circle one) None D C B A

GEOLOGIC LOG

Note each depth where water was encountered in consolidated formations.

0 - .5' concrete/Base
.5 - 6' Sand/Silt
6 - 9' S.H/clay
9 - 17' Brunswick Shale
17 - 57' S.A.A.

I certify that I have constructed the above referenced well in accordance with all well permit requirements and applicable State rules and regulations.

Drilling Company B & B DRILLING, INC

Well Driller (Print) Douglas Myerchin

Driller's Signature Douglas Myerchin

Registration No. M1977 Date 6/5/03

AS-BUILT WELL LOCATION
(NAD 83 HORIZONTAL DATUM)
NJ STATE PLANE COORDINATE IN US SURVEY FEET

NORTHING: ______ EASTING: ______
OR
LATITUDE: __ ° __ ' __ . __ " LONGITUDE: __ ° __ ' __ . __ "

COPIES: White - DEP Canary - Driller Pink - Owner Goldenrod - Health Dept.

DWR-133M
2/00

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
TRENTON, NJ

MONITORING WELL PERMIT 54

Permit No. 266521 8

VALID ONLY AFTER APPROVAL BY THE D.E.P.

Mail To:
NJDEP
BUREAU OF WATER ALLOCATION
PO BOX 426
TRENTON, NJ 08625-0426

COORD #: 26 : 03 : 2 : 98

Owner US EPA c/o The Shaw Group Inc
Address 100 W. Hunter Avenue
Maywood NJ 07607

Driller B+B Drilling Inc
Address P.O. Box 8
Netcong NJ 07857

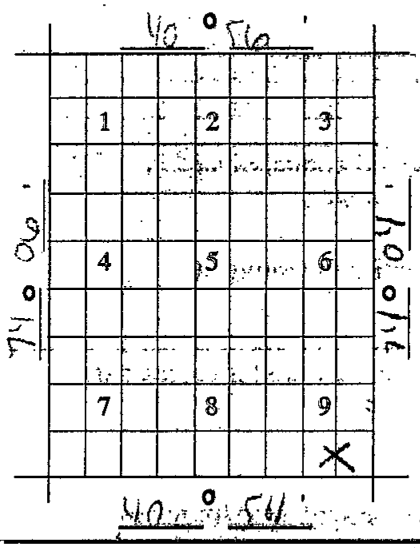
Name of Facility Maywood Chemical Superfund Site
Address Grove Avenue
Rochelle Park NJ

Diameter of Well(s) 6 Inches	Proposed Depth of Well(s) 50 Feet
# of Wells Applied for (max. 10) 1	Will pumping equipment be utilized? YES ☐ NO ☑
Type of Well (see reverse) Monitoring	If Yes, give pump capacity — cumulative GPM

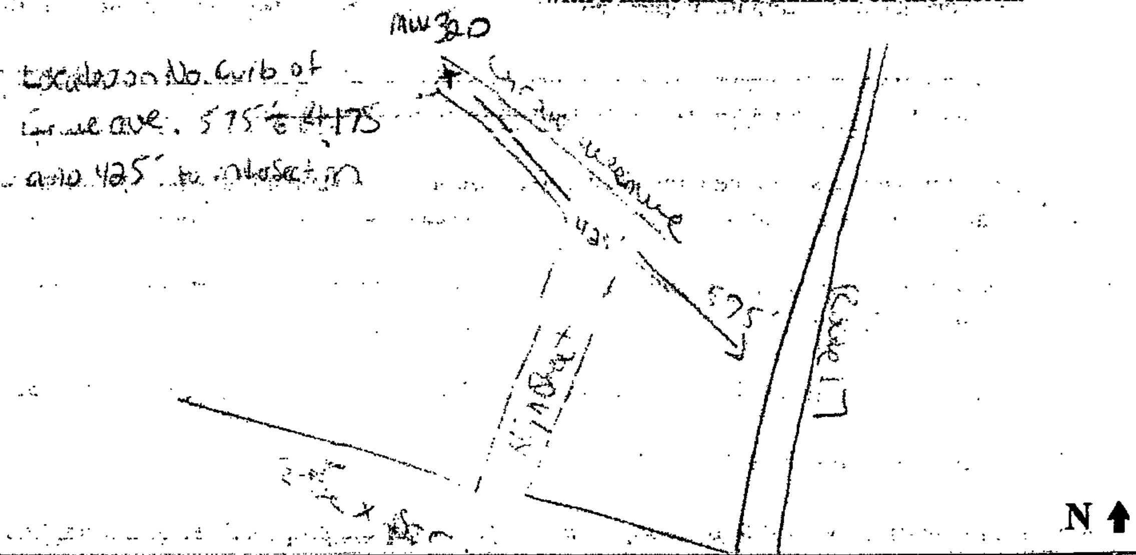
LOCATION OF WELL(S)

Lot #	Block #	Municipality	County
N/a	N/a	Rochelle Park	Bergen

State Atlas Map No. 26



Draw sketch of well(s) nearest roads, buildings, etc. with marked distances in feet. Each well MUST be labeled with a name and/or number on the sketch.



FOR MONITORING WELLS, RECOVERY WELLS, OR PIEZOMETERS, THE FOLLOWING MUST BE COMPLETED BY THE APPLICANT. PLEASE INDICATE WHY THE WELLS ARE BEING INSTALLED:

- ☐ Spill Site
- ☐ ISRA Site
- ☑ CERCLA (Superfund) Site
- ☐ RCRA Site
- ☐ Underground Storage Tank Site
- ☐ Operational Ground Water Permit Site
- ☐ Pretreatment and Residuals Site
- ☐ Water and Hazardous Waste Enforcement Case
- ☐ Water Supply Aquifer Test Observation Well
- ☐ Other (explain)

CASE I.D. Number

This Space for Approval Stamp

WELL PERMIT APPROVED
N.J.D.E.P.
JUL 19 2002
BUREAU OF WATER ALLOCATION

FOR D.E.P. USE	☑ Issuance of this permit is subject to the conditions attached. (see next page) ☐ For monitoring purposes only ☐	☑ The well(s) may not be completed with more than 25 feet of total screen or uncased borehole.

SEE REVERSE SIDE FOR IMPORTANT PROVISIONS PERTAINING TO THIS PERMIT.
In compliance with N.J.S.A.58:4A-14, application is made for a permit to drill a well as described above.

Date 7/15/02 Signature of Driller Douglas Nyerick Jr Registration No. 11277

Signature of Property Owner Robert Zeman, ?

DWR-138 M
8/00

New Jersey Department of Environmental Protection
Bureau of Water Allocation
MONITORING WELL RECORD

Well Permit No. 26 - 65218

Atlas Sheet Coordinates 26 : 03 : 298

OWNER IDENTIFICATION - Owner USEPA C/O SHAW GROUP INC
Address 100 W HUNTER AVE
City MAYWOOD State NJ Zip Code 07607

WELL LOCATION - If not the same as owner please give address. Owner's Well No. MW34D
County BERGEN Municipality ROCHELLE PARK T Lot No. N/A Block No. N/A
Address GROVE AVENUE
DATE WELL STARTED 9/12/02
DATE WELL COMPLETED 9/16/02
TYPE OF WELL (as per Well Permit Categories) MONITORING
Regulatory Program Requiring Well ______ Case I.D.# ______

CONSULTING FIRM/FIELD SUPERVISOR (if applicable) ______ Tele. # ______

WELL CONSTRUCTION

Total depth drilled 53 ft.
Well finished to 53 ft.

Borehole diameter:
Top 10 in.
Bottom 6 in.

Well was finished: ☒ above grade ☐ flush mounted

If finished above grade, casing height (stick up) above land surface 2 ft.

Was steel protective casing installed? ☒ Yes ☐ No

Static water level after drilling ______ ft.

Water level was measured using ______

Well was developed for ______ hours at ______ gpm

Note: Measure all depths from land surface	Depth to Top (ft.)	Depth to Bottom (ft.)	Diameter (inches)	Material	Wgt./Rating (lbs/sch no.)
Single/Inner Casing	+2	28	6	Steel	19#
Middle Casing (for triple cased wells only)					
Outer Casing (largest diameter)	0	18	10	Steel	sch 40
Open Hole or Screen (No. Used)	28	53	6	Bedrock	
Blank Casings (No. Used)					
Tail Piece					
Gravel Pack					
Grout	0	28	ann	Neat Cement Bentonite	900 lbs. ____ lbs.

Grouting Method Pressure
Drilling Method Air Rotary

Method of development ______

Was permanent pumping equipment installed? ☐ Yes ☒ No

Pump capacity ______ gpm

Pump type: ______

Drilling Fluid — Type of Rig IRT4W

Health and Safety Plan submitted? ☒ Yes ☐ No

Level of Protection used on site (circle one) None D C B A

I certify that I have constructed the above referenced well in accordance with all well permit requirements and applicable State rules and regulations.

Drilling Company B & B DRILLING, INC

Well Driller (Print) Douglas Myerchin

Driller's Signature [signature]

Registration No. M1277 Date 9/21/02

GEOLOGIC LOG

Note each depth where water was encountered in consolidated formations.

0-6 Crushed Stone - Mulch
6-18 F/C Sand, Silt, Clay
18-53 Bedrock - Silt Sandstone

AS-BUILT WELL LOCATION
(NAD 83 HORIZONTAL DATUM)
NJ STATE PLANE COORDINATE IN US SURVEY FEET

NORTHING: ______ EASTING: ______
OR
LATITUDE: __ ° __ ' __ . __ " LONGITUDE: __ ° __ ' __ . __ "

COPIES: White - DEP Canary - Driller Pink - Owner Goldenrod - Health Dept.

APPENDIX C

Boring Logs and Monitoring Well Construction Logs - RI Addendum Wells

APPENDIX C.1

BORING LOGS FOR RI ADDENDUM WELLS

HTRW DRILLING LOG	DISTRICT New York District		HOLE NUMBER MW-27D
1. COMPANY NAME Stone & Webster	2. DRILLING SUBCONTRACTOR B & B Drilling		SHEET 1 OF SHEETS 3
3. PROJECT Maywood		4. LOCATION MISS	
5. NAME OF DRILLER Doug Myerchin		6. MANUFACTURERS DESIGNATION OF DRILL T-4 Air Rotary Rig	
7. SIZE AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	10" Air Hammer 6" Air Hammer	8. HOLE LOCATION Apprximately 200' NE of MW-26D	
		9. SURFACE ELEVATION 62.68	
		10. DATE STARTED 08/06/2002	11. DATE COMPLETED 08/09/2002
12. OVERBURDEN THICKNESS	20'	15. DEPTH GROUNDWATER ENCOUNTERED Approx. 28-30' bgs in bedrock	
13. DEPTH DRILLED INTO ROCK	35.5'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLINGCOMPLETED 18.45 (8-14-02)	
14. TOTAL DEPTH OF HOLE	58.5'	17. OTHER WATER LEVEL MEASURMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES		
No			No		
20. SAMPLES FOR CHEMICAL ANALYSIS		VOC	METALS	OTHER (SPECIFY)	21. CORE RECOVERY %
Groundwater		Yes			
22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL		OTHER (SPECIFY)	SIGNATURE OF INSPECTOR
		Stickup			

LOCATION SKETCH / COMMENTS SCALE: 1" = 65'

PROJECT	HOLE NUMBER
MAYWOOD FUSRAP	MW-27D

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER MW-27D

PROJECT Maywood

INSPECTOR Sal Kokol

SHEET 2 OF 3 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX #	ANALYTICAL SAMPLE #	BLOW COUNTS	REMARKS
	0	Fill comprised of Gray, Brown, Black Sand, Silt, Gravel Sand is Coarse					
	5'	Brown, tan coarse to medium fine Sand & Silt					
		Occassional Gray/White clumps of Clay					Possibly ash material
	10'						
							Moisture on rods noted
		Brown/Black silty Sand w/gray clumps					
	15'						
	20'	Top of Rock @ 20'					
							air hammer rate of 1 ft/2 min.
		Red/brown siltstone w/friable standstone					
	25'						
	30'						
							Casing set @ 33.5' Open hole to 58.5'
	35'						
		Red/Brown medium to fine grained					
	40'	sandstone & siltstone					
	45'						

PROJECT MAYWOOD FUSRAP

HOLE NUMBER MW-27D

HTRW DRILLING LOG (CONTINUATION SHEET)							HOLE NUMBER MW-27D
PROJECT Maywood			INSPECTOR Sal Kokol				SHEET 3 OF 3 SHEETS
ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX #	ANALYTICAL SAMPLE #	BLOW COUNTS	REMARKS
	45'						
	50'						
	55'						
		EOB @ 58.5'					
	60'						
	65'						
	70'						
	75'						
	80'						
	85'						
	90'						

HTRW DRILLING LOG	DISTRICT New York District		HOLE NUMBER MW-28D
1. COMPANY NAME Stone & Webster	2. DRILLING SUBCONTRACTOR B & B Drilling		SHEET 1 OF 2 SHEETS
3. PROJECT Maywood	4. LOCATION MISS		
5. NAME OF DRILLER Doug Myerchin	6. MANUFACTURERS DESIGNATION OF DRILL T-4 Air Rotary Rig		
7. SIZE AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 10" Air Hammer; 6" Air Hammer	8. HOLE LOCATION Apprximately 160' East of MW-26D		
	9. SURFACE ELEVATION 61.9		
	10. DATE STARTED 08/07/2002		11. DATE COMPLETED 08/12/2002
12. OVERBURDEN THICKNESS 20'	15. DEPTH GROUNDWATER ENCOUNTERED Approx. 47' bgs in bedrock		
13. DEPTH DRILLED INTO ROCK 37'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLINGCOMPLETED 18.45 (8-14-02)		
14. TOTAL DEPTH OF HOLE 57'	17. OTHER WATER LEVEL MEASURMENTS (SPECIFY)		
18. GEOTECHNICAL SAMPLES: No | DISTURBED | UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES No		
20. SAMPLES FOR CHEMICAL ANALYSIS: Groundwater | VOC: Yes	METALS	OTHER (SPECIFY)	21. CORE RECOVERY %
22. DISPOSITION OF HOLE | BACKFILLED | MONITORING WELL: Stickup		OTHER (SPECIFY)	SIGNATURE OF INSPECTOR

LOCATION SKETCH / COMMENTS SCALE: 1" = 65'

PROJECT	HOLE NUMBER
MAYWOOD FUSRAP	MW-28D

HTRW DRILLING LOG (CONTINUATION SHEET)							HOLE NUMBER MW-28D
PROJECT Maywood			INSPECTOR Sal Kokol				SHEET 2 OF 2 SHEETS
ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX #	ANALYTICAL SAMPLE #	BLOW COUNTS	REMARKS
	0	Ground Surface Fill: Crushed rock, mulch, sand, silt.					
	5'	Overburden Tan/brown cmf SAND, trace silt, trace gravel.					
	10'	Black/Brown SAND, w/clay clumps					
	15'	Red-brown dense sand & silt, tr. gravel					
	20'	Top of rock @ 20' bgs					Surfactant odor detected 22-32 feet bgs
	25'	Red/brown medium to fine grained SS/occasional silt stone					
	30'	fragments.					Casing set @ 32' bgs Open hole to 57'
	35'						
	40'	Red/Brown medium to fine grained sandstone & siltstone					
	45'						First water @ 47'
	50'						
	55'						
		E.O.B @ 57'					

HTRW DRILLING LOG

HTRW DRILLING LOG	DISTRICT New York District			HOLE NUMBER MW-31D
1. COMPANY NAME Shaw E&I	2. DRILLING SUBCONTRACTOR B & B Drilling			SHEET 1 OF SHEETS 2
3. PROJECT Maywood		4. LOCATION 37 Grove Avenue, Rochelle Park		
5. NAME OF DRILLER Doug Myerchin		6. MANUFACTURERS DESIGNATION OF DRILL T-4 Air Rotary Rig		
7. SIZE AND TYPES OF DRILLING AND SAMPLING EQUIPMENT 10" Air Hammer 6" Air Hammer		8. HOLE LOCATION Apprximately 375' southwest of B38W17B		
		9. SURFACE ELEVATION 49.08		
		10. DATE STARTED 02/12/2003		11. DATE COMPLETED 02/14/2003
12. OVERBURDEN THICKNESS 10'		15. DEPTH GROUNDWATER ENCOUNTERED 8' bgs (2-14-03)		
13. DEPTH DRILLED INTO ROCK 35'		16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLINGCOMPLETED 6.70 (2/21/03)		
14. TOTAL DEPTH OF HOLE 45'		17. OTHER WATER LEVEL MEASURMENTS (SPECIFY)		
18. GEOTECHNICAL SAMPLES No	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES No	
20. SAMPLES FOR CHEMICAL ANALYSIS Groundwater	VOC Yes	METALS	OTHER (SPECIFY)	21. CORE RECOVERY %
22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL Flushmount	OTHER (SPECIFY)	SIGNATURE OF INSPECTOR

LOCATION SKETCH / COMMENTS SCALE: 1" = 80'

PROJECT MAYWOOD FUSRAP	HOLE NUMBER MW-31D

HTRW DRILLING LOG (CONTINUATION SHEET)							HOLE NUMBER MW-31D
PROJECT Maywood			INSPECTOR Sal Kokol				SHEET 2 OF 2 SHEETS
ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX #	ANALYTICAL SAMPLE #	BLOW COUNTS	REMARKS
	0	Concrete and subbase veneer Brown/Reddish Brown, coarse to medium Sand, little silt, little gravel w/rock frag.					
	5'						
	10'	medium to coarse Sand, gravel with tr. Silt and clay Top of rock @ 12' bgs Dark Brown/Red medium to fine grained sandstone					
							Fracture producing water @ 17'-18'
	20'						6-in. Casing set @ 20' bgs Open hole from 20'-45' bgs
	30'						Fracture producing water @ 32'-35' Well producing significant water from 35'-45'
	40						
		E.O.B @ 45'					
	50						
PROJECT MAYWOOD FUSRAP							HOLE NUMBER MW-31D

HTRW DRILLING LOG

HTRW DRILLING LOG	DISTRICT New York District	HOLE NUMBER MW-32D
1. COMPANY NAME Shaw E&I	2. DRILLING SUBCONTRACTOR B & B Drilling	SHEET 1 OF 2 SHEETS

3. PROJECT Maywood	4. LOCATION Rochelle Park
5. NAME OF DRILLER Doug Myerchin	6. MANUFACTURERS DESIGNATION OF DRILL T-4 Air Rotary Rig
7. SIZE AND TYPES OF DRILLING AND SAMPLING EQUIPMENT 10" Air Hammer 6" Air Hammer	8. HOLE LOCATION Apprximately 150 ' northwest of B38W17B
	9. SURFACE ELEVATION 49.18
	10. DATE STARTED 05/02/2003 / 11. DATE COMPLETED 05/05/2003
12. OVERBURDEN THICKNESS 18'	15. DEPTH GROUNDWATER ENCOUNTERED 8' bgs
13. DEPTH DRILLED INTO ROCK 39'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLINGCOMPLETED 6.10 (5/5/03)
14. TOTAL DEPTH OF HOLE 57'	17. OTHER WATER LEVEL MEASURMENTS (SPECIFY)

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES		
No			No		
20. SAMPLES FOR CHEMICAL ANALYSIS		**VOC**	**METALS**	**OTHER (SPECIFY)**	**21. CORE RECOVERY %**
Groundwater		Yes			
22. DISPOSITION OF HOLE	**BACKFILLED**	**MONITORING WELL**		**OTHER (SPECIFY)**	**SIGNATURE OF INSPECTOR**
		Flushmount			

LOCATION SKETCH / COMMENTS SCALE: 1" = 80"

PROJECT	HOLE NUMBER
MAYWOOD FUSRAP	MW-32D

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER MW-32D

PROJECT Maywood

INSPECTOR Rob DeMott & Kevin Cote

SHEET 2 OF 2 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX #	ANALYTICAL SAMPLE #	BLOW COUNTS	REMARKS
	0	Concrete and sub-base sand to 18" Dry, Red-brown fine to medium sand and silt					
	10	Wet, medium to coarse red/brown sand w/some silt					
	20	Top of Rock @ 18' Red-brown siltstone and fine-grained sandstone					water encountered @ 20'
	30						Fracture @ 25' 6" casing set @ 32' bgs Open hole to 57' From 35'-45' advanced approx. 1'/min.
	40						
	50						Fracture @ 47' 50' -55' advanced approx. 1'/2 min.
	60	EOB @ 57'					

HTRW DRILLING LOG

HTRW DRILLING LOG	DISTRICT New York District	HOLE NUMBER MW-33D
1. COMPANY NAME Stone & Webster	2. DRILLING SUBCONTRACTOR B & B Drilling	SHEET 1 OF 3 SHEETS

3. PROJECT Maywood	4. LOCATION MISS
5. NAME OF DRILLER Doug Myerchin	6. MANUFACTURERS DESIGNATION OF DRILL T-4 Air Rotary Rig
7. SIZE AND TYPES OF DRILLING AND SAMPLING EQUIPMENT 10" Air Hammer 6" Air Hammer	8. HOLE LOCATION NE Corner of Temp. Building
	9. SURFACE ELEVATION 59.44
	10. DATE STARTED 09/10/2002 — 11. DATE COMPLETED 09/12/2002
12. OVERBURDEN THICKNESS 20'	15. DEPTH GROUNDWATER ENCOUNTERED Apprximately 16'
13. DEPTH DRILLED INTO ROCK 48'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLINGCOMPLETED 12.70 (9/13/02)
14. TOTAL DEPTH OF HOLE 68'	17. OTHER WATER LEVEL MEASURMENTS (SPECIFY)

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
No			None

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	21. CORE RECOVERY %
Groundwater	Yes			

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	SIGNATURE OF INSPECTOR
		Stickup		

LOCATION SKETCH / COMMENTS SCALE: 1" = 65'

PROJECT	HOLE NUMBER
MAYWOOD FUSRAP	MW-33D

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT Maywood

INSPECTOR Sal Kokol

HOLE NUMBER MW-33D

SHEET 2 OF 3 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX #	ANALYTICAL SAMPLE #	BLOW COUNTS	REMARKS
	0	Ground Surface					
		Fill: Gravel, crushed rock.					
	5'						
		Color of sed. Black from 8'-21'					
	10'	Brown cmf SAND,silt, wood fragments from 10'-20'					Wood may be related to roots or old rail road ties.
	15'						Moist at 16'
	20'	Fractured Bedrock at 20'					Top of Rock
	25'	Competent bedrock at 25' Redish brown medium to fine grained SS					Upper bedrock section appears fractured.
	30'	Soft/fractured medium to fine grained sandstone, some siltstone (31'-38')					
	35'						
	40'	Soft medium to fine grained Sandstone					Set 6" ID casing in competent rock @ 38'

PROJECT MAYWOOD FUSRAP

HOLE NUMBER MW-33D

HTRW DRILLING LOG (CONTINUATION SHEET)							HOLE NUMBER MW-33D
PROJECT Maywood			INSPECTOR Sal Kokol				SHEET 3 OF 3 SHEETS
ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX #	ANALYTICAL SAMPLE #	BLOW COUNTS	REMARKS
	45'	Soft medium to fine grained Sandstone					
	50'						Fractured/soft fine SS/silt stone to 68'
		Soft fine Sandstone & Siltstone					Installed 2" PVC screen/ filter pack from 43 to 68'
	55'						
		Soft fine Sandstone & Siltstone					
	60'						
		Soft fine Sandstone & Siltstone					
	65'						
		E.O.B. @ 68'					
	70'						

HTRW DRILLING LOG

HTRW DRILLING LOG	DISTRICT New York	HOLE NUMBER MW-34D
1. COMPANY NAME Stone & Webster	2. DRILLING SUBCONTRACTOR B & B Drilling	SHEET 1 OF 2 SHEETS

3. PROJECT Maywood	4. LOCATION MISS
5. NAME OF DRILLER Doug Myerchin	6. MANUFACTURERS DESIGNATION OF DRILL T-4 Air Rotary Rig
7. SIZE AND TYPES OF DRILLING AND SAMPLING EQUIPMENT 10" Air Hammer	8. HOLE LOCATION Apprximately 60' East of MW-26D
6" Air Hammer	9. SURFACE ELEVATION 58.35
	10. DATE STARTED 09/12/2002 / 11. DATE COMPLETED 09/16/2002
12. OVERBURDEN THICKNESS 18'	15. DEPTH GROUNDWATER ENCOUNTERED Apprximately 14'
13. DEPTH DRILLED INTO ROCK 35'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLINGCOMPLETED 10.04 (9/17/02)
14. TOTAL DEPTH OF HOLE 53'	17. OTHER WATER LEVEL MEASURMENTS (SPECIFY)

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES		
			None		
20. SAMPLES FOR CHEMICAL ANALYSIS		VOC	METALS	OTHER (SPECIFY)	21. CORE RECOVERY %
GROUNDWATER		Yes			
22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL		OTHER (SPECIFY)	SIGNATURE OF INSPECTOR
		Stickup			

LOCATION SKETCH / COMMENTS SCALE: 1' = 65'

PROJECT	HOLE NUMBER
MAYWOOD FUSRAP	MW-34D

HTRW DRILLING LOG (CONTINUATION SHEET)							HOLE NUMBER	MW-34D
PROJECT	Maywood		INSPECTOR	Sal Kokol				
							SHEET	SHEETS
			FIELD	GEOTECH	ANALYTICAL		2 OF 2	
ELEV.	DEPTH	DESCRIPTION OF MATERIALS	SCREENING	SAMPLE OR	SAMPLE #	BLOW COUNTS	REMARKS	
			RESULTS	CORE BOX #				
	0	Ground Surface Fill: Crushed rock, mulch, sand, silt.						
	5'	Reddish brown cmf SAND, little silt, trace gravel, trace clay.						
	10'							
	15'							
		Gravel/weathered rock interface - angular c to med gravel (sandstone fragments) mixed w/sand & some silt Competent bedrock at 19' Red/Dk. Brn m-f grained Sandstone, possibly mixed w/silty Sandstone at different					Top of Rock @ 18'	
	20'	horizons						
		m-f Sandstone with finer sandy & silty horizons - finer w/depth						
	25'						Six-inch casing to 28' Open rock hole to 53'	
	35'							
	45'							
		Silt and shale chips at 51'-52' E.O.B @53'						
	55'							
PROJECT		MAYWOOD FUSRAP					HOLE NUMBER MW-34D	

APPENDIX C.2

MONITORING WELL CONSTRUCTION FORMS FOR RI ADDENDUM WELLS

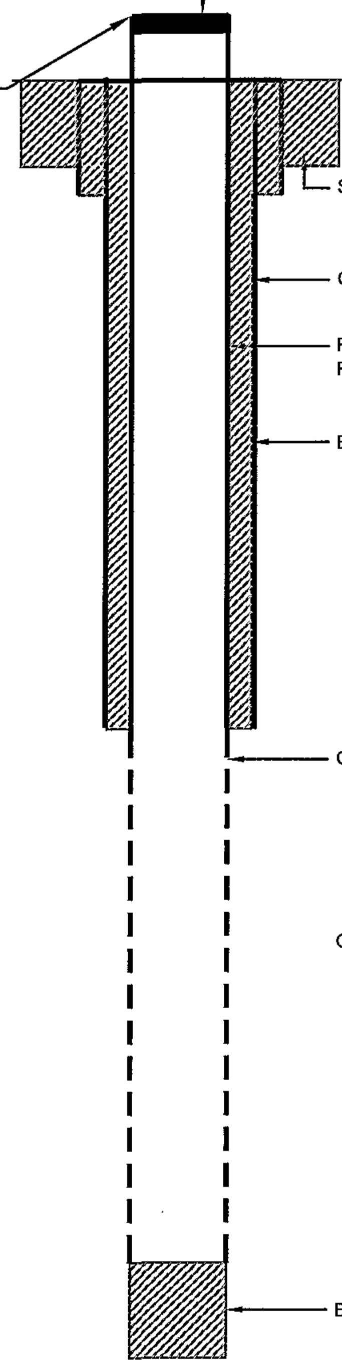
SHAW ENVIRONMENTAL & INFRASTRUCTURE

MW-27D

Project:	FUSRAP MAYWOOD SUPERFUND SITE	**Job Number:**	
Client:	Shaw Environmental & Infrastructure	**Date:**	08/6-8/9/02
Subcontractor:	B&B Drilling		
Drilling Method:	Air rotary		
Development Method:	Air & electrosubmersible pump		
Construction Dates:	08/06/02	**to**	08/9/02

Type of Measuring Point	**Elevation (NGVD)**
GROUND SURFACE:	62.68
TOP OF INNER CASING:	N/A
TOP OF CASING (OUTER IF APPLICABLE):	65.16

Item	**Depth, below Measuring Point (ft)**	**Elevation (ft)**
Top of Casing	+2.48	65.16
Grade	0.00	62.68
Top of Bedrock	20.00	42.68
Top of Open Hole	33.50	29.18
Base of Open Hole	58.50	4.18
Total Depth	58.50	4.18



Description	
Surface Seal Type:	Concrete
Grout Type:	Cement-bentonite
Riser Pipe Type:	Black Steel
Riser Pipe ID:	6 (in.)
Borehole Diameter:	10 (in.)
Open Hole Diameter:	6 (in.)
Open Hole Length (ft):	25.00 (ft)
Backfill/Grout:	NA

Notes: Developed by airlifing, surge and pumping.

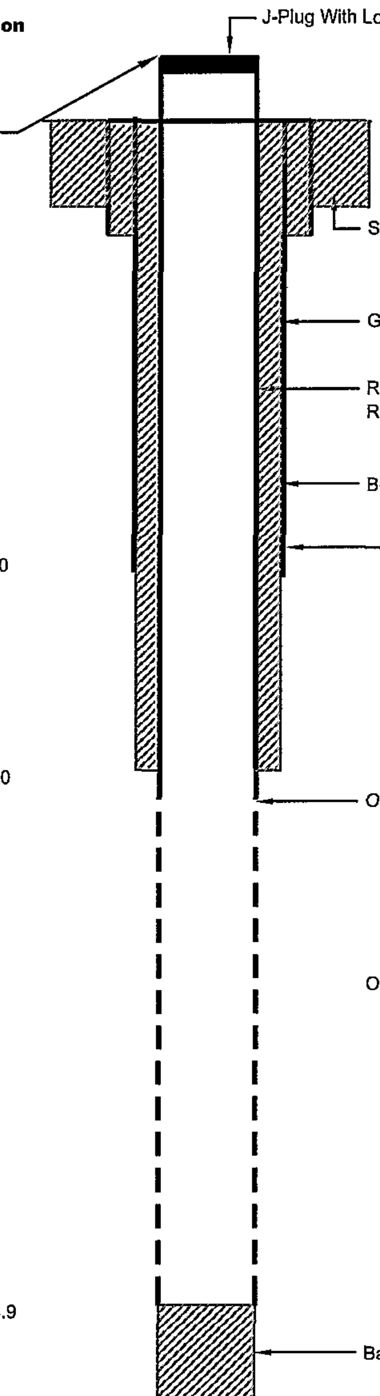
\\Bosfs01\Maywood\Maywood\Task0515\drawings\MW-28D.dwg

SHAW ENVIRONMENTAL & INFRASTRUCTURE

Project: FUSRAP MAYWOOD SUPERFUND SITE	**Job Number:**	**MW-28D**
Client: Shaw Environmental & Infrastructure	**Date:** 08/7-8/12/02	**Subcontractor:**

Drilling Method:	Air rotary		**Type of Measuring Point**	**Elevation (NGVD)**
Development Method:	Air & electrosubmersible pump		GROUND SURFACE:	61.9
			TOP OF INNER CASING:	N/A
Construction Dates:	08/07/02	**to** 08/12/02	TOP OF CASING (OUTER IF APPLICABLE):	64.5

Item	**Depth, below Measuring Point (ft)**	**Elevation (ft)**
Top of Casing	+2.6	64.5
Grade	0.00	61.9
Top of Bedrock	20.00	41.90
Top of Open Hole	32.00	29.90
Base of Open Hole	57.00	4.9
Total Depth	57.00	4.9



Description

Surface Seal Type:	Concrete
Grout Type:	Cement-bentonite
Riser Pipe Type:	Black Steel
Riser Pipe ID:	6 (in.)
Borehole Diameter:	10 (in.)
Casing Type:	Black Steel
Casing ID:	10 (in.)
Open Hole Diameter:	6 (in.)
Open Hole Length (ft):	25.00 (ft)
Backfill/Grout:	NA

Note: Temporarty 10" ID drive casing could not be pulled and was left in place.

Notes: Developed by airlifing, surge and pumping.

\\Bosfs01\Maywood\Maywood\Task0515\drawings\MW-28D.dwg

SHAW ENVIRONMENTAL & INFRASTRUCTURE

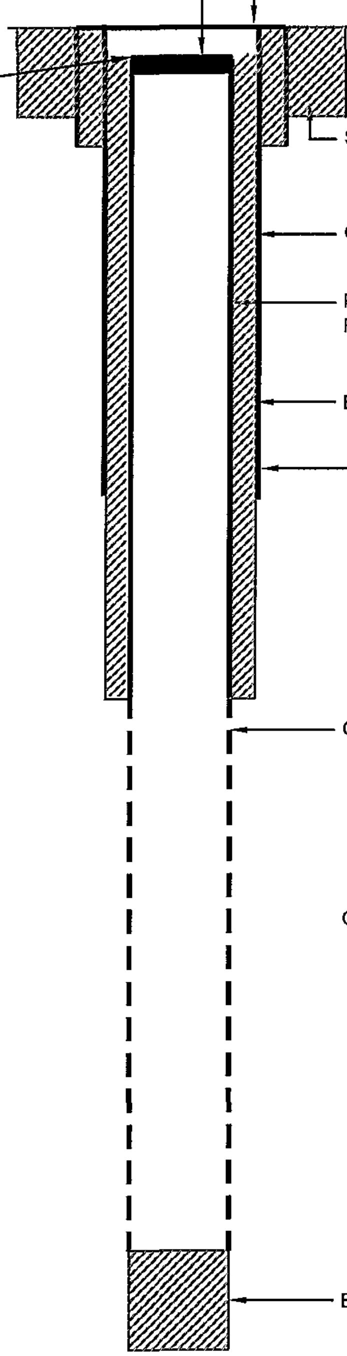
MW-31D

Project:	FUSRAP MAYWOOD SUPERFUND SITE	**Job Number:**	
Client:	Shaw Environmental & Infrastructure	**Date:**	02/12-2/14/03
Drilling Method:	Air rotary		
Development Method:	Air and electrosubmersible pump		
Construction Dates:	02/12/03	**to**	02/14/03

Subcontractor: B&B Drilling

Type of Measuring Point	**Elevation (NGVD)**
GROUND SURFACE:	49.08
TOP OF INNER CASING:	48.62
TOP OF CASING (OUTER IF APPLICABLE):	49.08

Item	**Depth, below Measuring Point (ft)**	**Elevation (ft)**
Grade/Top of Casing (Outer)	0.00	49.08
Top of Inner Casing	0.46	48.62
Top of Bedrock	10.00	39.08
Top of Open Hole	20.00	29.08
Base of Open Hole	45.00	4.08
Total Depth	45.00	4.08



Description	
Flushmount Diameter	12 (in.)
Surface Seal Type:	Concrete
Grout Type:	Cement-bentonite
Riser Pipe Type:	Black Steel
Riser Pipe ID:	6 (in.)
Borehole Diameter:	10 (in.)
Casing Type:	Black Steel
Casing ID:	10 (in.)
Open Hole Diameter:	6 (in.)
Open Hole Length (ft):	25.00 (ft)
Backfill/Grout:	NA

Note: Temporarty 10" ID drive casing could not be pulled and was left in place.

Notes: Developed by airlifing, surge and pumping.

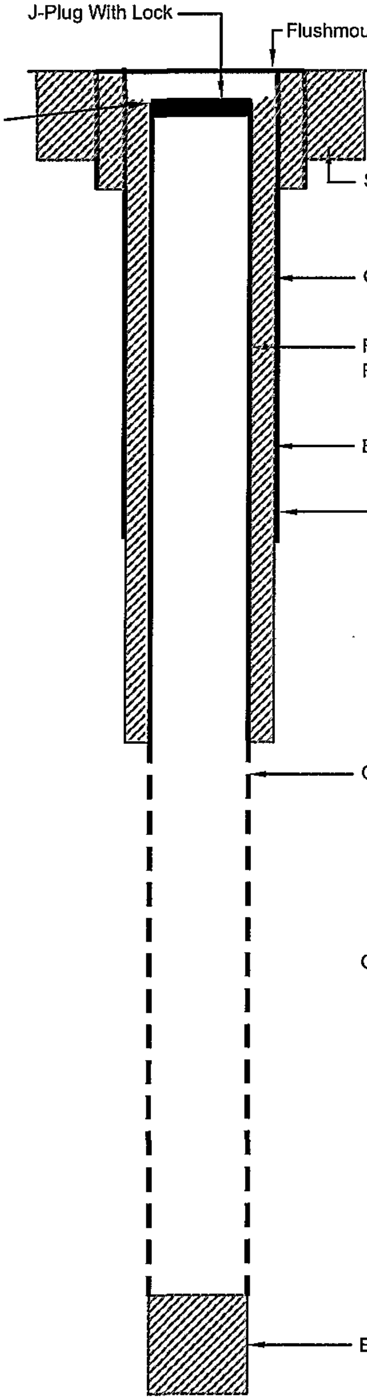
SHAW ENVIRONMENTAL & INFRASTRUCTURE

MW-32D

Project:	FUSRAP MAYWOOD SUPERFUND SITE	**Job Number:**	
Client:	Shaw Environmental & Infrastructure	**Date:**	05/2-5/5/03
Subcontractor:	B&B Drilling		
Drilling Method:	Air rotary		
Development Method:	Air and electrosubmersible pump		
Construction Dates:	05/2/03	to	05/5/03

Type of Measuring Point	Elevation (NGVD)
GROUND SURFACE:	49.18
TOP OF INNER CASING:	48.83
TOP OF CASING (OUTER IF APPLICABLE):	49.18

Item	Depth, below Measuring Point (ft)	Elevation (ft)
Grade/Top of Casing (Outer)	0.00	49.18
Top of Inner Casing	0.35	48.83
Top of Bedrock	18.00	31.18
Top of Open Hole	32.00	17.18
Base of Open Hole	57.00	-7.82
Total Depth	57.00	-7.82



Description	
Flushmount Diameter	12 (in.)
Surface Seal Type:	Concrete
Grout Type:	Cement-bentonite
Riser Pipe Type:	Black Steel
Riser Pipe ID:	6 (in.)
Borehole Diameter:	10 (in.)
Casing Type:	Black Steel
Casing ID:	10 (in.)
Open Hole Diameter:	6 (in.)
Open Hole Length (ft):	25.00 (ft)
Backfill/Grout:	NA

Note: Temporarty 10" ID drive casing could not be pulled and was left in place.

Notes: Developed by airlifing, surge and pumping.

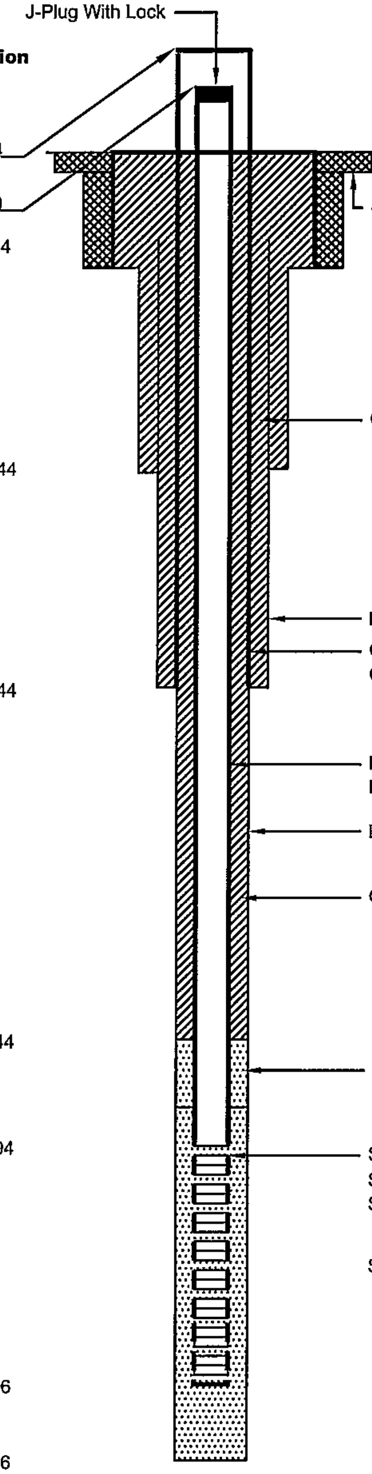
\\Bosfs01\Maywood\Maywood\Task0515\drawings\MW-28D.dwg

SHAW ENVIRONMENTAL & INFRASTRUCTURE		MW-33D
Project: FUSRAP MAYWOOD SUPERFUND SITE	**Job Number:**	
Client: Shaw Environmental & Infrastructure	**Date:** 09/10-9/12/02	**Subcontractor:** B&B Drilling

Drilling Method:	Air Rotary
Development Method:	Surge & electrosubmersible pump
Construction Dates:	09/10/02 **to** 09/12/02

Type of Measuring Point	**Elevation (NGVD)**
GROUND SURFACE:	59.44
TOP OF INNER CASING:	62.00
TOP OF CASING (OUTER IF APPLICABLE):	62.24

Item	**Depth, below Measuring Point (ft)**	**Elevation (ft)**
Top of Casing (Outer)	+2.90	62.24
Top of Casing (Inner)	+2.56	62.00
Grade	0.00	59.44
Top of Bedrock	20.00	39.44
Base of 6-in. Casing	38.00	21.44
Top of Filter Pack	43.00	16.44
Top of Screen	45.50	13.94
Base of Screen	65.50	-6.06
Total Depth	68.00	-8.56



Description

Surface Seal Type:	Concrete
Grout Type:	Cement-bentonite
Borehole Diameter:	10 (in.)
Casing Type:	Black Steel
Casing ID:	6 (in.)
Riser Pipe Type:	Schedule 40 PVC
Riser Pipe ID:	2 (in.)
Borehole Diameter:	6 (in.)
Grout Type:	Cement-bentonite
Filter/Sand Pack Type:	#1 'Morie Sand'
Screen Type:	Schedule 40 PVC
Screen ID:	2 (in.)
Screen Slot Size:	10 (0.01-inch)
Screen Length (ft):	20.0

Notes: Developed by airlifing, surge and pumping.

\\Bosfs01\Maywood\Maywood\Task0515\drawings\BRPW-33D.dwg

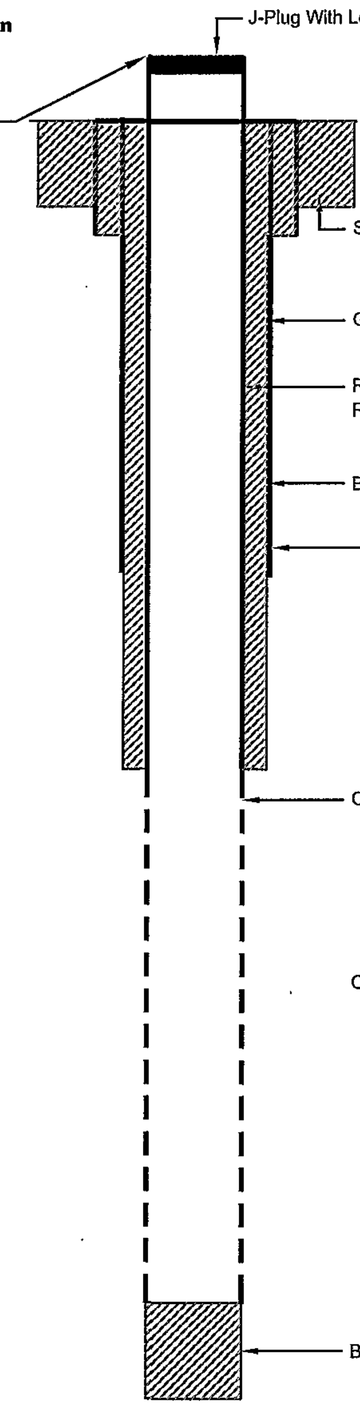
SHAW ENVIRONMENTAL & INFRASTRUCTURE

Project: FUSRAP MAYWOOD SUPERFUND SITE	**Job Number:**	**MW-34D**
Client: Shaw Environmental & Infrastructure	**Date:** 09/12-9/16/02	**Subcontractor:** B&B Drilling

Drilling Method:	Air rotary		
Development Method:	Air & electrosubmersible pump		
Construction Dates:	09/12/02	**to**	09/16/02

Type of Measuring Point	**Elevation (NGVD)**
GROUND SURFACE:	58.35
TOP OF INNER CASING:	N/A
TOP OF CASING (OUTER IF APPLICABLE):	60.63

Item	**Depth, below Measuring Point (ft)**	**Elevation (ft)**
Top of Casing	+2.28	60.63
Grade	0.00	58.35
Top of Bedrock	18.00	40.35
Top of Open Hole	28.00	30.35
Base of Open Hole	53.00	5.35
Total Depth	53.00	5.35



Description	
Surface Seal Type:	Concrete
Grout Type:	Cement-bentonite
Riser Pipe Type:	Black Steel
Riser Pipe ID:	6 (in.)
Borehole Diameter:	10 (in.)
Casing Type:	Black Steel
Casing ID:	10 (in.)
Open Hole Diameter:	6 (in.)
Open Hole Length (ft):	25.00 (ft)
Backfill/Grout:	NA

Note: Temporarty 10" ID drive casing could not be pulled and was left in place.

Notes: Developed by airlifing, surge and pumping.

\\Bosfs01\Maywood\Maywood\Task0515\drawings\MW-34D.dwg

APPENDIX D

Well Development Forms

Appendix D
Summary of Water Purged During Well Development and Specific Capacity Testing

	Volume Evacuated (gallon)	Note	Pump Rate (gpm)	Activity	Development Volume Required	Date of Measurement
/OOD SUPERFUND SITE,	65		0.25 - 0.5	Well Development	190	8/12/2002
MW-27D	65		0.25 - 0.5	Well Development		8/13/2003
MW-27D	40		0.25 - 0.5	Well Development		8/14/2002
MW-27D	20		0.25 - 0.5	Well Development		8/15/2002
MW-27D	5.3		0.04 - 0.055	Specific Capacity Test		8/15/2002
Total Volume Purged	195.3					
MW-28D	8		0.25 - 0.5	Well Development	190	8/12/2002
MW-28D	132		0.25 - 0.5	Well Development		8/13/2002
MW-28D	50		0.25 - 0.5	Well Development		8/14/2002
MW-28D	20		0.15-0.2	Specific Capacity Test		8/14/2002
Total Volume Purged	210					
MW-31D	125	NFC	12 - 15	Well Development	170	2/14/2003
MW-31D	350		5	Well Development/Specific Capacity		2/21/2003
Total Volume Purged	475					
MW-32D	240		>20	Well Development	230	5/5/2003
MW-32D	400		2.5 - 4	Specific Capacity Test		5/6/2003
Total Volume Purged	640					
MW-33D	65		1.25	Well Development	200(1)/22(2)	9/13/2002
MW-33D	115		1.25	Well Development		9/16/2002
MW-33D	99		0.8 - 1	Specific Capacity Test		9/16/2002
Total Volume Purged	279					
MW-34D	150	NFC	NR	Well Development	190	9/16/2002
MW-34D	55		0.25 - 0.75	Well Development		9/17/2002
MW-34D	60.6		0.375 - 0.5	Specific Capacity Test		9/17/2003
Total Volume Purged	265.6					

Legend -

(1) - MW-33D was initally drilled as a 6-inch open well and completed as 2-inch PVC Screened well.
NR - Not recorded.
NFC - No Field Form Completed for development activity

ATTACHMENT G

WELL DEVELOPMENT LOG
STONE & WEBSTER ENGINEERING CORP.

WELL NO. MW-27D

PROJECT: MAYWOOD | SITE: | Page 1 of

Project No: | Client:

Contractor: | Ground Elevation:

Start Date/Time: 8/12/02 | Completion Date/Time: | Well Diameter: 6" ø

Development Method/Equipment: Pumping - Whale pump

Logged by: S.K. | Water Level (ft bgs): 15.85 | Protection Level:

Pre-development DTW (PVC) (ft): 18.35 DTB (PVC) (ft): 58

Post-development DTW (PVC) (ft): N/A

Standing Well Volume (gal) = D^2(ft)/4 x π x (DTB-DTW)(ft) x 7.48 gal/ft^3

(2-inch well = 0.164 x (DTB-DTW)(ft)) =

6" ø ⇒ 63.25 gal.

(2.5-inch well = 0.255 x (DTB-DTW)(ft)) =

Minimum Purge Volume (gal) (3 well volumes) = 189.75

Development Purge/Discharge Rate (gpm): .5 - .25 gpm

Maximum Drawdown During Purging (ft): 27.01

Total Quantity Purged: 65 gallons

Disposition of Purge Water:

Hours of Development: 3.5 hrs *

Hours of Decon: N/A

Hours of Standby:

Time	Volume Purged (gal)	DTW (ft) (PVC)	Clarity/ Color	Temp. (°C)	pH	Conductivity (mS/cm)	Turbidity	DO	Remarks
12:30		18.35	Clear	—	—	—	—	—	Start
13:00		31.10		15.9	6.96	5.05	48.2	.48	
13:20		36.10		16.1	7.06	5.01	36.–	.60	
13:55		38.90		16.8	7.18	4.97	24.–	1.08	
14:25		42.35		17.1	7.19	4.83	10.–	.75	
14:55		44.65		17.4	7.19	4.87	10.–	.56	
15:30		45.24		17.9	7.18	4.85	10.–	.49	
15:45		45.36		18.1	7.18	4.84	10.–	.33	

Notes: = be bgs = below ground surface D = well diameter D (2-inch well) = 0.167 feet
PVC = below top of PVC DTB = depth to bottom of well D (2.5-inch well) = 0.208 feet

* To be continued next day.

ATTACHMENT G

...VELOPMENT LOG
... WEBSTER ENGINEERING CORP.

WELL NO. MW-27D

...t: MAYWOOD | SITE: | Page 1 of

...t No: | Client:

...tractor: | Ground Elevation:

...art Date/Time: 8/13/02; 7:35 | Completion Date/Time: 8/13/02 : 14:35 | Well Diameter: 6"

Development Method/Equipment: Pumping w/whale pump

Logged by: S.K. | Water Level (ft bgs): | Protection Level:

Pre-development DTW (PVC) (ft): | DTB (PVC) (ft):

Post-development DTW (PVC) (ft):

Standing Well Volume (gal) = D^2(ft)/4 x π x (DTB-DTW)(ft) x 7.48 gal/ft^3

(2-inch well = 0.164 x (DTB-DTW)(ft)) =

(2.5-inch well = 0.255 x (DTB-DTW)(ft)) =

Minimum Purge Volume (gal) (3 well volumes) = ≃ 190 gallons

Development Purge/Discharge Rate (gpm): Varying rates 0.25 gpm - ≤0.10 gmp.

Maximum Drawdown During Purging (ft): 25.3'

...l Quantity Purged: Approx. 65 gallons today ; 130 gallons total

Disposition of Purge Water:

Hours of Development: 7 hrs.

Hours of Decon: N/A (dedicated disposable pump)

Hours of Standby: N/A

Time	Volume Purged (gal)	DTW (ft) (PVC)	Clarity/ Color	Temp. (°C)	pH	Conductivity (mS/cm)	Turbidity	D.O.	Remarks
7:35		23.60	Clear	14.1	6.57	4.88	8	2.44	sample sprayed into container, aerated it.
8:30		33.80		20.4	7.02	4.84	Ø	1.02	
9:30		44.40		16.2	6.89	4.93	-10	0.27	
10:30		47.75		16.4	7.03	4.88	-10	0.53	
11:30		48.30		18.5	7.03	4.87	-10	0.52	- Stopped 11:45-12:45
12:45		45.50		17.8	7.02	4.85	-10	0.38	
13:40		48.80		17.6	7.02	4.85	-10	0.28	
14:35		48.90	↓	—	—	—	—	—	Stopped
	≈65 gal 130 Total.								

Notes: bgs = below ground surface; PVC = below top of PVC; D = well diameter; DTB = depth to bottom of well; D (2-inch well) = 0.167 feet; D (2.5-inch well) = 0.208 feet

ATTACHMENT G

WELL NO. MW-27D

WELL DEVELOPMENT LOG
STONE & WEBSTER ENGINEERING CORP.

Page 1 of ____

PROJECT: MAYWOOD

SITE:

Client:

Project No:

Ground Elevation:

Contractor:

Well Diameter: 6"

Start Date/Time: 8/14/02; 730

Completion Date/Time: 08/14/02;

Development Method/Equipment: Pumping.

Protection Level:

Logged by: S. K

Water Level (ft bgs):

Pre-development DTW (PVC) (ft): 35.50

DTB (PVC) (ft):

Post-development DTW (PVC) (ft):

Standing Well Volume (gal) = D^2(ft)/4 x π x (DTB-DTW)(ft) x 7.48 gal/ft^3

(2-inch well = 0.164 x (DTB-DTW)(ft)) =

(2.5-inch well = 0.255 x (DTB-DTW)(ft)) =

Minimum Purge Volume (gal) (3 well volumes) = ~~190~~ ~190 (approx. 130 removed already)

Development Purge/Discharge Rate (gpm): .5 - .25 variable

Maximum Drawdown During Purging (ft): 47.10

Total Quantity Purged:

Disposition of Purge Water: 3

Hours of Development: 2

Hours of Decon: N/A

Hours of Standby: —

Time	Volume Purged (gal)	DTW (ft) (PVC)	Clarity/ Color	Temp. (°C)	pH	Conductivity (mS/cm)	Turbidity	D.O.	Remarks
0735		35.50	Clear	16.5	7.08	4.96	8	.28	
			Clear	16.7	7.02	4.84	-10	.28	→ 4th drum.
0930		44.20							
0955		47.10	Not pumping out - stopped for recharge.						

Notes: = be bgs = below ground surface
PVC = below top of PVC
D = well diameter
DTB = depth to bottom of well
D (2-inch well) = 0.167 feet
D (2.5-inch well) = 0.208 feet

ATTACHMENT G

..ELL DEVELOPMENT LOG
STONE & WEBSTER ENGINEERING CORP.

WELL NO. MW-27D

PROJECT: MAYWOOD SITE: Page 1 of

Project No: Client:

Contractor: Ground Elevation:

Start Date/Time: 8/15/02 0800 Completion Date/Time: 8/15/02 Well Diameter:

Development Method/Equipment: Pumping

Logged by: S.K. Water Level (ft bgs): Protection Level:

Pre-development DTW (PVC) (ft): 20.35' DTB (PVC) (ft): 58'

Post-development DTW (PVC) (ft):

Standing Well Volume (gal) = D^2(ft)/4 x π x (DTB-DTW)(ft) x 7.48 gal/ft^3

(2-inch well = 0.164 x (DTB-DTW)(ft)) =

(2.5-inch well = 0.255 x (DTB-DTW)(ft)) =

Minimum Purge Volume (gal) (3 well volumes) = ~190 gallons (170 gallons already removed)

Development Purge/Discharge Rate (gpm): ~0.08 gpm or 310 ml/min. – reduced to 270 ml/m at 10:40

aximum Drawdown During Purging (ft):

·l Quantity Purged:

Disposition of Purge Water:

Hours of Development:

Hours of Decon:

Hours of Standby:

Time	Volume Purged (gal)	DTW (ft) (PVC)	Clarity/ Color	Temp. (°C)	pH	Conductivity (mS/cm)	Turbidity	D.O.	Remarks
0800		20.35	Clear	16.4	6.85	5.03	-10	0.67	
0900		20.90	Clear	16.8	6.97	5.01	-10	0.58	
1000		23.35	Clear	20.0	7.00	5.05	-10	0.57	
10:40		24.50	Clear	—	—	—	—	—	reduced flow rate to 270 ml
11:40		25.60	Clear	21.5	7.00	5.05	-10	0.46	
12:20		26.65	Clear	21.7	7.00	5.04	-10	0.38	
12:35		26.85	Clear	22.4	7.00	5.04	-10	0.36	→ End developing Start Test

Notes: = bs bgs = below ground surface D = well diameter D (2-inch well) = 0.167 feet
PVC = below top of PVC DTB = depth to bottom of well D (2.5-inch well) = 0.208 feet

ATTACHMENT G

WELL DEVELOPMENT LOG
STONE & WEBSTER ENGINEERING CORP.

WELL NO. MW-28D

PROJECT: MAYWOOD | SITE: | Page 1 of

Project No: | Client:

Contractor: | Ground Elevation:

Start Date/Time: 8/12/02 | Completion Date/Time: | Well Diameter: 6"

Development Method/Equipment: Pumping - Whale pump

Logged by: S.K. | Water Level (ft bgs): 30.82 | Protection Level:

Pre-development DTW (PVC) (ft): 30.82 DTB (PVC) (ft): 58

Post-development DTW (PVC) (ft): 31.8

Standing Well Volume (gal) = D^2(ft)/4 x π x (DTB-DTW)(ft) x 7.48 gal/ft³

(2-inch well = 0.164 x (DTB-DTW)(ft)) =

Based on general elevation of G.W. this should be ≈63.25

(2.5-inch well = 0.255 x (DTB-DTW)(ft)) =

Minimum Purge Volume (gal) (3 well volumes) = 189.75

Development Purge/Discharge Rate (gpm): 0.5 - .25 gpm

Maximum Drawdown During Purging (ft): 1'

Total Quantity Purged: 7-8 gallons

Disposition of Purge Water:

Hours of Development: 23 minutes *

Hours of Decon: N/A

Hours of Standby: N/A

Time	Volume Purged (gal)	DTW (ft) (PVC)	Clarity/ Color	Temp. (°C)	pH	Conductivity (mS/cm)	Turbidity	D.O.	Remarks
15:07		30.82	Clear	18.2	7.13	5.31	14.0	1.63	Start pumping.
15:30		31.80	Clear	18.4	7.17	5.28	10	1.02	

Notes: bgs = below ground surface; PVC = below top of PVC; D = well diameter; DTB = depth to bottom of well; D (2-inch well) = 0.167 feet; D (2.5-inch well) = 0.208 feet

* To be continued next day.

ATTACHMENT G

WELL DEVELOPMENT LOG
STONE & WEBSTER ENGINEERING CORP.

WELL NO. MW-28D

PROJECT: MAYWOOD
SITE:
Page ______ of ______

Project No:
Client:

Contractor:
Ground Elevation:

Start Date/Time: 8/13/02; 7:35
Completion Date/Time: 8/13/02 : 15:30
Well Diameter: 6"

Development Method/Equipment: Pumping - whale pump.

Logged by: S.K.
Water Level (ft bgs): ______
Protection Level:

Pre-development DTW (PVC) (ft): ______ DTB (PVC) (ft): ______

Post-development DTW (PVC) (ft): ______

Standing Well Volume (gal) = D^2(ft)/4 x π x (DTB-DTW)(ft) x 7.48 gal/ft^3

(2-inch well = 0.164 x (DTB-DTW)(ft)) =

(2.5-inch well = 0.255 x (DTB-DTW)(ft)) =

Minimum Purge Volume (gal) (3 well volumes) = ~~70~~ 190 gallons

Development Purge/Discharge Rate (gpm): 0.5 – 0.25 gpm variable rates.

Maximum Drawdown During Purging (ft): 19'

Total Quantity Purged: 130–135 gallons today; 140 gallons total

Disposition of Purge Water:

Hours of Development: 8 hrs.

Hours of Decon: N/A - Disposable dedicated pump.

Hours of Standby: Ø

Time	Volume Purged (gal)	DTW (ft) (PVC)	Clarity/ Color	Temp. (°C)	pH	Conductivity (mS/cm)	Turbidity	D.O.	Remarks
7:30		18.40	Clear,	19.1	6.57	4.88	8	2.44	First 2 D.O. readings are high due to sample spray into container and aerating the sample. Subsequently made a flow thru-cell to eliminate the problem.
8:30		32.40	Slightly red/pink	19.8	7.01	4.38	8	1.64	
9:30		32.10	↓	17.1	6.94	4.92	-10	0.27	
10:30		33.5		17.0	7.01	4.85	-10	0.34	
11:30		37.00		18.4	7.03	4.86	-10	0.28	
12:30		37.60		18.6	7.02	4.85	-10	0.28	
13:30		37.80		18.6	7.02	4.84	-10	0.25	
14:30		37.60		18.7	7.02	4.84	-10	0.25	
15:30		37.60		18.6	7.02	4.84	-10	0.25	

Notes: * bs bgs = below ground surface; PVC = below top of PVC; D = well diameter; DTB = depth to bottom of well; D (2-inch well) = 0.167 feet; D (2.5-inch well) = 0.208 feet

ATTACHMENT G

WELL DEVELOPMENT LOG
STONE & WEBSTER ENGINEERING CORP.

WELL NO. MW-28D

PROJECT: Maywood		SITE:	Page 1 of
Project No:		Client:	
Contractor:			Ground Elevation:
Start Date/Time: 08/14/02 7:30	Completion Date/Time: 08/14/02,		Well Diameter: 6"
Development Method/Equipment: Pumping			
Logged by: S.K.	Water Level (ft bgs):		Protection Level:

Pre-development DTW (PVC) (ft): 18.45 DTB (PVC) (ft):

Post-development DTW (PVC) (ft):

Standing Well Volume (gal) = D^2(ft)/4 x π x (DTB-DTW)(ft) x 7.48 gal/ft³

(2-inch well = 0.164 x (DTB-DTW)(ft)) =

(2.5-inch well = 0.255 x (DTB-DTW)(ft)) =

Minimum Purge Volume (gal) (3 well volumes) = ≃190 (~140 already purged

Development Purge/Discharge Rate (gpm): ~ .5gpm - variable

Maximum Drawdown During Purging (ft): 33.40

Total Quantity Purged:

Disposition of Purge Water:

Hours of Development: 6

Hours of Decon: N/A

Hours of Standby: ∅

Time	Volume Purged (gal)	DTW (ft) (PVC)	Clarity/ Color	Temp. (°C)	pH	Conductivity (mS/cm)	Turbidity	D.O.	Remarks
0730		18.45	clear	16.2	7.06	4.88	~10	.46	
08:30		32.26	Clear	16.4	7.02	4.84	~10	.28	→ 4th Drum
09:15		33.40	Clear	16.8	7.02	4.84	~10	.27	→ Stop.
10:00		29.20							
11:30		21.40	Clear	16.4	7.03	4.86	~10	.28	restart
12:30		23.90	Clear	18.4	7.03	4.14	~10	.40	
13:25		25.60		21.2	7.04	3.96	~3	.36	→ End develop.
13:30	→			Start	Specific	Capacity Test			

Notes: bgs = below ground surface; PVC = below top of PVC; D = well diameter; DTB = depth to bottom of well; D (2-inch well) = 0.167 feet; D (2.5-inch well) = 0.208 feet

Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

~~WELL SAMPLING RECORD~~/FIELD WATER QUALITY SAMPLE AND ANALYSIS

58 WELL DEVELOPMENT

SITE Grove WBS ______ DATE 2/21/03

WORK ORDER # ______ NORFAS ______

FIELD INSTRUMENTS: 3" submersible pump, 451 1050 MDS & Sonde

SAMPLING METHOD Bailer

Well I.D. MW-31D

SAMPLE I.D. ______

MEAS. REF. POINT (Ft. AGS or BGS) 13.65

WELL DEPTH (Ft. TOC) 45 feet

INNER CASING/OPEN HOLE DIAM (In) 6" ID

DEPTH TO TOP OF SCREEN (Ft TOC) 20 ft

WLL VOLUME (Gal) ______

PUMP INTAKE (Ft. TOC) 35 ft, bgs

Sample Time (From/To)	Water Level (Ft TOR)	Discharge ~~(milliliters/minute)~~ LPM	Volume Purged ~~(ml)~~ gallons	Temp °C	Specific Cond. (mS/cm)	pH	ORP (mv)	DO(1) (mg/L)	Turbidity (NTU)
0930	6.70	0							
start → 1055	8.61	5		15.8°	2.461	7.44	~~-28~~ NR	3.7(1)	180
1103	8.70	5	40	16.06	0.021	7.51	~~-25.7~~ NR	2.11(1)	88.4
1110	8.70	5	75	15.77	1.321	7.46	~~-58~~ NR	2.10(1)	32.8
1120	8.65	5	125	15.67	2.464	NR	~~-54~~ NR	6.0(1)	13.7
1130	8.65	5	175	15.75	2.471	7.50	-26.0	3.32(1)	NR*
1140	8.66	5	225	15.85	2.469	7.55	-31.0	2.04(1)	NR*
1150	8.65	5	290	16.05	2.470	7.55	-31.5	2.43(1)	NR*
1205	8.65	5	350	16.05	2.468	7.55	-34.7	2.42(1)	2.5

NR = No reading, meter not functioning properly.

(1) = DO readings are biased high due to high pumping rate and introduction of air.

APPEARANCE/COLOR clear

ODOR slight-organic

SAMPLED BY (PRINT) Robert DeWitt

SIGNATURE Robert DeWitt

SAMPLED BY ______

SIGNATURE ______

WELL CAP REPLACED AND LOCKED BY ______

DATE/TIME ______

ATTACHMENT G

WELL DEVELOPMENT LOG
STONE & WEBSTER ENGINEERING CORP.

WELL NO. MW-32D

PROJECT: Maywood (FMSS)	SITE:	Page 1 of 1
Project No:	Client: USACE	
Contractor: Shaw E&I		Ground Elevation: 49.18
Start Date/Time: 5/5/03 @1253	Completion Date/Time: 5/5/03 @1350	Well Diameter: 6" Open Hole
Development Method/Equipment: Submersible Pump		
Logged by: Kevin Cote	Water Level (ft bgs): 6.10	Protection Level: D

Pre-development DTW (PVC) (ft): 6.10 DTB (PVC) (ft): 57

Post-development DTW (PVC) (ft): 6.55

Standing Well Volume (gal) = D^2(ft)/4 x π x (DTB-DTW)(ft) x 7.48 gal/ft^3

(6-inch well = ~~0.164~~ 1.48 x (DTB-DTW)(ft)) = 75

(2.5-inch well = 0.255 x (DTB-DTW)(ft)) = N/A

Minimum Purge Volume (gal) (3 well volumes) = 225 gallons

Development Purge/Discharge Rate (gpm): Typically 2.5 - 4 gpm, except 2 intervals of 12+ gpm over short duration

Maximum Drawdown During Purging (ft): 2.66

Total Quantity Purged: 240 gallons

Disposition of Purge Water: Containerized

Hours of Development: 1 hour

Hours of Decon: N/A

Hours of Standby: N/A

Time	Volume Purged (gal)	DTW (ft) (PVC)	Clarity/ Color	Temp. (°C)	pH	Conductivity (mS/cm)	Turbidity	Remarks
1253	—	6.10						START Development
1303	20	6.21						2 gpm
1310	65	8.76	Cloudy	16.93	7.94	2.70	127	3 gpm
1320	85	7.40	Red	15.41	7.62	2.70	430	3 gpm
1330	100	7.40	Cloudy	15.53	7.49	2.70	230	3 gpm
1335	170	7.48	Clear	15.58	7.48	2.70	27.0	4 gpm
1340	180	7.48	Clear	15.44	7.48	2.70	22.0	2.5 gpm
1350	210	7.48	clear	15.45	7.48	2.70	17.2	2.5 gpm
End	240							

Notes: bgs = below ground surface D = well diameter D (2-inch well) = 0.167 feet
PVC = below top of PVC DTB = depth to bottom of well D (2.5-inch well) = 0.208 feet

D (6-in. well) = 1.48 gal/ft

ATTACHMENT G

WELL DEVELOPMENT LOG
STONE & WEBSTER ENGINEERING CORP. MW-33D

WELL NO. MW-33D

PROJECT: MAYWOOD
SITE:
Page 1 of 2
Project No:
Client:
Contractor:
Ground Elevation:
Start Date/Time: 9/13/02 14:00–15:00
Completion Date/Time: 9/16/02 9:15–11:30
Well Diameter: 2"
Development Method/Equipment: Whale Pump
Logged by: S.K.
Water Level (ft bgs): 12.7'
Protection Level: D
Pre-development DTW (PVC) (ft): 12.7
DTB (PVC) (ft): 68'
Post-development DTW (PVC) (ft):
Standing Well Volume (gal) = $D^2(ft)/4 \times \pi \times (DTB-DTW)(ft) \times 7.48\ gal/ft^3$
(2-inch well = 0.164 x (DTB-DTW)(ft)) =

(2.5-inch well = 0.255 x (DTB-DTW)(ft)) =

Minimum Purge Volume (gal) (3 well volumes) = Due to well Constr. ~ 180 gallons.
Development Purge/Discharge Rate (gpm): 1.25 gpm
Maximum Drawdown During Purging (ft):
Total Quantity Purged:
Disposition of Purge Water: Drum
Hours of Development: 3-3.25
Hours of Decon:
Hours of Standby:

Time	Volume Purged (gal)	DTW (ft) (PVC)	Clarity/ Color	Temp. (°C)	pH	Conductivity (mS/cm)	Turbidity	DO	Remarks
✓	X	✓	✓	✓	✓	✓	✓		
9:15		12.7	Clear	15.9	6.33	6.93	-10	1.69	@ 1.25 gpm
9:35		21.2	Clear	15.9	6.31	6.95	-10	.88	@ 1.25 gpm
9:55		22.05	Clear	15.2	6.39	6.93	-10	.54	@ 1.25 gpm
Stop @ 10.	→ need	more	drums →						
10:15		16.02	Clear	15.3	6.51	6.86	-10	.76	@ 1.25 gpm
10:30		22.05	Clear	15.3	6.45	6.77	-10	.45	@ 1.25 gpm
10:50		22.50	Clear	15.4	6.41	6.71	-10	.39	@ 1.25 gpm
11:00		22.55	Clear	15.4	6.40	6.70	-10	.39	@ 1.25 gpm

Notes: bgs = below ground surface; PVC = below top of PVC; D = well diameter; DTB = depth to bottom of well; D (2-inch well) = 0.167 feet; D (2.5-inch well) = 0.208 feet

ATTACHMENT G

WELL DEVELOPMENT LOG
STONE & WEBSTER ENGINEERING CORP. mw-33D

WELL NO. MW

PROJECT: MAYWOOD	SITE:	Page 2
Project No:	Client:	
Contractor:		Ground Elevation:
Start Date/Time: 9/13/02	Completion Date/Time: 9/16/02 12:00	Well Diameter: 2"
Development Method/Equipment:		
Logged by: S.K.	Water Level (ft bgs):	Protection Level:

Pre-development DTW (PVC) (ft): 12.7' DTB (PVC) (ft): 68'

Post-development DTW (PVC) (ft):

Standing Well Volume (gal) = $D^2(ft)/4 \times \pi \times (DTB-DTW)(ft) \times 7.48\ gal/ft^3$

(2-inch well = 0.164 x (DTB-DTW)(ft)) =

(2.5-inch well = 0.255 x (DTB-DTW)(ft)) =

Minimum Purge Volume (gal) (3 well volumes) = ~180 gallons needed.

Development Purge/Discharge Rate (gpm): 1.25 gpm

Maximum Drawdown During Purging (ft):

Total Quantity Purged:

Disposition of Purge Water:

Hours of Development: Total of 3.25 hrs.

Hours of Decon:

Hours of Standby:

Time (E.S.T.)	Volume Purged (gal)	DTW (ft) (PVC)	Clarity/ Color	Temp. (°C)	pH	Conductivity (mS/cm)	Turbidity	DO	Remarks Flow Rate (gpm)
11:15	-	22.71	Clear	15.4	6.45	6.70	-10	.37	1.25
11:30		22.77	Clear	15.3	6.45	6.70	-10	.37	1.25
12.00		22.85	Clear	15.6	6.48	6.69	-10	.43	1.25

Notes: = be bgs = below ground surface; PVC = below top of PVC; D = well diameter; DTB = depth to bottom of well; D (2-inch well) = 0.167 feet; D (2.5-inch well) = 0.208 feet

ATTACHMENT G

WELL DEVELOPMENT LOG
STONE & WEBSTER ENGINEERING CORP.

WELL NO. MW-34D

PROJECT: MAYWOOD

SITE:

Page 1 of 1

Project No:

Client:

Contractor:

Ground Elevation:

Start Date/Time: 9/17/02 0815

Completion Date/Time: 9/17/02

Well Diameter: 6"

Development Method/Equipment: Whale Pump

Logged by: S.K.

Water Level (ft bgs): 10.04

Protection Level: D+

Pre-development DTW (PVC) (ft): 10.04

DTB (PVC) (ft): 55' from TOC

Post-development DTW (PVC) (ft):

Standing Well Volume (gal) = $D^2(ft)/4 \times \pi \times (DTB-DTW)(ft) \times 7.48$ gal/ft^3 ≃ 65 gallons

(2-inch well = 0.164 x (DTB-DTW)(ft)) =

(2.5-inch well = 0.255 x (DTB-DTW)(ft)) =

Minimum Purge Volume (gal) (3 well volumes) = 200 (Already purged for 150g)

Development Purge/Discharge Rate (gpm): 1.25gpm (Started @ 0.5 gpm, opened full to get volume, naturally slowed to .75 gpm by the time develop. was done.)

Maximum Drawdown During Purging (ft):

Total Quantity Purged:

Disposition of Purge Water:

Hours of Development: 1.5 (+3.5hrs yesterday)

Hours of Decon: 1.0

Hours of Standby: —

Time	Volume Purged (gal)	DTW (ft) (PVC)	Clarity/ Color	Temp. (°C)	pH	Conductivity (mS/cm)	Turbidity	DO	Remarks
0815	*@ 1/2 gpm	10.04		15.7	5.65	3.59	-10	1.76	
0830	*	12.46		15.3	5.89	3.50	-10	.92	
0845	*	12.90		15.8	6.02	3.50	-10	.64	
0900	.25 gpm	15.40		15.2	6.09	3.47	-10	.53	
0915		17.30		15.3	6.32	3.45	-10	.53	
0930		21.20		16.2	6.61	3.40	-10	.52	
	0.75 Natural drop								
0945		23.60		16.4	6.62	3.10	-10	.50	STOP 55 gals.

Notes: bgs = below ground surface; PVC = below top of PVC; D = well diameter; DTB = depth to bottom of well; D (2-inch well) = 0.167 feet; D (2.5-inch well) = 0.208 feet

APPENDIX E

SPECIFIC CAPACITY DATA

Appendix E
Transmissivity and Hydraulic Conductivity Results from Specific Capacity Tests
MW-27D

Date	Time	Elapsed Time (min)	W.L (Ft. BTOR)	Incremental Drawdown (ft)	Cumulative Drawdown (ft)	Discharge (mL/min)	Discharge (ft^3/day)	Transmissivity (ft^2/day)	Log Transmissivity (ft^2/day)	Specific Capacity (gpm/ft)
08/13/2002	0735	0	23.6	-	-	945	48.195			
08/13/2002	0830	55	33.8	10.2	10.2	945	48.195	95.10	1.98	0.02
08/13/2002	0930	115	44.4	10.6	20.8	945	48.195	59.00	1.77	0.01
08/13/2002	1030	175	47.75	3.35	24.15	945	48.195	53.38	1.73	0.01
08/13/2002	1130	235	48.3	0.55	24.7	945	48.195	52.58	1.72	0.01
08/13/2002	1245	310	45.5	-2.8	21.9	945	48.195	57.00	1.76	0.01
08/13/2002	1340	365	48.8	3.3	25.2	945	48.195	51.88	1.72	0.01
08/13/2002	1435	420	48.9	0.1	25.3	945	48.195	51.74	1.71	0.01
										Average Q/s
							Average "T"	60.62	59.02	0.01
							Thickness (ft)	25	25	
							Hydraulic Conductivity (ft/day)	2.42	2.36	
							Hydraulic Conductivity (cm/sec)	8.55E-04	8.33E-04	

T=33.6(Q/s)^0.67 : Method Razack and Huntley (1991) as cited in Fetter (Applied Hydrogeology, 1994, Section 7.6, page 256- 257, eq., 7-90b)
ft. BTOR = Feet Below Top of Riser
ft = Feet
T = Transmissivity
mL/min = Milliliters per Minute
gpm/ft = Gallons per Mintue per foot

Appendix E
Transmissivity and Hydraulic Conductivity determined from Specific Capacity Data - MW-27D

Date	Time	Elapsed Time (min)	W.L (Ft. BTOR)	Incremental Drawdown (ft)	Cumulative Drawdown (ft)	Discharge (mL/min)	Discharge (ft^3/day)	Transmissivity (ft^2/day)	Log Transmissivity (ft^2/day)	Specific Capacity (gpm/ft)
08/12/2002	1430	0	18.35	-	-	945	48.195			
08/12/2002	1500	30	31.1	12.75	12.75	945	48.195	81.90	1.91	0.02
08/12/2002	1520	50	36.1	5	17.75	945	48.195	65.61	1.82	0.01
08/12/2002	1555	85	38.9	2.8	20.55	945	48.195	59.48	1.77	0.01
08/12/2002	1625	115	42.35	3.45	24	945	48.195	53.61	1.73	0.01
08/12/2002	1655	145	44.65	2.3	26.3	945	48.195	50.42	1.70	0.01
08/12/2002	1730	180	45.24	0.59	26.89	945	48.195	49.67	1.70	0.01
08/12/2002	1743	193	45.36	0.12	27.01	945	48.195	49.53	1.69	0.01
										Average Q/s
							Average "T"	59.97	58.99	0.01
							Thickness (ft)	25	25	
							Hydraulic Conductivity (ft/day)	2.40	2.36	
							Hydraulic Conductivity (cm/sec)	8.46E-04	8.32E-04	

T=33.6(Q/s)^0.67 : Method Razack and Huntley (1991) as cited in Fetter (Applied Hydrogeology, 1994, Section 7.6, page 256- 257, eq., 7-90b)
ft. BTOR = Feet Below Top of Riser
ft = Feet
T = Transmissivity
mL/min = Milliliters per Minute
gpm/ft = Gallons per Mintue per foot

Appendix E

Transmissivity and Hydraulic Conductivity determined from Specific Capacity Data - MW-28D

Date	Time	Elapsed Time (min)	W.L (Ft. BTOR)	Incremental Drawdown (ft)	Cumulative Drawdown (ft)	Discharge (mL/min)	Discharge (ft^3/day)	Transmissivity (ft^2/day)	Log Transmissivity (ft^2/day)	Specific Capacity (gpm/ft)
08/12/2002	1330	0	25.6	-	-	800	40.8			
08/12/2002	1345	15	25.98	0.38	0.38	600	30.6	635.80	2.80	0.42
08/12/2002	1400	30	26.6	0.62	1	700	35.7	368.66	2.57	0.19
08/12/2002	1415	45	26.8	0.2	1.2	660	33.66	313.66	2.50	0.15
08/12/2002	1430	60	26.9	0.1	1.3	650	33.15	294.25	2.47	0.13
08/12/2002	1445	75	27.1	0.2	1.5	580	29.58	247.70	2.39	0.10
08/12/2002	1500	90	27.1	0	1.5	580	29.58	247.70	2.39	0.10
08/12/2002	1515	105	27.1	0	1.5	580	29.58	247.70	2.39	0.10
08/12/2002	1530	120	27.12	0.02	1.52	580	29.58	245.51	2.39	0.10
										Average Q/s
							Average "T"	325.12	307.87	0.16
							Thickness (ft)	25	25	
							Hydraulic Conductivity (ft/day)	13.00	12.31	
							Hydraulic Conductivity (cm/sec)	4.59E-03	4.34E-03	

T=33.6(Q/s)^0.67 : Method Razack and Huntley (1991) as cited in Fetter (Applied Hydrogeology, 1994, Section 7.6, page 256- 257, eq., 7-90b)

ft. BTOR = Feet Below Top of Riser

ft = Feet

T = Transmissivity

mL/min = Milliliters per Minute

gpm/ft = Gallons per Mintue per foot

Appendix E
Transmissivity and Hydraulic Conductivity determined from Specific Capacity Data - MW-31D

Date	Time	Elapsed Time (min)	Elapsed Time (min)	W.L (Ft. BTOR)	Incremental Drawdown (ft)	Cumulative Drawdown (ft)	Discharge (mL/min)	Discharge (ft^3/day)	Transmissivity (ft^2/day)	Log Transmissivity (ft^2/day)	Specific Capacity (gpm/ft)
02/21/2003	9:30	0	0	6.7	-	-	18900	963.9			
02/21/2003	10:55	0	85	8.61	1.91	1.91	18900	963.9	2174.44	3.34	2.62
02/21/2003	11:03	8	93	8.7	0.09	2	18900	963.9	2108.39	3.32	2.50
02/21/2003	11:10	15	100	8.7	0	2	18900	963.9	2108.39	3.32	2.50
02/21/2003	11:20	25	110	8.65	-0.05	1.95	18900	963.9	2144.46	3.33	2.56
02/21/2003	11:30	35	120	8.65	0	1.95	18900	963.9	2144.46	3.33	2.56
02/21/2003	11:40	45	130	8.66	0.01	1.96	18900	963.9	2137.12	3.33	2.55
02/21/2003	11:52	57	142	8.65	-0.01	1.95	18900	963.9	2144.46	3.33	2.56
02/21/2003	12:05	70	155	8.65	0	1.95	18900	963.9	2144.46	3.33	2.56
											Average Q/s
								Average "T"	2133.10	2133.05	2.55
								Thickness (ft)	25	25	
								Hydraulic Conductivity (ft/day)	85.32	85.32	
								Hydraulic Conductivity (cm/sec)	3.01E-02	3.01E-02	

T=33.6(Q/s)^0.67 : Method Razack and Huntley (1991) as cited in Fetter (Applied Hydrogeology, 1994, Section 7.6, page 256- 257, eq., 7-90b)
ft. BTOR = Feet Below Top of Riser
ft = Feet
T = Transmissivity
mL/min = Milliliters per Minute
gpm/ft = Gallons per Mintue per foot

Appendix E

Transmissivity and Hydraulic Conductivity determined from Specific Capacity Data - MW-32D

Date	Time	Elapsed Time (min)	W.L (Ft. BTOR)	Incremental Drawdown (ft)	Cumulative Drawdown (ft)	Discharge (mL/min)	Discharge (ft^3/day)	Transmissivity (ft^2/day)	Log Transmissivity (ft^2/day)	Specific Capacity (gpm/ft)
05/06/2003	9:50	0	4.62	-	-	15120	771.12	-	-	
05/06/2003	10:00	10	7.27	2.65	2.65	15120	771.12	1503.61	3.18	1.51
05/06/2003	10:10	20	8	0.73	3.38	15120	771.12	1277.43	3.11	1.18
05/06/2003	10:15	25	7.97	-0.03	3.35	15120	771.12	1285.08	3.11	1.19
05/06/2003	10:20	30	7.95	-0.02	3.33	15120	771.12	1290.25	3.11	1.20
05/06/2003	10:30	40	7.96	0.01	3.34	15120	771.12	1287.66	3.11	1.20
05/06/2003	10:40	50	7.97	0.01	3.35	15120	771.12	1285.08	3.11	1.19
05/06/2003	10:50	60	7.81	-0.16	3.19	15120	771.12	1327.92	3.12	1.25
05/06/2003	11:00	70	7.92	0.11	3.3	15120	771.12	1298.10	3.11	1.21
05/06/2003	11:10	80	7.93	0.01	3.31	15120	771.12	1295.47	3.11	1.21
05/06/2003	11:20	90	7.9	-0.03	3.28	15120	771.12	1303.39	3.12	1.22
05/06/2003	11:30	100	7.9	0	3.28	15120	771.12	1303.39	3.12	1.22
										Average Q/s
							Average "T"	1314.31	1312.99	1.24
							Thickness (ft)	29	29	
							Hydraulic Conductivity (ft/day)	45.32	45.28	
							Hydraulic Conductivity (cm/sec)	1.60E-02	1.60E-02	

T=33.6(Q/s)^0.67 : Method Razack and Huntley (1991) as cited in Fetter (Applied Hydrogeology, 1994, Section 7.6, page 256- 257, eq., 7-90b)

ft. BTOR = Feet Below Top of Riser

ft = Feet

T = Transmissivity

mL/min = Milliliters per Minute

gpm/ft = Gallons per Mintue per foot

Appendix E
Transmissivity and Hydraulic Conductivity determined from Specific Capacity Data - MW-33D

Date	Time	Elapsed Time (min)	W.L (Ft. BTOR)	Incremental Drawdown (ft)	Cumulative Drawdown (ft)	Discharge (mL/min)	Discharge (ft^3/day)	Transmissivity (ft^2/day)	Log Transmissivity (ft^2/day)	Specific Capacity (gpm/ft)
09/16/2002	1415	0	16.1	-	-	4000	204	-	-	
09/16/2002	1430	15	19.95	3.85	3.85	3000	153	396.12	2.60	0.21
09/16/2002	1445	30	20.85	0.9	4.75	3000	153	344.11	2.54	0.17
09/16/2002	1500	45	21.11	0.26	5.01	3000	153	332.04	2.52	0.16
09/16/2002	1515	60	21.15	0.04	5.05	3000	153	330.28	2.52	0.16
09/16/2002	1530	75	21.17	0.02	5.07	3000	153	329.40	2.52	0.16
09/16/2002	1545	90	21.18	0.01	5.08	3000	153	328.97	2.52	0.16
09/16/2002	1600	105	21.18	0	5.08	3000	153	328.97	2.52	0.16
09/16/2002	1615	120	21.18	0	5.08	3000	153	328.97	2.52	0.16
										Average Q/s
							Average "T"	339.86	339.21	0.16
							Thickness (ft)	22	22	
							Hydraulic Conductivity (ft/day)	15.45	15.42	
							Hydraulic Conductivity (cm/sec)	5.45E-03	5.44E-03	

T=33.6(Q/s)^0.67 : Method Razack and Huntley (1991) as cited in Fetter (Applied Hydrogeology, 1994, Section 7.6, page 256- 257, eq., 7-90b)
ft. BTOR = Feet Below Top of Riser
ft = Feet
T = Transmissivity
mL/min = Milliliters per Minute
gpm/ft = Gallons per Mintue per foot

Appendix E

Transmissivity and Hydraulic Conductivity determined from Specific Capacity Data - MW-34D

Date	Time	Elapsed Time (min)	W.L (ft. BTOR)	Incremental Drawdown (ft)	Cumulative Drawdown (ft)	Discharge (mL/min)	Discharge (ft^3/day)	Transmissivity (ft^2/day)	Log Transmissivity (ft^2/day)	Specific Capacity (gpm/ft)
09/17/2002	1015	0	13.6	-	-	2000	102	-	-	
09/17/2002	1030	15	15.6	2	2	2000	102	468.18	2.67	0.26
09/17/2002	1045	30	16.85	1.25	3.25	2000	102	338.17	2.53	0.16
09/17/2002	1100	45	17.75	0.9	4.15	2000	102	287.08	2.46	0.13
09/17/2002	1115	60	17.93	0.18	4.33	1500	76.5	230.12	2.36	0.09
09/17/2002	1130	75	17.85	-0.08	4.25	1500	76.5	233.01	2.37	0.09
09/17/2002	1145	90	17.8	-0.05	4.2	1600	81.6	245.24	2.39	0.10
09/17/2002	1200	105	17.75	-0.05	4.15	1600	81.6	247.22	2.39	0.10
09/17/2002	1215	115	17.75	0	4.15	1600	81.6	247.22	2.39	0.10
09/17/2002	1230	130	17.75	0	4.15	1600	81.6	247.22	2.39	0.10
										Average Q/s
							Average "T"	282.61	275.12	0.13
							Thickness (ft)	25	25	
							Hydraulic Conductivity (ft/day)	11.30	11.00	
							Hydraulic Conductivity (cm/sec)	3.99E-03	3.88E-03	

T=33.6(Q/s)^0.67 : Method Razack and Huntley (1991) as cited in Fetter (Applied Hydrogeology, 1994, Section 7.6, page 256- 257, eq., 7-90b)

ft. BTOR = Feet Below Top of Riser
ft = Feet
T = Transmissivity
mL/min = Milliliters per Minute
gpm/ft = Gallons per Mintue per foot

APPENDIX F

Monitoring Well Abandonment Forms

DWR-020
7/02

New Jersey Department of Environmental Protection
Water Supply Element - Bureau of Water Allocation

WELL ABANDONMENT REPORT

MAIL TO: **Bureau of Water Allocation**
PO Box 426
Trenton, NJ 08625-0426

WELL PERMIT # 2611379-1 (of well sealed)

DATE WELL SEALED 8/8/02

PROPERTY OWNER Stepan Chemical Plant

ADDRESS 100 W. Hunter ave, Maywood NJ

WELL LOCATION 100 W Hunter avenue, Maywood, Bergen County
Street & No., Township, County

B38W60	10	124
Well No.	Lot No.	Block No.

USE OF WELL PRIOR TO ABANDONMENT: monitor

REASON FOR ABANDONMENT: No Longer Required

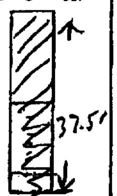
WAS A NEW WELL DRILLED? ☐ YES ☒ NO PERMIT # OF NEW WELL ______

TOTAL DEPTH OF WELL 37.5'
DIAMETER 2"
CASING LENGTH 15.9'
SCREEN LENGTH 5'
NUMBER OF CASINGS unknown

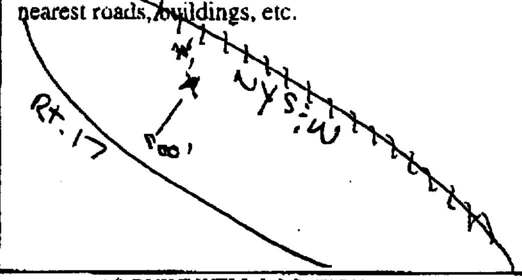
MATERIAL USED TO DECOMMISSION WELL:
47 Gallons of Water
705 Lbs. of Cement
— Lbs. of Bentonite
— Lbs. of Sand/Gravel
(none if well is contaminated)

FORMATION: ✓ Consolidated
✓ Unconsolidated

Cross-section of scaled well



Draw a sketch showing distance and relations of well site to nearest roads, buildings, etc.



AS-BUILT WELL LOCATION
(NAD 83 HORIZONTAL DATUM)
NJ STATE PLACE COORDINATE IN US SURVEY FEET

N

NORTHING: ______ EASTING: ______
OR
LATITUDE: __ __ ' __ . _" LONGITUDE: __ __ ' __ . _"

To permit adequate grouting, the casing should remain in place, but ungrouted liner pipes or any other obstructions must be removed. Pressure grouting is the only accepted method.

WAS CASING LEFT IN PLACE? ☒ YES ☐ NO CASING MATERIAL: S.S.

WERE OTHER OBSTRUCTIONS LEFT IN WELL? ☐ YES ☒ NO WHAT WERE THE OBSTRUCTIONS: ______

IF "YES", AUTHORIZATION GRANTED BY ______ ON ______
(NJDEP Official) (Date)

Was an alternative decommissioning method used and/or approval to decommission granted by a DEP official? ☐ YES ☒ NO

IF "YES", authorization granted by ______ ON ______
(NJDEP Official) (Date)

I certify that this well was sealed in accordance with N.J.A.C. 7:9D-3 et seq.

Douglas Myerchin	P.O. Box 8 Netcong NJ 07857	8/8/02
Performing Work (Print or Type) Name of NJ Licensed Well Driller	Address	Mailing Date
	[signature] Signature of NJ Licensed Well Driller Performing Work	M1277 Registration #

COPIES: *White - Water Allocation* *Yellow - Owner* *Pink - Health Dept.* *Goldenrod - Driller*

DWR-020
1/02

New Jersey Department of Environmental Protection
Water Supply Element - Bureau of Water Allocation

WELL ABANDONMENT REPORT

MAIL TO: **Bureau of Water Allocation**
PO Box 426
Trenton, NJ 08625-0426

WELL PERMIT # 26-59180 (of well sealed)

DATE WELL SEALED 8/1/02

PROPERTY OWNER Connie Tauber - Omni Assets

ADDRESS 26 Journal Square, 16th Floor, Jersey City, NJ 07306

WELL LOCATION Maywood Chemical Superfund Site, Route 17, Rochelle Park, Bergen
Street & No., Township, County

MW15	1	19.02
Well No.	Lot No.	Block No.

USE OF WELL PRIOR TO ABANDONMENT: Monitor

REASON FOR ABANDONMENT: No Longer Required

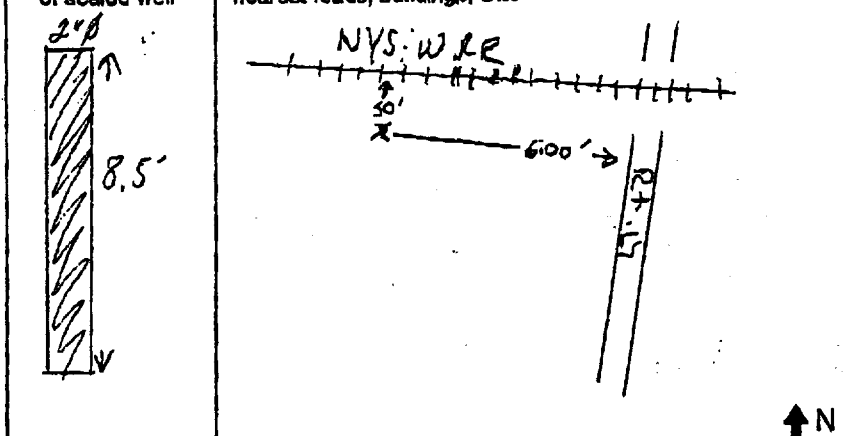
WAS A NEW WELL DRILLED? ☐ YES ☒ NO PERMIT # OF NEW WELL ______

TOTAL DEPTH OF WELL 8.5'
DIAMETER 2"
CASING LENGTH 3.5'
SCREEN LENGTH 5'
NUMBER OF CASINGS ______

MATERIAL USED TO DECOMMISSION WELL:
96 Gallons of Water
141 Lbs. of Cement
– Lbs. of Bentonite
– Lbs. of Sand/Gravel
(none if well is contaminated)

FORMATION: ✓ Consolidated / Unconsolidated

Cross-section of sealed well | Draw a sketch showing distance and relations of well site to nearest roads, buildings, etc.



To permit adequate grouting, the casing should remain in place, but ungrouted liner pipes or any other obstructions must be removed. Pressure grouting is the only accepted method.

WAS CASING LEFT IN PLACE? ☒ YES ☐ NO CASING MATERIAL: PVC

WERE OTHER OBSTRUCTIONS LEFT IN WELL? ☐ YES ☒ NO WHAT WERE THE OBSTRUCTIONS: ______

IF "YES", AUTHORIZATION GRANTED BY ______ (NJDEP Official) ON ______ (Date)

Was an alternative decommissioning method used? ☐ YES ☒ NO

IF "YES", authorization granted by ______ (NJDEP Official) ON ______ (Date)

I certify that this well was sealed in accordance with N.J.A.C. 7:9D-3 et seq.

Gordon Blewett — Performing Work (Print or Type) Name of NJ Licensed Well Driller

PO Box 8 Netcong NJ 07857 — Address

9/4/02 — Mailing Date

[signature] — Signature of NJ Licensed Well Driller Performing Work

J0002-1852 — Registration #

COPIES: White - Water Allocation Yellow - Owner Pink - Health Dept. Goldenrod - Driller

Sep. 5. 2002 9:08AM H R S DRILLING No.2265 P. 2/3

DWR-020
1/02

New Jersey Department of Environmental Protection
Water Supply Element - Bureau of Water Allocation

WELL ABANDONMENT REPORT

WELL PERMIT # 26-59181
of well sealed

MAIL TO: Bureau of Water Allocation
PO Box 426
Trenton, NJ 08625-0426

DATE WELL SEALED 8/1/02

PROPERTY OWNER Connie Tauber - Omni assets

ADDRESS 26 Journal Square, 16th Floor, Jersey City NJ 07306

WELL LOCATION Maywood Chemical Superfund Site, Route 17, Rochelle Park, Ber

Street & No., Township, County

MWID	1	19.02
Well No.	Lot No.	Block No.

USE OF WELL PRIOR TO ABANDONMENT: Monitor

REASON FOR ABANDONMENT: No Longer Required

WAS A NEW WELL DRILLED? ☐ YES ☒ NO PERMIT # OF NEW WELL

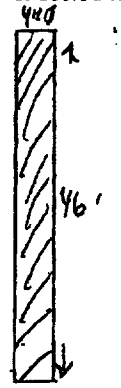
TOTAL DEPTH OF WELL 46'
DIAMETER 4"
CASING LENGTH 21'
SCREEN LENGTH openhole
NUMBER OF CASINGS

MATERIAL USED TO DECOMMISSION WELL:

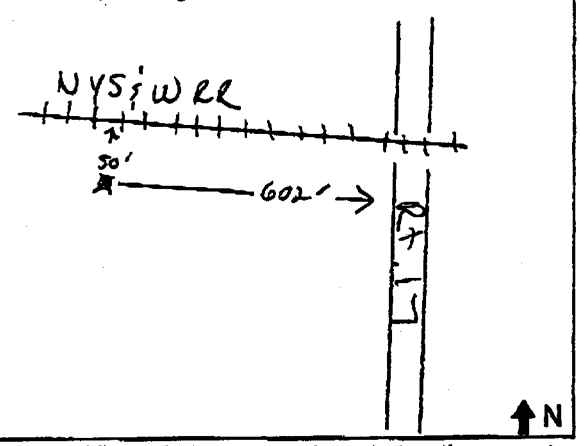
54 Gallons of Water
846 Lbs. of Cement
— Lbs. of Bentonite
— Lbs. of Sand/Gravel
(none if well is contaminated)

FORMATION: ✓ Consolidated
Unconsolidated

Cross-section of sealed well



Draw a sketch showing distance and relations of well site to nearest roads, buildings, etc.



To permit adequate grouting, the casing should remain in place, but ungrouted liner pipes or any other obstructions must be removed. Pressure grouting is the only accepted method.

WAS CASING LEFT IN PLACE? ☒ YES ☐ NO CASING MATERIAL: Steel

WERE OTHER OBSTRUCTIONS LEFT IN WELL? ☐ YES ☒ NO WHAT WERE THE OBSTRUCTIONS:

IF "YES", AUTHORIZATION GRANTED BY ______ ON ______
(NJDEP Official) (Date)

Was an alternative decommissioning method used? ☐ YES ☒ NO

IF "YES", authorization granted by ______ ON ______
(NJDEP Official) (Date)

I certify that this well was sealed in accordance with N.J.A.C. 7:9D-3 et seq.

Graman Blewett	PO Box 8 Netcong NJ 07857	9/4/02
Performing Work (Print or Type) Name of NJ Licensed Well Driller	Address	Mailing Date
	[signature] Signature of NJ Licensed Well Driller Performing Work	J0002185? Registration #

COPIES: White - Water Allocation Yellow - Owner Pink - Health Dept. Goldenrod - Driller

APPENDIX G

BOREHOLE GEOPHYSICAL REPORT

Draft Borehole Geophysics Logging Report
MW-27D, -28D, -31D, -32D, & -34D
Maywood Chemical Superfund Site
Maywood, New Jersey

Prepared for
SHAW ENVIRONMENTAL
July 2003

GEOPHYSICAL
APPLICATIONS

INCORPORATED

GEOPHYSICAL
APPLICATIONS
INCORPORATED

July 31, 2003

Mr. Michael Kulbersh
SHAW ENVIRONMENTAL
100 Technology Center Drive
Stoughton, MA 02072

Subject: Draft Borehole Geophysics Logging Report
MW-27D, MW-28D, MW-31D, MW-32D, & MW-34D
Maywood Chemical Superfund Site
Maywood, New Jersey

Dear Mr. Kulbersh:

Geophysical Applications has performed borehole geophysical logging at the above-noted five wells, to help Shaw Environmental characterize hydraulically-active bedrock fractures encountered by those boreholes.

The logging suite included conventional measurements (caliper, fluid temperature [FTemp], fluid resistivity [FRes], single-point resistance [SPR], spontaneous potential [SP], and natural gamma), acoustic televiewer [ATV], and heat-pulse flowmeter logging.

METHODS OF INVESTIGATION

Survey Control

All borehole logs were referenced to depths below ground surface. The geophysical logging winch contains an optical depth encoder that maintains depth measurements accurate within approximately ± 0.2 feet throughout each borehole.

Borehole Geophysical Logging

A Mount Sopris model 4MXB digital logging winch was used with Mount Sopris heat-pulse flowmeter, polygamma, and caliper probes to obtain the conventional geophysical log data.

The caliper probe includes a fluid resistivity/fluid temperature subassembly at the probe's bottom. Caliper, fluid temperature, fluid resistivity, SP, SPR, and natural gamma data were recorded at 0.1-foot depth increments, as determined by the logging winch's digital depth encoder. The fluid logs were recorded using a relatively slow speed of 3 to 4 feet per minute, to allow the thermistor to measure subtle temperature variations. The remaining conventional logs were recorded at higher logging speeds (typically 5 to 10 feet per minute).

Acoustic televiewer (ATV) data were recorded using Geophysical Applications' Advanced Logic Technologies (ALT) model ABI40 acoustic televiewer probe, with the Mount Sopris logging winch. This televiewer can adapt to a wide range of borehole diameters (up to 16-inch diameter), and is not hindered by suspended sediments in the water column. ATV data were recorded at 0.01-foot intervals, at a speed of approximately 1.3 feet per minute.

125 Washington Street • Suite Two • Foxboro • MA • 02035
508-543-1388 • FAX 508-543-1019

The ABI40 probe contains a high-frequency sonic transducer, aimed upwards at a rotating mirror. This mirror is tilted approximately 45 degrees from the probe's vertical axis, to aim the sonic pulses at the borehole wall. The transducer divides each sweep around a borehole's circumference into 288 arc segments, and records two-way sonic travel time and reflected signal amplitude from the borehole wall for each arc segment.

Flowmeter data were recorded at specific depths, located approximately 5 feet apart, above and below possible bedrock fractures indicated by field plots of the caliper and fluid temperature/resistivity logs. Flow test depths were adjusted to avoid placing the probe at caliper enlargements that might cause water to flow around the diverter petals instead of through the probe's measurement chamber.

Flow data were recorded in ambient conditions on the downward run, to detect groundwater flow between fracture zones with differing hydraulic head. Flowmeter data were subsequently repeated under low-flow (approximately 0.15 to 0.5 gallons per minute, or gpm) pumping conditions, to help determine which fracture zones were providing significant recharge into the wells. Pumped fluids were temporarily stored on-site in 15-gallon carboys provided by Shaw Environmental, and subsequently transferred to 55-gallon steel drums.

All geophysical logs were recorded on a laptop computer's hard drive, and transferred to CD-ROM as a backup precaution.

Post-survey plot scales were adjusted to display as much detail as possible. All conventional logs from the same borehole were merged onto one log plot, to aid data correlation. Acoustic televiewer logs are presented on a separate page, for clarity. All geophysical log plots presented in this report were prepared using ALT's WellCAD software package, with a special image-processing module for the acoustic televiewer data.

Equipment Decontamination Procedures

Decontamination procedures consisted of an Alconox scrub and tap water rinse of logging cables and probes between logging runs.

SURVEY LIMITATIONS

Measured log depths are estimated to be accurate within ± 0.2 feet, allowing for some cable stretch and minor slippage of the winches' depth-measurement wheels.

The caliper-probe's arms can measure borehole diameters up to approximately 16 inches. Caliper logs can detect fractures that cross a borehole at moderate angles, typically less than approximately 70 degrees. Caliper logs may not detect near-vertical fractures.

The heat-pulse flowmeter is designed for relatively low-flow environments, typically less than 1.0 gpm. Higher flow rates may produce erroneous flow-rate data values.

Hydraulically-active fracture zones were inferred by correlating numerous geophysical logs. These interpretations are a subjective judgment based upon available data.

The ATV probe's specifications state that measured dip azimuths and dip angles are accurate within ±5 degrees. However, down-dip compass azimuths for fractures with dip angles less than 10 degrees may have a greater possible margin of error.

Televiewer probes rely on a three-component magnetometer to orient the recorded images with respect to magnetic north. These images become distorted when the magnetometers approach the bottom of steel casing, typically beginning approximately 1 to 2.5 feet below the steel. This distortion was minimized by importing an unoriented section of the televiewer images (immediately below the steel casing), and rotating it to match a visible feature below the depth where magnetic interference began.

RESULTS

All geophysical logs described in this report are presented in Appendix A.

Interpreted fracture orientations based on the acoustic televiewer (ATV) data are provided in Appendix B. These summaries are Excel spreadsheets, presenting measured fracture depths ("depth" column), down-dip fracture azimuths ("azimuth" column), and fracture dip angles ("tilt" column) measured with the WellCAD software. The "category" column indicates whether the observed feature was judged to be open (category 105, or red), hydraulically conductive (category 107, or blue) or less-open (category 100, or black).

Strat logs (SP, SPR, and natural gamma) and fluid conductivity (FCond) data are presented in the two left-hand columns of each conventional log plot.

Caliper logs are presented in the middle of each conventional-log plot. Inflections to the right indicate borehole enlargements, for example where the drill bit passed through a fracture zone.

Fluid temperature (FTemp) and fluid resistivity (FRes) logs are presented in the next plot column. Localized inflections or changes in slope of either fluid log typically represent water entering or exiting the borehole.

Heat-pulse flowmeter data are presented on the caliper panel (ambient measurements) and on the FTemp/FRes panel (flow measurements while pumping). Shaded boxes to the left of centerline on either panel represent downwards water flow, with the box length indicating the flow magnitude in gpm. Shaded boxes to the right of a panel's centerline represent upwards water flow. Filled circles represent flow measurements that were less than the probe's minimum calibration limit of 0.02 gpm (nearly zero flow). Flowmeter test depths were selected using field plots of the caliper, fluid temperature, and fluid resistivity logs, and were positioned so as to avoid (to the extent possible) caliper enlargements that might adversely affect the flowmeter data.

Acoustic televiewer logs were evaluated using WellCAD's image-processing module, to measure planar-feature dip angles and down-dip azimuths. All inferred down-dip azimuths are referenced to magnetic north. Tadpole plots indicate measured fracture orientations, where the filled circles indicate dip angles (plotted on a graph that ranges between 0 and 90 degrees from left to right). Each tadpole tail points in the measured down-dip azimuth (i.e., perpendicular to the fracture strike direction), assuming that north is straight up on the printed page.

Red tadpoles and sine curves represent fractures judged to be "open", because they were evident on both the ATV traveltime and amplitude plots. Blue tadpoles and sine curves represent fractures judged to be hydraulically conductive, based on correlations with FTemp/FRes or heat-pulse flowmeter data. Black tadpoles and sine curves represent features judged to be "less-open", because they were primarily visible only on the ATV amplitude plots. The tadpoles are presented on both the ATV and conventional log plots, for the reader's convenience.

Stereoplots indicate the poles to inferred fracture planes. Each stereoplot is an equal-angle, southern hemisphere projection of: a) both the open and less-open (red and black) features, and b) interpreted hydraulically conductive (blue) features. Stereoplots often show distinct clusters of open and/or less-open poles, indicating numerous planar features with similar orientations. Each stereoplot is presented with magnetic north straight up on the printed page. The pole to a horizontal feature plots near a stereoplot's center. Poles for steeply dipping features plot near the diagram's outer edge, on the side of the diagram opposite the downdip compass azimuth.

Rose diagrams summarize the dominant down-dip fracture azimuths (a red rose plot for open fractures, black for less-open, and light grey for all interpreted features within a borehole). The rose diagrams are also presented with magnetic north straight up on the printed page.

The ATV plots include two colored panels, in addition to the rose and tadpole plots. The "traveltime" column presents two-way travel-time data between the probe and the borehole wall, and the "amplitude" column presents ATV reflection-amplitude variations at the borehole wall. Travel-time anomalies generally represent open fractures; amplitude variations can depict both open and less-open features. Note that these columns are oriented with respect to magnetic north, with numbers and vertical lines denoting the north (0), east (90), south (180), and west (270) positions. Each of these colored panels is a cylindrical projection, sliced along the north side, and flattened for presentation on a printed page. Each column therefore progresses from north at the left edge, through east, south, west, and back to north at the right edge.

Interpretations regarding hydraulically active zones are provided in the comments column of each conventional-log plot. All depth ranges described below, and shown on the logs in Appendix A and spreadsheets in Appendix B, are referenced (in units of feet) to the ground surface adjacent to each well.

Selected observations based on the recorded geophysical logs are listed below for each well (most interpretations described below are also shown on the conventional log plots).

MW-27D

This borehole's caliper log shows two enlargements, immediately below the casing bottom and near 50.5 feet deep. FRes and FTemp inflections near 37 to 37.5 feet deep are judged to represent a hydraulically active zone.

Ambient flowmeter tests did not disclose measurable flow. Pumping flow test data indicate that inflow originated greater than 52 feet deep (possibly from the west-dipping feature represented by a blue tadpole near 56 feet). A minor increase in upward flow while pumping apparently occurred between 34.5 and 39 feet deep (probably at the southwest dipping feature represented by a blue tadpole near 37 feet deep).

Most ATV-inferred features dip down towards the west, southeast, or east. The two interpreted hydraulically conductive features dip down gently towards the west and southwest.

MW-28D

Most caliper enlargements throughout this borehole are relatively small, with the largest located approximately 36.5 feet deep.

Subtle FTemp and FRes inflections near 37 to 37.5 feet deep are interpreted to represent a hydraulically active zone. A distinct FRes inflection near 56.5 feet deep may represent another hydraulically active zone (not corroborated by the flowmeter test results).

High gamma counts may represent radionuclides in soil, approximately 1 to 3 feet below ground surface at this borehole.

Ambient flowmeter tests showed water entering MW-28D between 49 and 56 feet deep, flowing upward, and exiting between the casing bottom and 34 feet deep. Pumping flow tests showed similar results, except with slightly higher flow rates and with some of the upward water flow exiting via the pump.

ATV-inferred planar features dip in a variety of azimuths, primarily ranging between west to north-northwest. The stereoplot shows most interpreted feature poles on the diagram's southeast quadrant, with dip angles less than 20 degrees from horizontal.

Discrete, hydraulically conductive planar features could not be confidently identified at this borehole, because of the large number of possible choices between 50 and 56 feet deep. The ambient and pumping inflow might have originated from a roughly horizontal granular bed visible on the ATV plot, centered near 53 feet deep.

<u>MW-31D</u>

A distinct caliper enlargement was observed near 29 feet deep, with smaller enlargements common at shallower depths. Relatively smooth borehole walls are evident greater than 30 feet deep.

Several step-wise FRes inflections suggest hydraulically active zones near 30, 34.5, and 39 feet deep. The FRes increase near 43 feet deep represents the upper surface of soft sediments that fill the lower portion of this borehole.

Ambient flowmeter measurements showed weak upward flow originating between 37 and 41 feet deep (probably near the 39-foot subtle FRes inflection), and exiting between 24.5 and 32 feet deep (probably at the 29-foot caliper enlargement and 30-foot FRes inflection).

Pumping flowmeter tests showed weak inflow beginning greater than 41 feet deep. The greatest increase in flow while pumping occurred between 24.5 and 32 feet (probably also at the 29-foot caliper enlargement). Additional inflow while pumping occurred between the casing bottom and 24.5 feet deep (probably immediately below the casing bottom, at a modest caliper enlargement).

Less-open features (black rose plot) dip down primarily towards the west-southwest and southeast. Open features (red rose plot) dip down primarily towards the northwest. Two of the three blue tadpoles representing interpreted hydraulically conductive features indicate the upper and lower surfaces of a nearly horizontal coarse-grained layer centered near 29.5 feet deep.

The ATV probe descended through soft sediments between 43 and 46.5 feet deep (represented by dark grey and dark red colored portions of the ATV image columns), but could not detect the borehole wall through those materials.

MW-32D

This caliper log detected a distinct enlargement near 45 feet deep, with minor diameter variations at shallower depths. A small enlargement is visible near 53 feet deep, but the borehole wall is mostly quite smooth below 46 feet deep. A slightly smaller drill bit appears to have been used below 53 feet deep.

A change in slope of the FRes plot near 41 feet deep probably represents a hydraulically active zone.

Ambient flowmeter tests showed weak upward flow (at the probe's lower measurement limit) at all but one test depth. If these observations are accurate (and not just thermal buoyancy of the warm water pulse), the ambient inflow occurs greater than 54 feet deep.

Weak upward flow was also observed originating greater than 54 feet deep during the pumping flowmeter tests. Most inflow while pumping occurred between 40.5 and 47 feet deep. The visibly open features dipping down steeply towards the southeast were interpreted to be the most likely source of this inflow.

Less open features dip down primarily towards the northwest, whereas interpreted open or hydraulically conductive features dip down towards the southeast.

MW-34D

This borehole showed only minor diameter, FTemp, and FRes variations throughout the uncased section.

Ambient flowmeter tests showed water entering greater than 49 feet deep, flowing upward, and exiting between 40 and 46.5 feet deep.

Pumping flow tests showed weak upward flow originating between 46.5 and 49 feet deep. Additional inflow occurred between the casing bottom and 35 feet deep; this interval provided most of the water that entered while pumping.

Less-open planar features dip down primarily towards the northwest and east-northeast. Open features dip down in widely varying directions that fall into two general groups: a) from southwest to northwest, and b) from northeast to southeast. The stereoplot shows a small group of feature poles clustered immediately southeast of the diagram's center (representing features that dip gently down towards the northwest).

* * * * *

We appreciate this opportunity to provide geophysical services, and we welcome questions concerning this report. Please call the undersigned at 508/543-1388 if we may provide additional information that would benefit Shaw Environmental's project.

Sincerely,

GEOPHYSICAL APPLICATIONS, INC.

M. Blackey

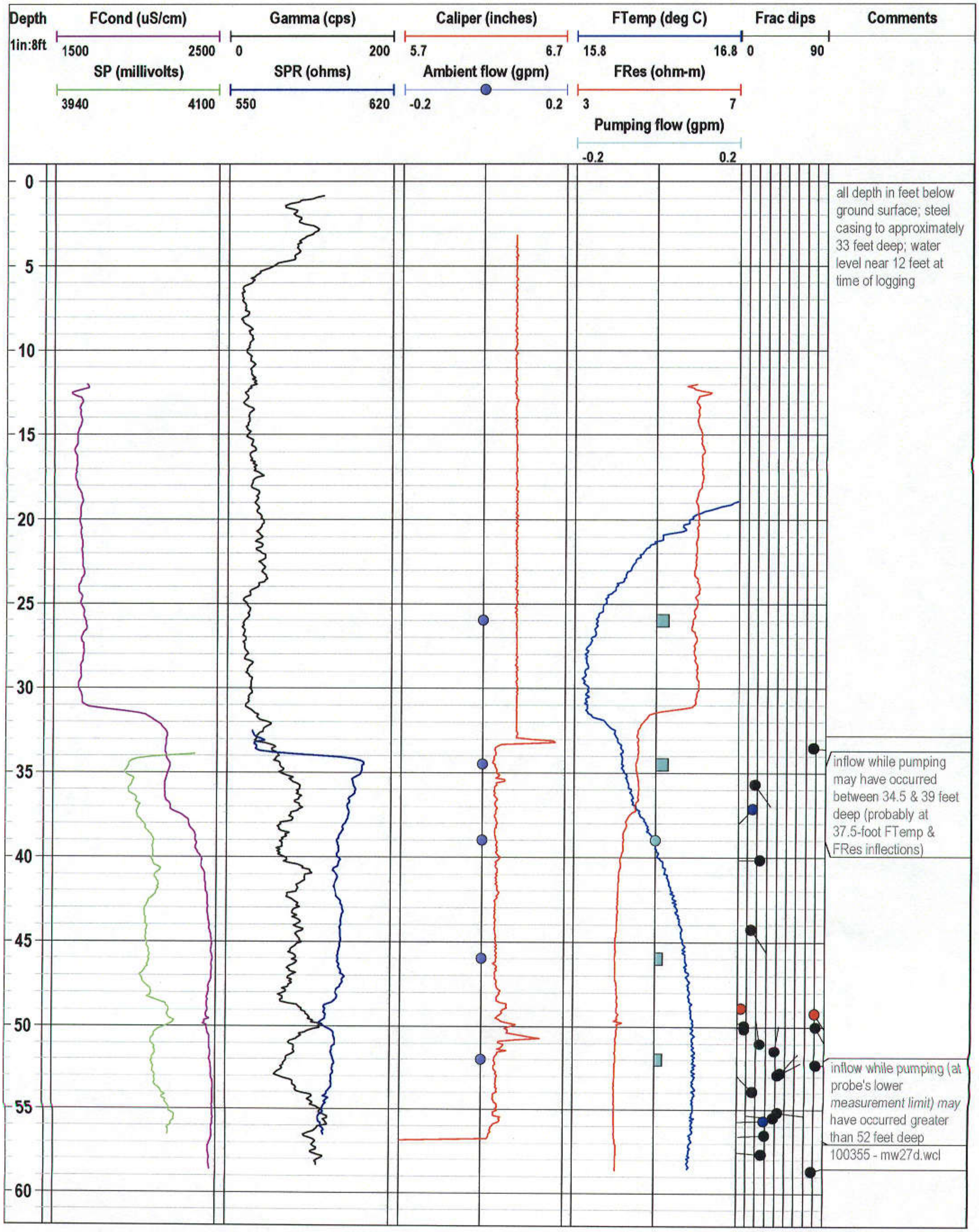
Mark E. Blackey
Principal and Geophysicist

100355 - 100355e.rpt

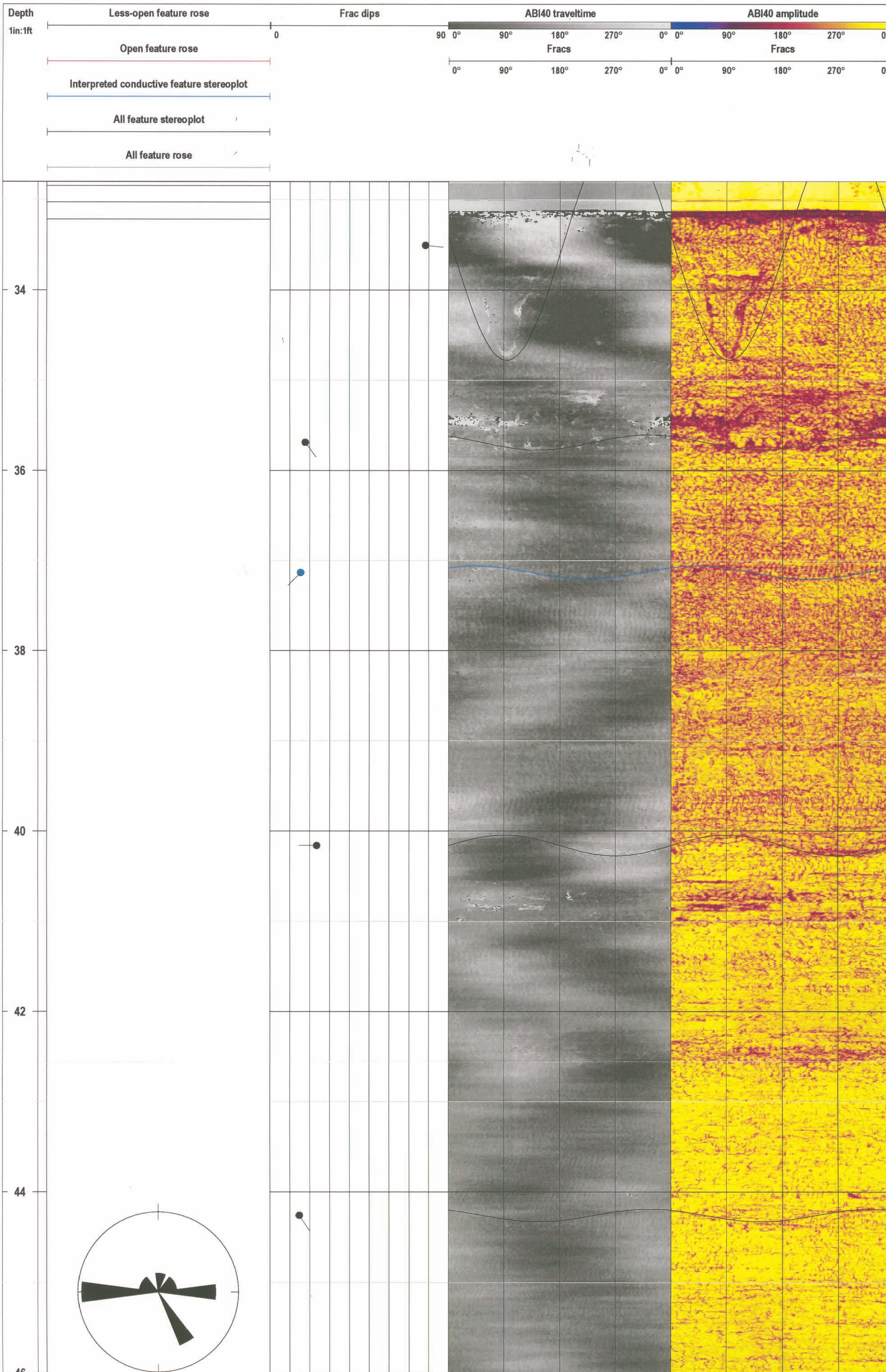
Appendix A

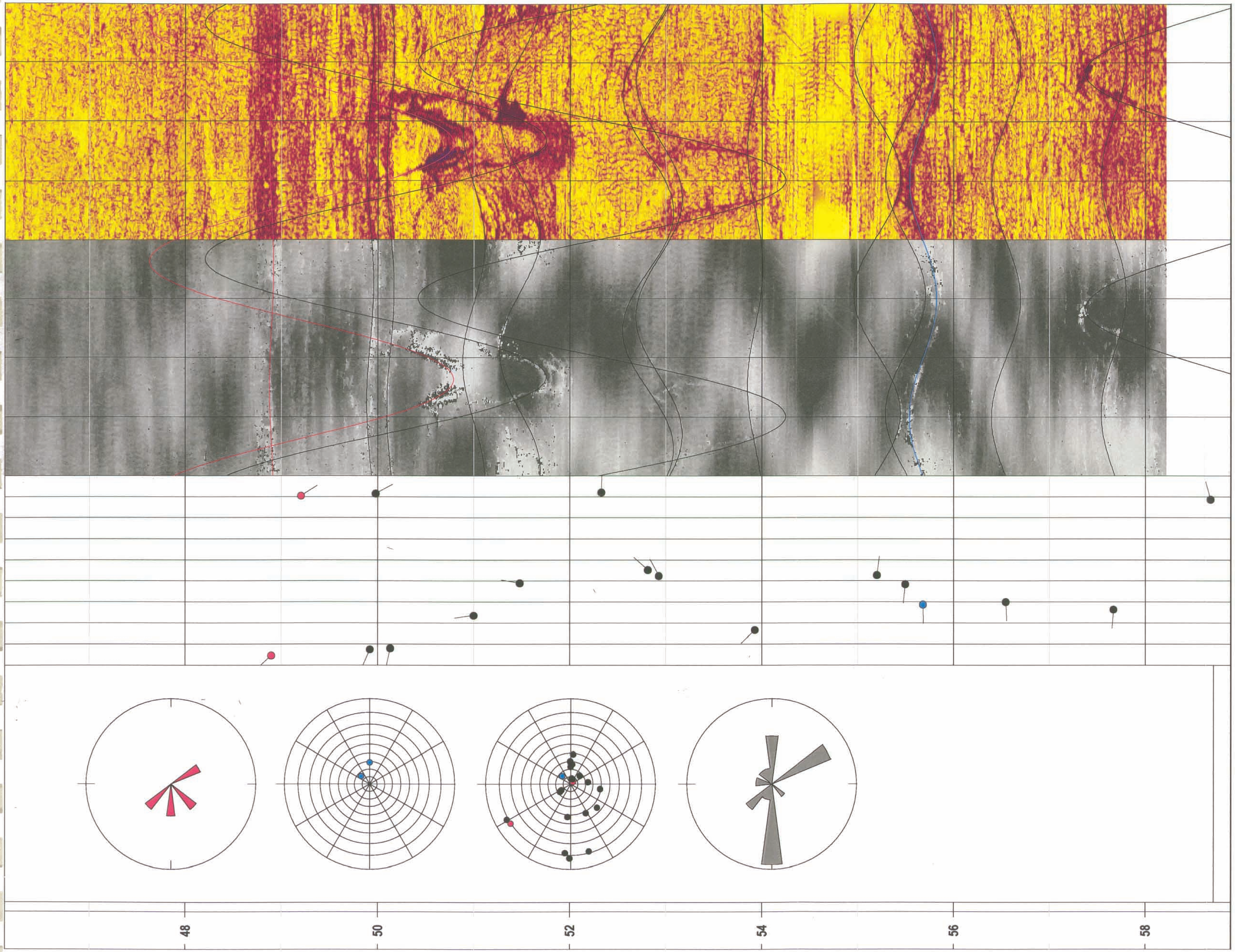
Borehole Geophysical Logs

Project - Well: Shaw Env'l/Maywood, NJ - MW-27D conventional logs

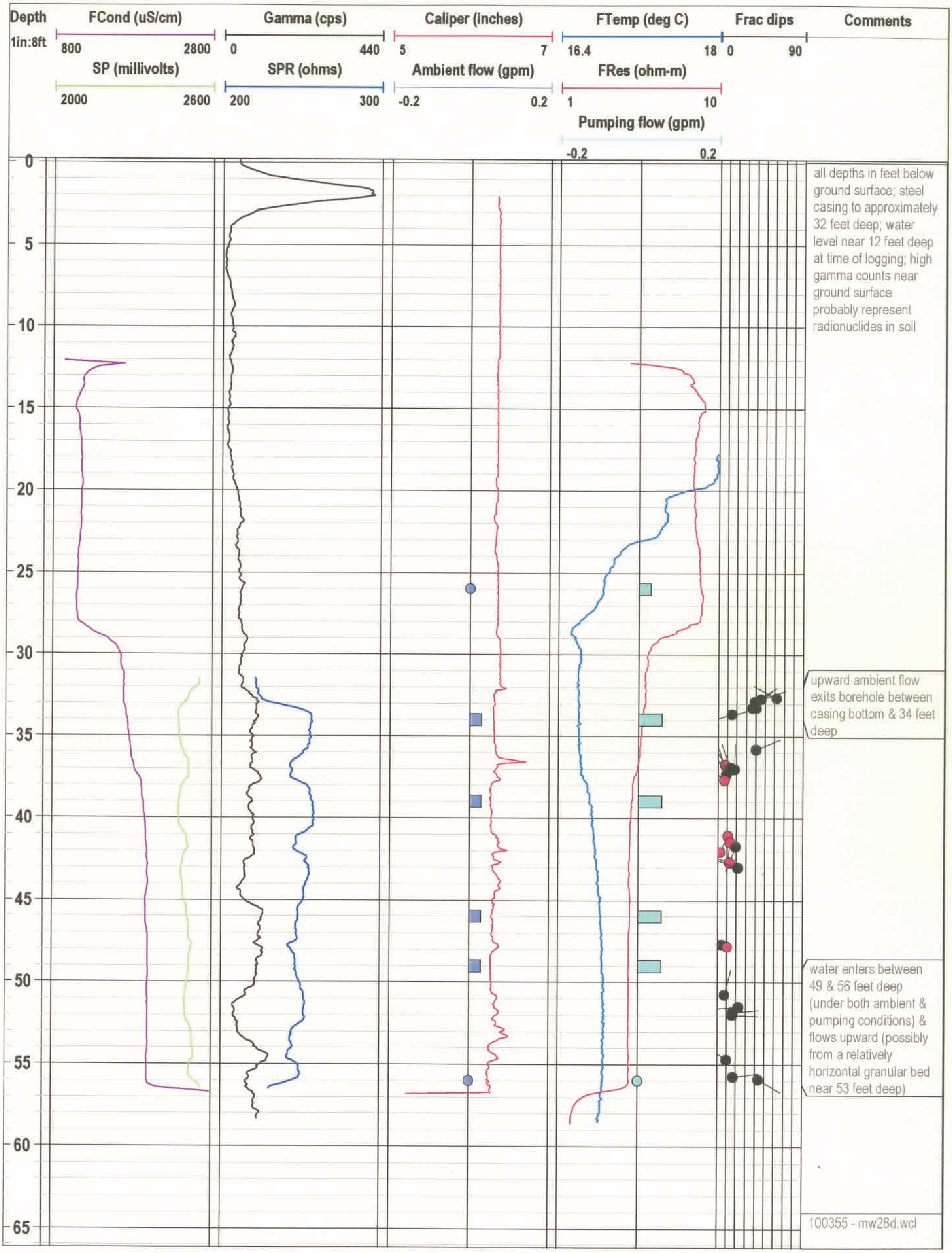


Project - Well: Shaw Env'l/Maywood, NJ - MW-27D acoustic televiewer log

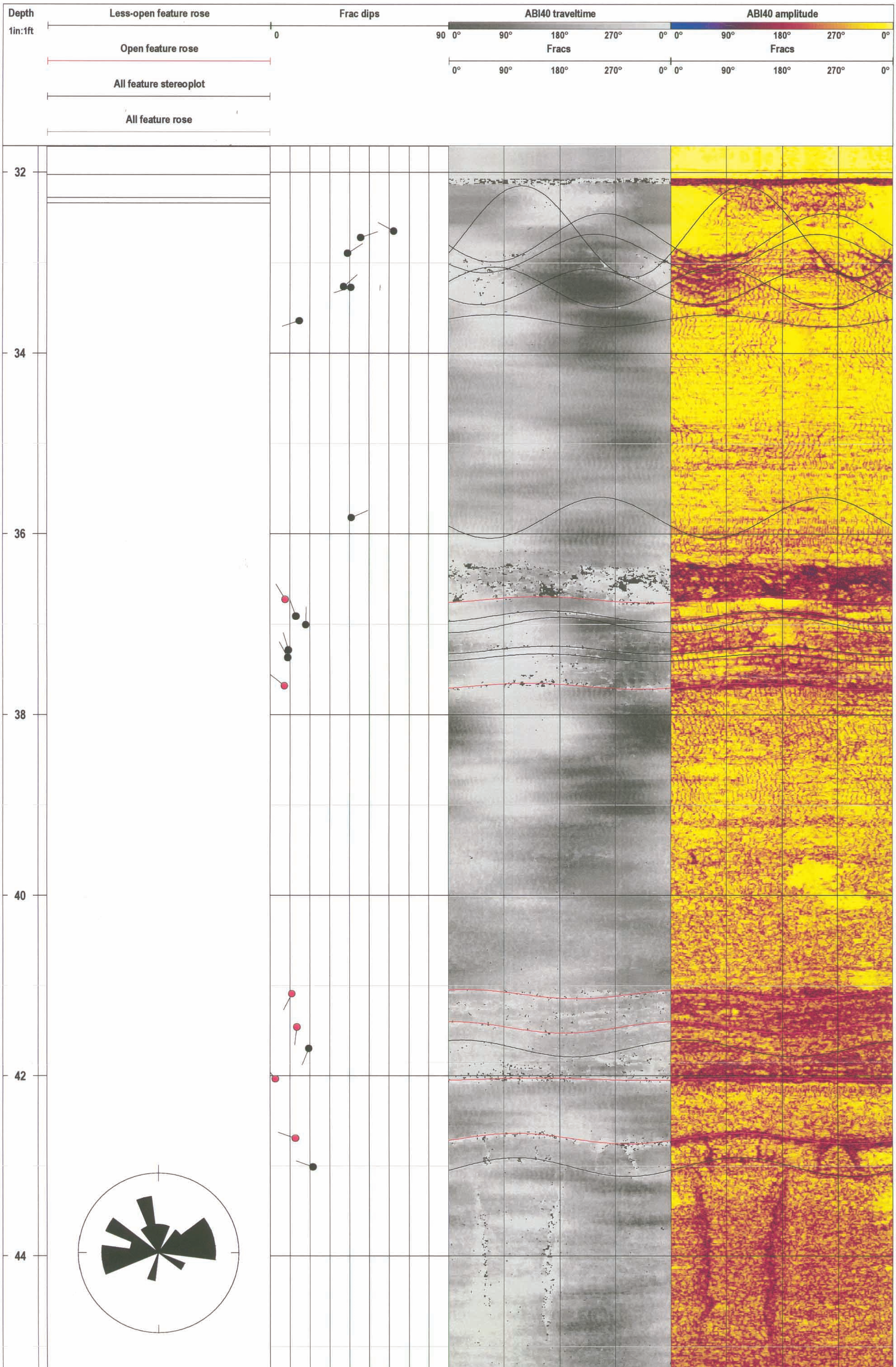


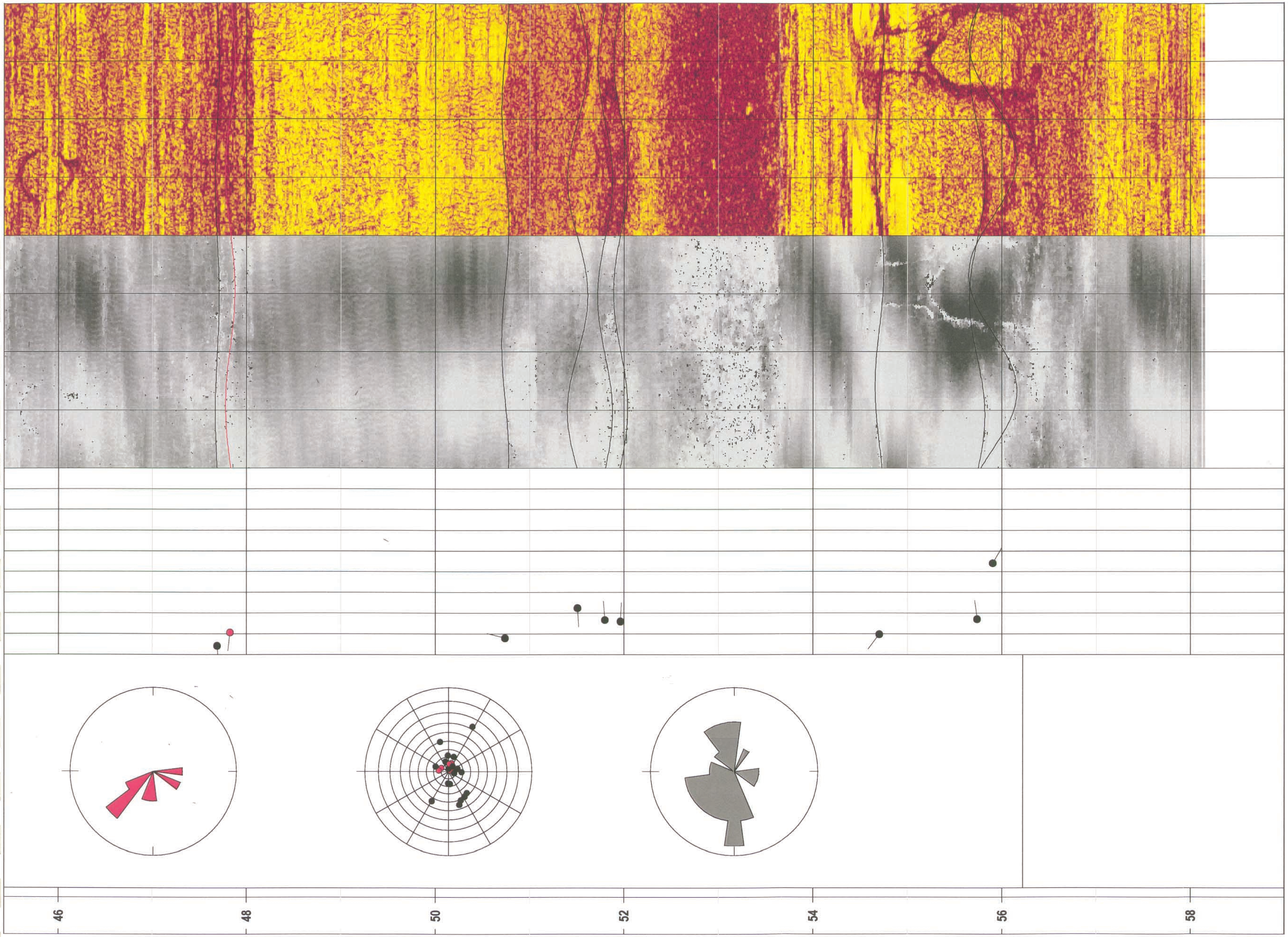

48
50
52
54
56
58

Project - Well: Shaw Env'l/Maywood, NJ - MW-28D conventional logs

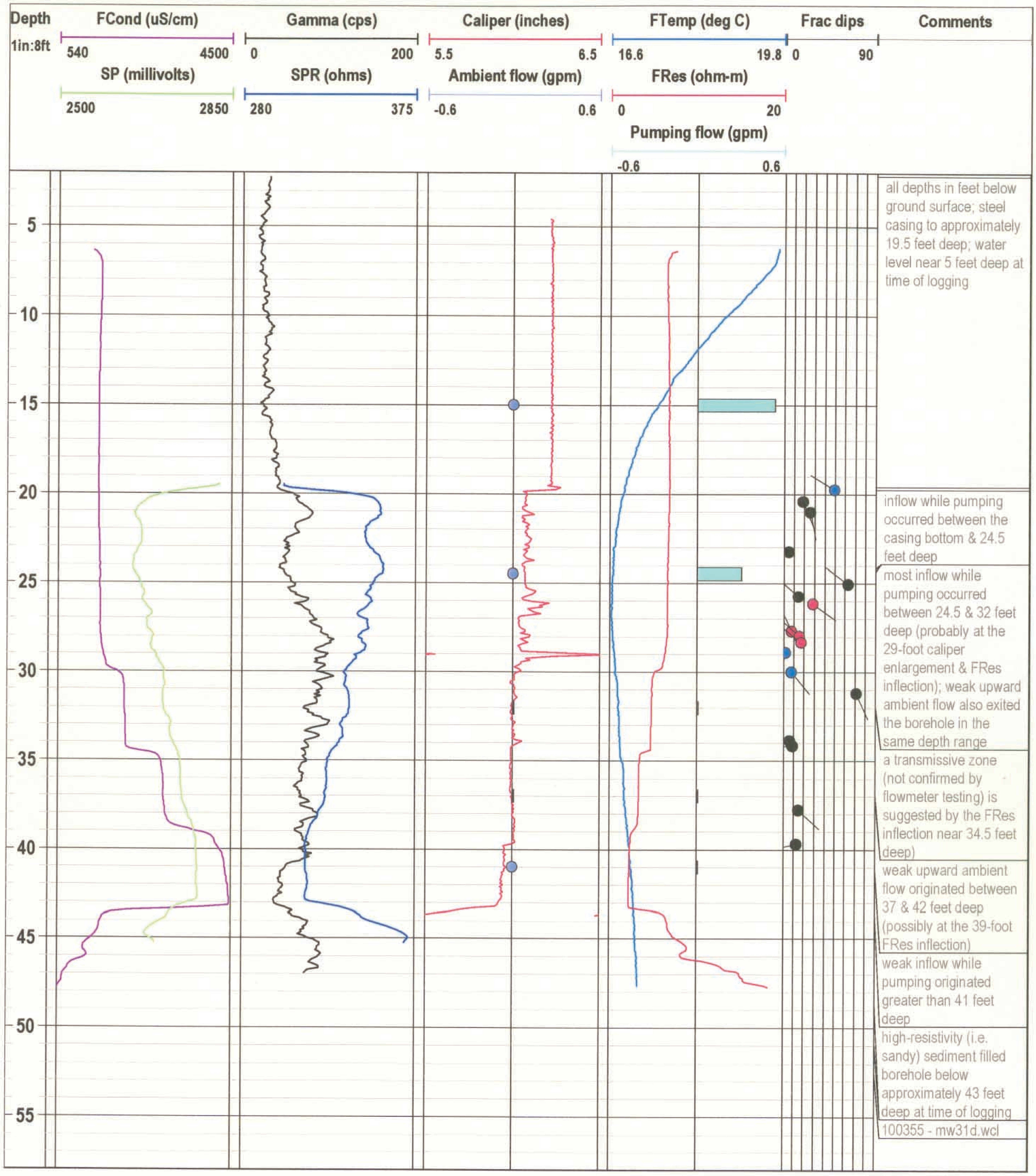


Project - Well: Shaw Env'l/Maywood, NJ - MW-28D acoustic televiewer log

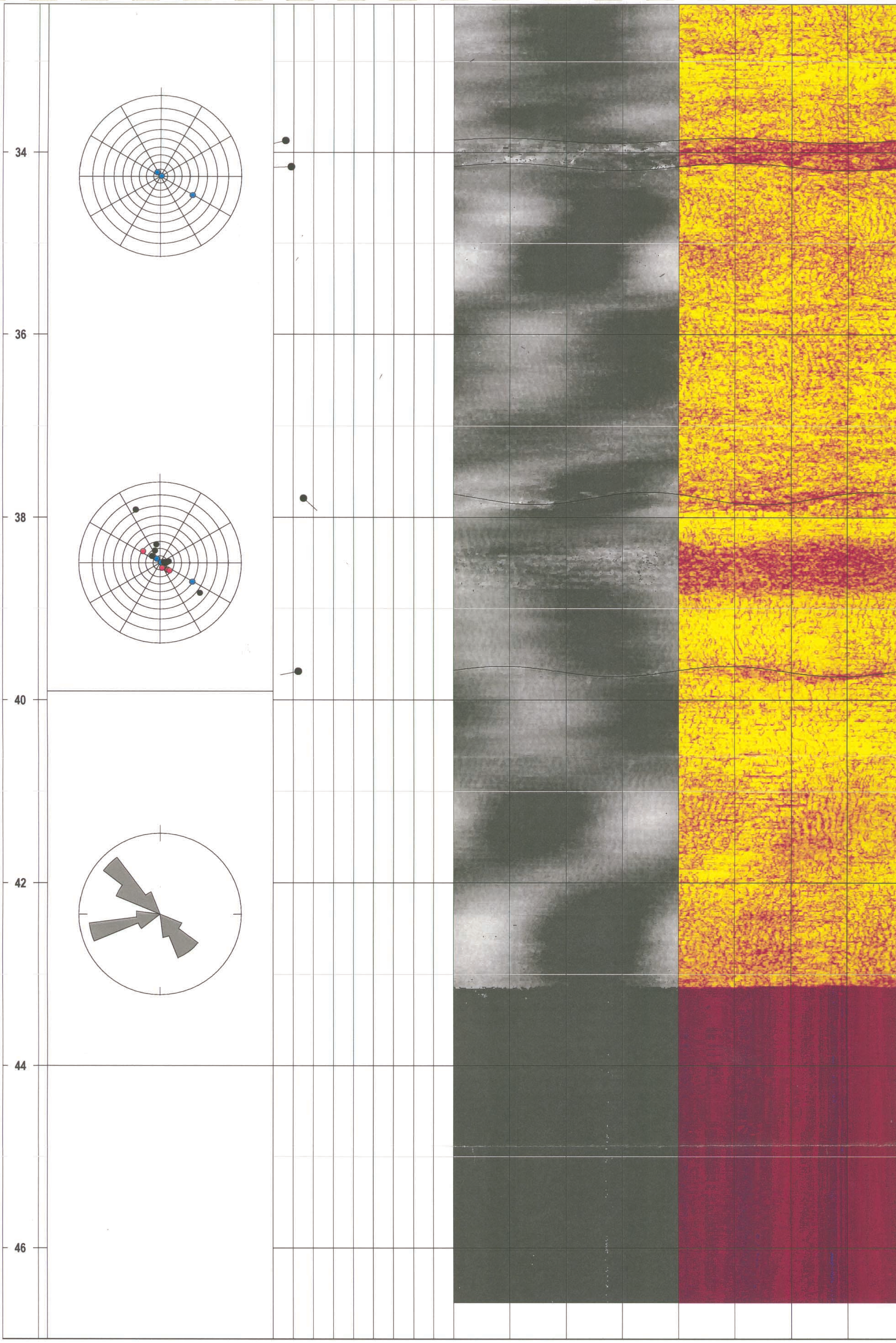



46
48
50
52
54
56
58

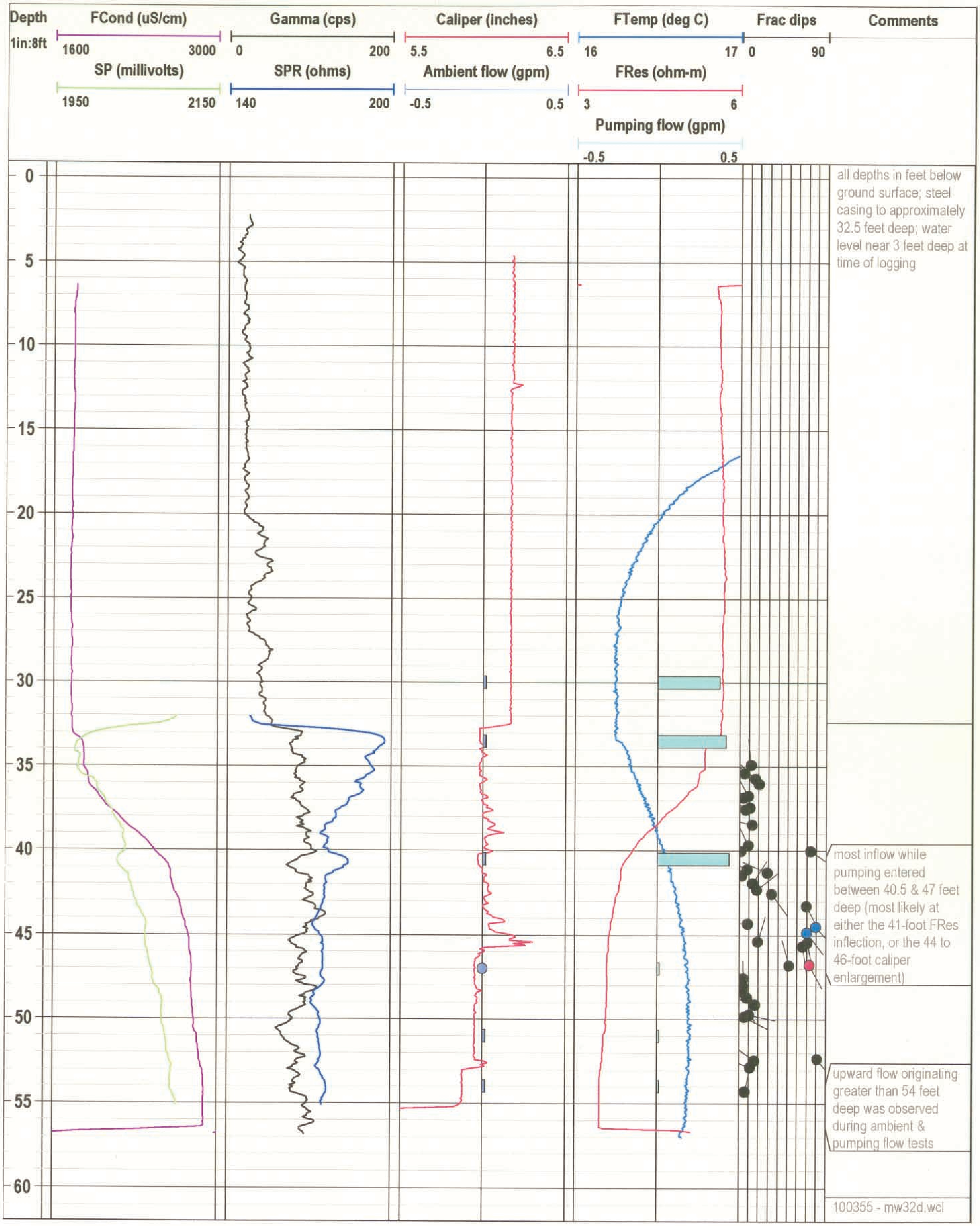
Project - Well: Shaw Env'l/Maywood, NJ - MW-31D conventional logs



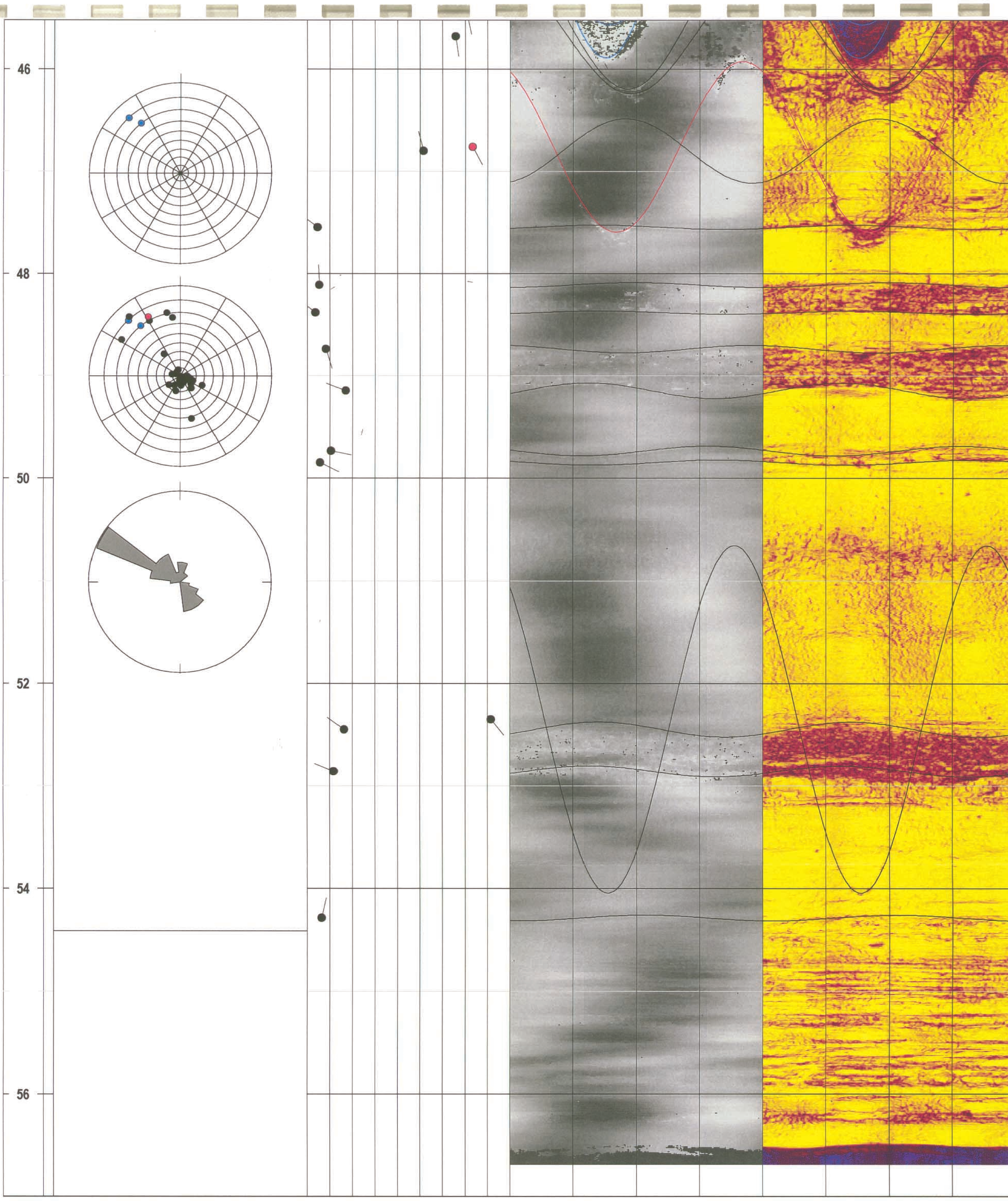
Project - Well: Shaw Env'l/Maywood, NJ - MW-31D acoustic televiewer log


34
36
38
40
42
44
46

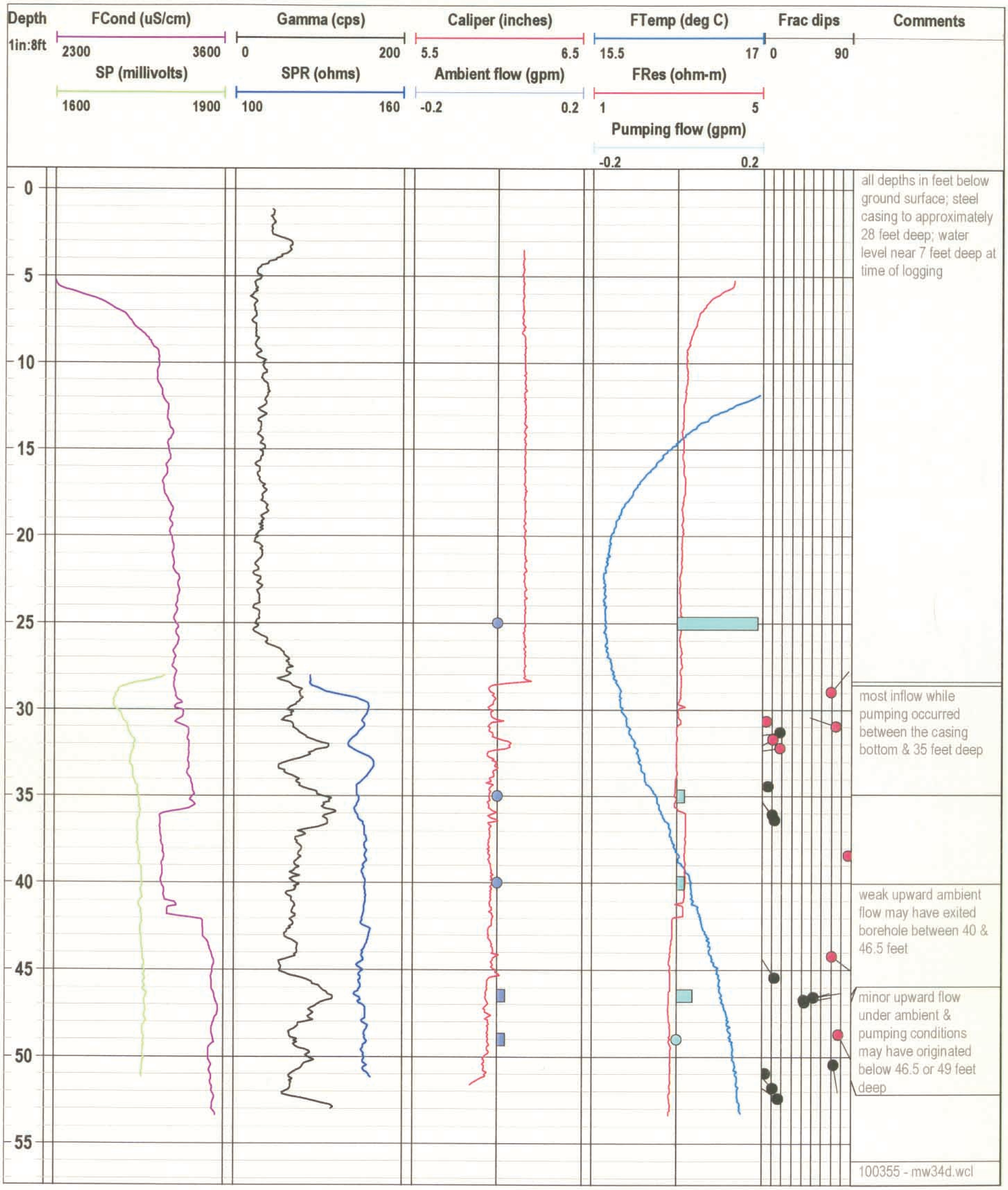
Project - Well: Shaw Env'l/Maywood, NJ - MW-32D conventional logs



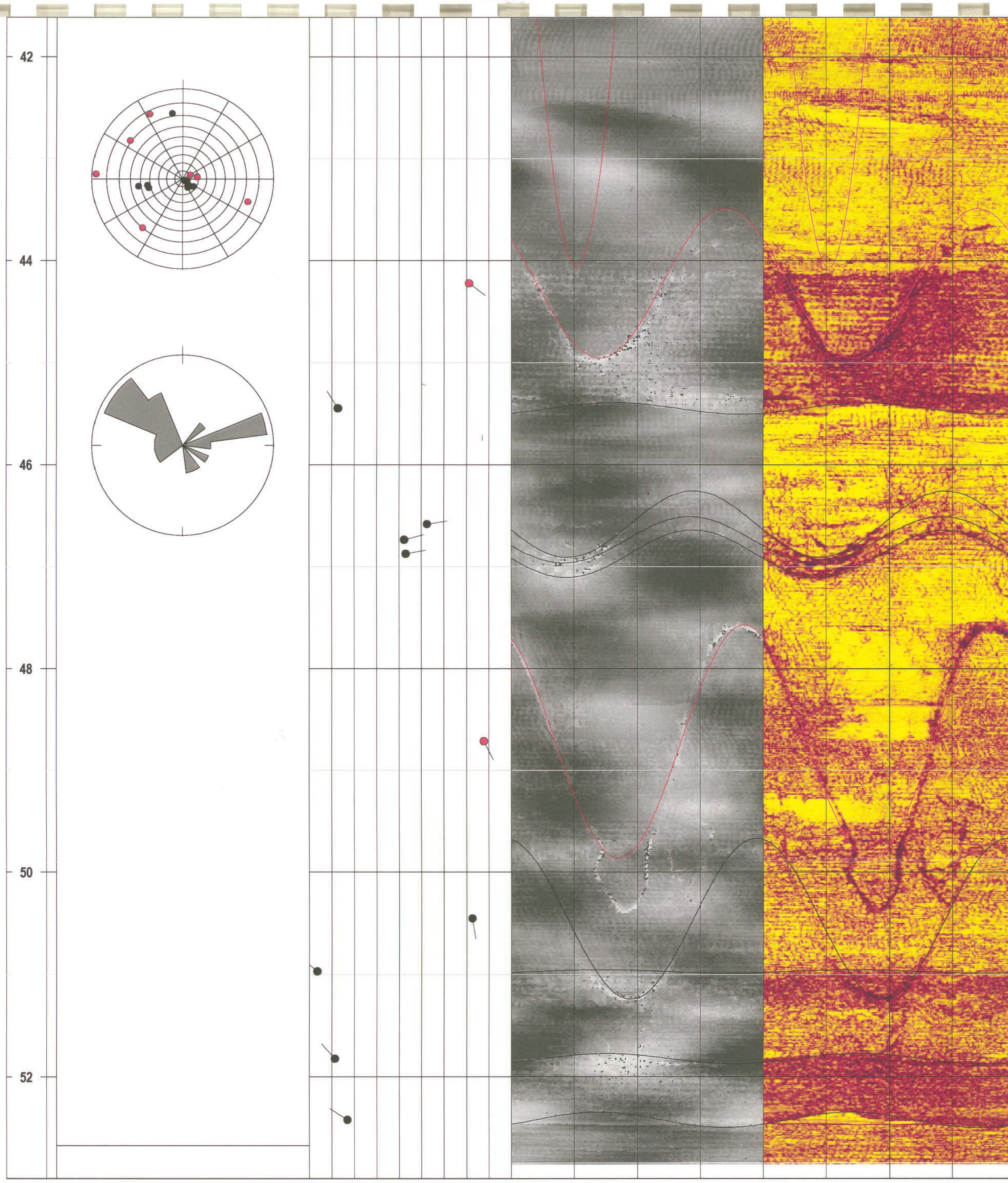
Project - Well: Shaw Env'l/Maywood, NJ - MW-32D acoustic televiewer log


46
48
50
52
54
56

Project - Well: Shaw Env'l/Maywood, NJ - MW-34D conventional logs



Project - Well: Shaw Env'l/Maywood, NJ - MW-34D acoustic televiewer log



42
44
46
48
50
52

Appendix B

Fracture Orientations Measured from Acoustic Televiewer Logs

Fracture Orientations Interpreted from MW-27D Acoustic Televiewer Log
Maywood Chemical Superfund Site
Maywood, New Jersey
Prepared for: Shaw Environmental
100355 - mw27di.xls

depth (feet)	down-dip compass azimuth (degrees)	dip angle (degrees)	fracture category (open = 105 less-open = 100 conductive = 107)
33.51	94.7	78.4	100
35.69	144.8	17.9	100
37.13	224.2	15.6	107
40.16	270.4	23.6	100
44.26	146.1	14.8	100
48.90	317.4	4.7	105
49.21	146.9	80.6	105
49.92	293.3	7.7	100
49.98	151.0	81.6	100
50.13	283.0	8.1	100
51.00	353.1	23.7	100
51.48	9.5	39.1	100
52.33	90.9	82.2	100
52.82	41.6	45.4	100
52.93	62.8	42.6	100
53.93	316.7	16.8	100
55.20	95.8	42.9	100
55.50	275.6	38.6	100
55.68	269.2	28.8	107
56.55	268.4	30.1	100
57.67	275.1	26.4	100
58.69	74.7	78.7	100

Note that down-dip compass azimuth is perpendicular to the strike direction.

Interpreted down-dip compass azimuths are with respect to magnetic north.

Fracture Orientations Interpreted from MW-28D Acoustic Televiewer Log
Maywood Chemical Superfund Site
Maywood, New Jersey
Prepared for: Shaw Environmental
100355 - mw28di.xls

depth (feet)	down-dip compass azimuth (degrees)	dip angle (degrees)	fracture category (open = 105 less-open = 100 conductive = 107)
32.65	298.4	62.5	100
32.72	71.6	45.7	100
32.90	57.2	39.1	100
33.26	49.2	37.1	100
33.27	253.4	40.8	100
33.64	252.3	14.8	100
35.83	66.5	41.1	100
36.73	328.8	7.8	105
36.92	340.4	13.2	100
37.01	1.7	18.0	100
37.29	342.7	9.5	100
37.37	332.3	9.1	100
37.68	309.9	7.2	105
41.09	207.5	11.1	105
41.46	186.6	13.5	105
41.69	201.6	19.5	100
42.04	322.0	2.8	105
42.69	289.9	12.8	105
43.01	290.3	21.7	100
47.69	265.5	4.5	100
47.83	276.5	10.9	105
50.74	14.4	8.2	100
51.51	267.2	22.5	100
51.80	85.8	16.8	100
51.97	92.2	16.1	100
54.70	307.0	9.9	100
55.74	82.3	17.2	100
55.91	119.6	44.2	100

Note that down-dip compass azimuth is perpendicular to the strike direction.

Interpreted down-dip compass azimuths are with respect to magnetic north.

Fracture Orientations Interpreted from MW-31D Acoustic Televiewer Log
Maywood Chemical Superfund Site
Maywood, New Jersey
Prepared for: Shaw Environmental
100355 - mw31di.xls

depth (feet)	down-dip compass azimuth (degrees)	dip angle (degrees)	fracture category (open = 105 less-open = 100 conductive = 107)
19.77	300.8	49.7	107
20.43	157.1	18.8	100
21.01	168.5	26.2	100
23.26	262.1	5.1	100
25.06	307.4	63.4	100
25.74	311.1	14.8	100
26.16	124.3	28.6	105
27.72	335.3	8.2	105
27.99	312.5	15.7	105
28.34	309.9	17.4	105
28.90	242.4	2.2	107
29.99	140.9	7.8	107
31.19	155.5	71.9	100
33.87	257.0	6.2	100
34.16	268.4	9.1	100
37.79	131.5	15.3	100
39.69	259.0	12.7	100

Note that down-dip compass azimuth is perpendicular to the strike direction.

Interpreted down-dip compass azimuths are with respect to magnetic north.

Fracture Orientations Interpreted from MW-32D Acoustic Televiewer Log
Maywood Chemical Superfund Site
Maywood, New Jersey
Prepared for: Shaw Environmental
100355 - mw32di.xls

depth (feet)	down-dip compass azimuth (degrees)	dip angle (degrees)	fracture category (open = 105 less-open = 100 conductive = 107)
34.90	353.1	12.5	100
35.39	297.6	5.8	100
35.72	307.3	16.8	100
36.03	318.1	20.5	100
36.76	332.0	9.4	100
36.86	324.8	4.9	100
37.46	285.0	11.5	100
37.57	298.4	6.9	100
38.45	283.8	13.2	100
39.67	335.4	9.6	100
40.02	312.2	1.8	100
40.03	121.9	74.6	100
41.09	299.6	8.3	100
41.29	293.5	29.5	100
41.44	306.7	2.9	100
41.93	32.0	13.8	100
42.31	51.3	18.6	100
42.55	143.4	33.5	100
43.28	150.8	70.0	100
44.32	275.1	9.3	100
44.51	137.0	79.8	107
44.86	141.8	70.5	107
45.39	16.5	19.7	100
45.46	168.1	71.1	100
45.68	172.4	66.1	100
46.76	151.6	73.4	105
46.80	345.0	51.7	100
47.55	306.7	4.7	100
48.11	358.1	5.5	100
48.38	307.9	3.6	100
48.74	162.2	8.3	100
49.14	291.3	16.9	100
49.73	101.2	10.8	100
49.84	116.8	5.8	100
52.35	139.5	81.7	100
52.45	306.3	16.4	100
52.86	292.6	11.9	100
54.28	12.6	6.5	100

Note that down-dip compass azimuth is perpendicular to the strike direction.

Interpreted down-dip compass azimuths are with respect to magnetic north.

Fracture Orientations Interpreted from MW-34D Acoustic Televiewer Log
Maywood Chemical Superfund Site
Maywood, New Jersey
Prepared for: Shaw Environmental
100355 - mw34di.xls

depth (feet)	down-dip compass azimuth (degrees)	dip angle (degrees)	fracture category (open = 105 less-open = 100 conductive = 107)
28.97	39.2	70.2	105
30.69	302.8	4.7	105
30.97	289.7	74.7	105
31.30	262.0	18.7	100
31.71	242.4	11.2	105
32.23	262.9	18.6	105
34.41	295.3	6.5	100
36.06	320.4	10.7	100
36.37	326.6	12.7	100
38.44	93.4	87.5	105
44.22	126.3	71.3	105
45.45	327.6	12.9	100
46.58	80.5	52.7	100
46.74	75.0	42.5	100
46.87	79.3	43.3	100
48.71	153.0	77.8	105
50.45	170.6	72.6	100
50.97	309.1	3.6	100
51.82	317.4	11.5	100
52.42	304.7	17.0	100

Note that down-dip compass azimuth is perpendicular to the strike direction.

Interpreted down-dip compass azimuths are with respect to magnetic north.

Appendix C

Daily Field Reports

Daily Field Report
Borehole Geophysics Logging Project
Maywood Superfund Site
Maywood, New Jersey
performed for
Stone & Webster, Inc.

Date: 6/23/03

Work location(s): MW-27d

Subcontractor: Geophysical Applications, Inc.

GeoApp Personnel: Mark Blackey

On-site work hours: 0800 → 1620

Standby hours: none

Work performed (borehole designations, logging runs):

MW-27d: fluid temperature, fluid resistivity, caliper, natural gamma, single-point resistance (SPR) spontaneous potential (SP) acoustic televiewer, heat-pulse flowmeter (ambient & pumping conditions)

Equipment used:

- Mount Sopris 4MXA logging winch & electronics box ☑
- Mount Sopris caliper/fluid temp/fluid resistivity probe ☑
- Mount Sopris flowmeter probe ☑
- Mount Sopris SP/SPR/gamma probe ☑
- ALT acoustic televiewer probe (ABI 40) ☑
- ALT optical televiewer probe ☐
- Laval borehole video system ☐

Problems or obstacles encountered:

none

Geophysicist's signature: M. Blackey

100355.frm.doc

Daily Field Report
Borehole Geophysics Logging Project
Maywood Superfund Site
Maywood, New Jersey
performed for
Stone & Webster, Inc.

Date: 6/24/03

Work location(s): mw-28d, mw-31d

Subcontractor: Geophysical Applications, Inc.

GeoApp Personnel: Mark Blackey

On-site work hours: 0700 → 1650

Standby hours: none

Work performed (borehole designations, logging runs):

mw-28d: FTemp/FRes caliper natural gamma, SP SPR, acoustic televiewer, heat-pulse flowmeter (ambient & pumping)

mw-31d: FTemp FRes caliper natural gamma SP SPR, acoustic televiewer, heat-pulse flowmeter (ambient & pumping)

Equipment used:

- Mount Sopris 4MXA logging winch & electronics box ☑
- Mount Sopris caliper/fluid temp/fluid resistivity probe ☑
- Mount Sopris flowmeter probe ☑
- Mount Sopris SP/SPR/gamma probe ☑
- ALT acoustic televiewer probe (ABI40 ☑
- ALT optical televiewer probe ☐
- Laval borehole video system ☐

Problems or obstacles encountered:

none

Geophysicist's signature: M. Blackey

100355.frm.doc

Daily Field Report
Borehole Geophysics Logging Project
Maywood Superfund Site
Maywood, New Jersey
performed for
Stone & Webster, Inc.

Date: 6/25/03

Work location(s): MW-34D, MW-32D

Subcontractor: Geophysical Applications, Inc.

GeoApp Personnel: Mark Blackey

On-site work hours: 0700 → 1650

Standby hours:

Work performed (borehole designations, logging runs):

MW-34d: FTemp, FRes, caliper natural gamma, SP, SPR, acoustic televiewer, heat-pulse flowmeter (ambient & pumping)

MW-32d: same as above

Equipment used:

- Mount Sopris 4MXA logging winch & electronics box ☑
- Mount Sopris caliper/fluid temp/fluid resistivity probe ☑
- Mount Sopris flowmeter probe ☑
- Mount Sopris SP/SPR/gamma probe ☑
- ALT acoustic televiewer probe (ABI40) ☑
- ALT optical televiewer probe ☐
- Laval borehole video system ☐

Problems or obstacles encountered:

none

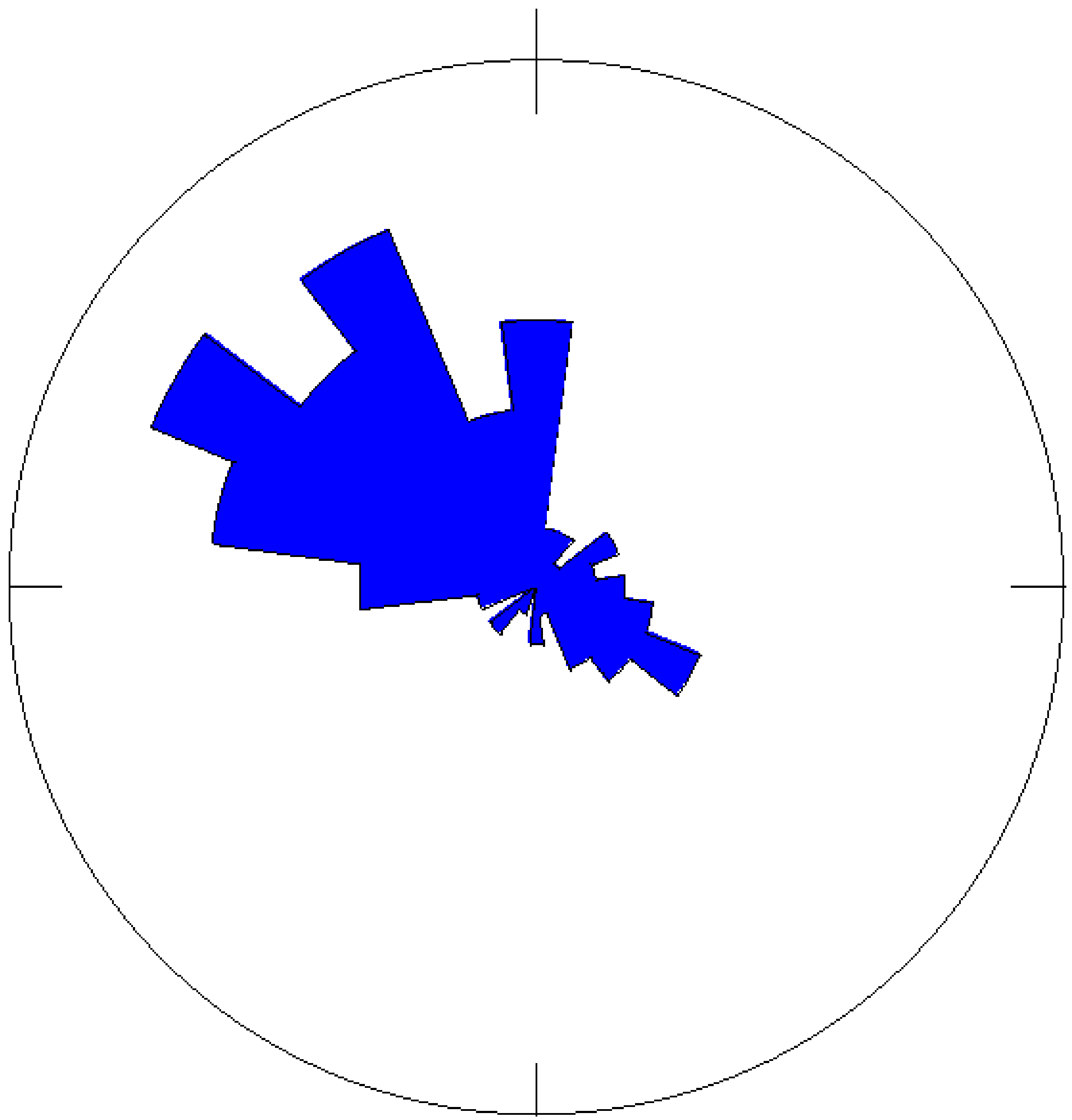
Geophysicist's signature: M. Blackey

100355.frm.doc

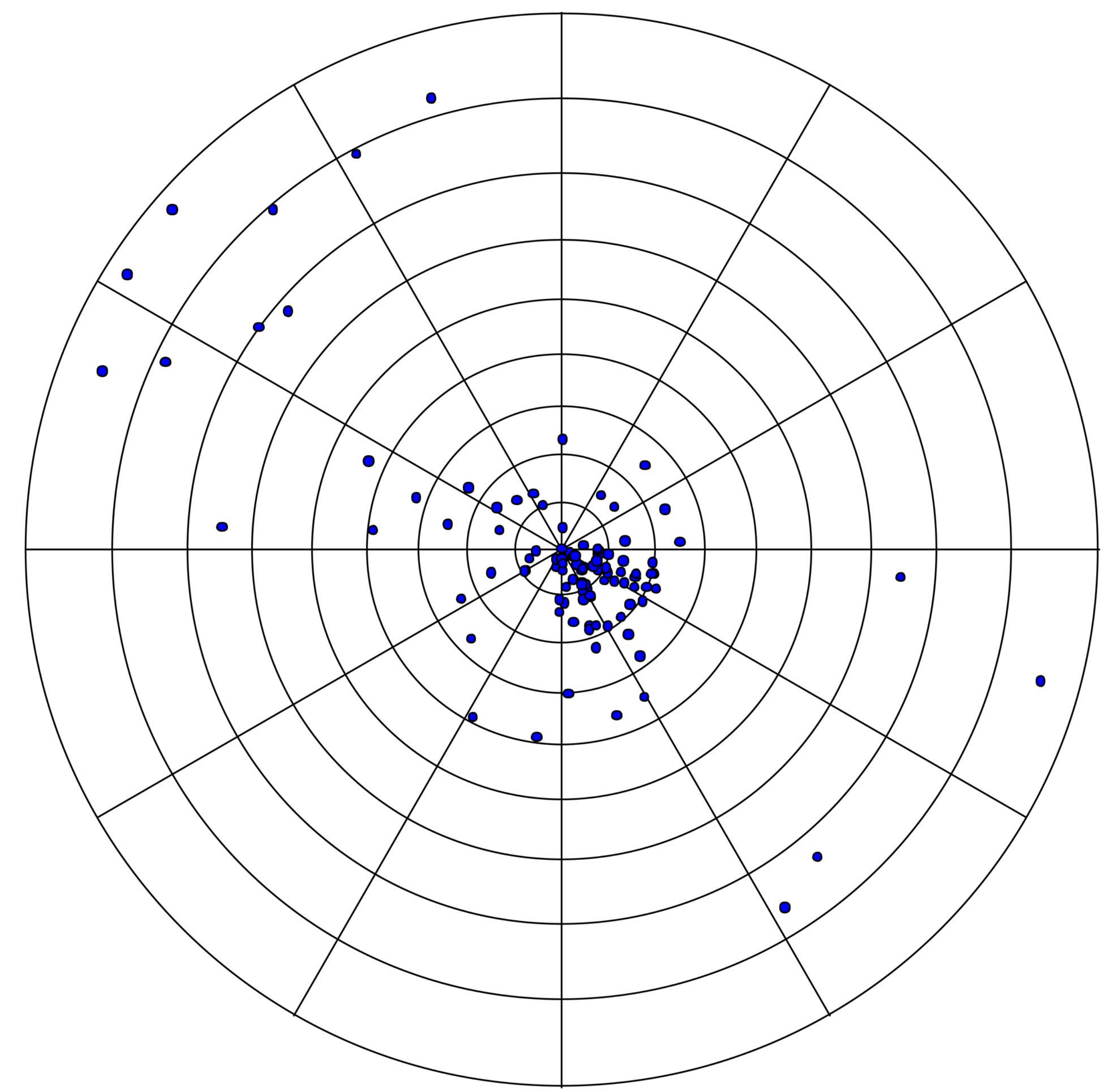
APPENDIX G.2

GWRI ROSE DIAGRAM/STEREONET PLOT OF WATER FILLED FRACTURES

(EXCERPTED FIGURE 3-12B, JUNE 2003)



Summary Rose Plot



Summary Stereonet

reference only. The USACE is reviewing historical archives to confirm the accuracy of the property locations and status depicted on the map. If you have a specific question about a particular property, please contact the USACE Public Information New Jersey or call 201-843-7466. Or, visit the FUSRAP Maywood Chemical Company Superfund Site at <www.fusrapmaywood.com>.

Figure 3-12 b: Summation of Conductive Bedrock Fracture Orientations within FMSS based on Borehole Geophysics

Legend:

Summary rose plot diagram displays the dominant down-dip fracture azimuth observed within borehole geophysical data in all FMSS boreholes logged. Summary stereonet is a lower hemisphere, equal angle, polar projection. **Summary stereonet diagram displays the dominant down-dip fracture azimuth and angle of fracture dip observed within borehole geophysical data in all FMSS boreholes logged. Black stereonet pole plots indicate less open fractures. Red stereonet pole plots indicate more open fractures. Blue stereonet pole plots indicate water filled fractures.**

Magnetic north is located to the top of each diagram.

US Army Corps of Engineers®

FUSRAP Maywood Superfund Site

Shaw Stone & Webster, Inc.

APPENDIX H

Monitoring Well Certification Form - B

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION – FORM B-LOCATION CERTIFICATION

Name of Permittee: **STONE & WEBSTER**
Name of Facility: **FUSRAP Maywood Superfund Site**
Location: **Maywood, NJ 07607**

NJPDES Number: NJ ____________

LAND SURVEYOR'S CERTIFICATION

Well Permit (As assigned by NJDEP's Water Allocation Section): 2 6-6 5 2 1 9 -
This number must be permanently affixed to the well casing.

NAD 83

Longitude (one-tenth of a second): West 74-04-16.62
Latitude (one-tenth of a second): North 40-53-55.12
Elevation of Top of Casing (cap off) (one-hundredth of a foot): 65.16 (NGVD 29)
Owner's Well Number (As shown on the application or plans): MW-27D

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

PROFESSIONAL LAND SURVEYOR'S SIGNATURE

ANGELO J. FIORENZA
PROFESSIONAL LAND SURVEYOR'S NAME
(Please print or type)

SEAL

NJ LIC NO. 37586
PROFESSIONAL LAND SURVEYOR'S LICENSE#

The Department reserves the right in cases of violation of permit specified ground water limits or Ground Water Quality Standards (N.J.A.C 7:9-6.1 et seq.) to require that wells be resurveyed to an accuracy of one hundredth of a second latitude and longitude. This shall not be considered to require a major modification of the NJPDES permit.

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION – FORM B-LOCATION CERTIFICATION

Name of Permittee: **STONE & WEBSTER**
Name of Facility: **FUSRAP Maywood Superfund Site**
Location: **Maywood, NJ 07607**

NJPDES Number: NJ ______________

LAND SURVEYOR'S CERTIFICATION

Well Permit (As assigned by NJDEP's Water Allocation Section): This number must be permanently affixed to the well casing.	2 6- 6 5 2 2 0 -
	NAD 83
Longitude (one-tenth of a second):	West 74-04-16.21
Latitude (one-tenth of a second):	North 40-53-53.63
Elevation of Top of Casing (cap off) (one-hundredth of a foot):	64.50 (NGVD 29)
Owner's Well Number (As shown on the application or plans):	MW-28D

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

PROFESSIONAL LAND SURVEYOR'S SIGNATURE

ANGELO J. FIORENZA
PROFESSIONAL LAND SURVEYOR'S NAME
(Please print or type)

SEAL

NJ LIC NO. 37586
PROFESSIONAL LAND SURVEYOR'S LICENSE#

The Department reserves the right in cases of violation of permit specified ground water limits or Ground Water Quality Standards (N.J.A.C 7:9-6.1 et seq.) to require that wells be resurveyed to an accuracy of one hundredth of a second latitude and longitude. This shall not be considered to require a major modification of the NJPDES permit.

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION – FORM B-LOCATION CERTIFICATION

Name of Permittee: **STONE & WEBSTER**
Name of Facility: **FUSRAP Maywood Superfund Site**
Location: **Maywood, NJ 07607**

NJPDES Number: NJ ________________

LAND SURVEYOR'S CERTIFICATION

Well Permit (As assigned by NJDEP's Water Allocation Section): This number must be permanently affixed to the well casing.	2 6-6 6 7 7 4 -
	NAD 83
Longitude (one-tenth of a second):	West 74-04-29.04
Latitude (one-tenth of a second):	North 40-53-48.96
Elevation of Top of Casing (cap off) (one-hundredth of a foot):	49.08 (NGVD 29)
Owner's Well Number (As shown on the application or plans):	MW-31D

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

PROFESSIONAL LAND SURVEYOR'S SIGNATURE

ANGELO J. FIORENZA
PROFESSIONAL LAND SURVEYOR'S NAME
(Please print or type)

SEAL

NJ LIC NO. 37586
PROFESSIONAL LAND SURVEYOR'S LICENSE#

The Department reserves the right in cases of violation of permit specified ground water limits or Ground Water Quality Standards (N.J.A.C 7:9-6.1 et seq.) to require that wells be resurveyed to an accuracy of one hundredth of a second latitude and longitude. This shall not be considered to require a major modification of the NJPDES permit.

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION – FORM B-LOCATION CERTIFICATION

Name of Permittee: **STONE & WEBSTER**
Name of Facility: **FUSRAP Maywood Superfund Site**
Location: **Maywood, NJ 07607**

NJPDES Number: NJ ______________

LAND SURVEYOR'S CERTIFICATION

Well Permit (As assigned by NJDEP's Water Allocation Section): This number must be permanently affixed to the well casing.		2 6-6 7 2 6 8 -
		NAD 83
Longitude (one-tenth of a second):	West	74-04-25.82
Latitude (one-tenth of a second):	North	40-53-48.06
Elevation of Top of Casing (cap off) (one-hundredth of a foot):		49.18 (NGVD 29)
Owner's Well Number (As shown on the application or plans):		MW-32D

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

PROFESSIONAL LAND SURVEYOR'S SIGNATURE

ANGELO J. FIORENZA
PROFESSIONAL LAND SURVEYOR'S NAME
(Please print or type)

SEAL

NJ LIC NO. 37586
PROFESSIONAL LAND SURVEYOR'S LICENSE#

The Department reserves the right in cases of violation of permit specified ground water limits or Ground Water Quality Standards (N.J.A.C 7:9-6.1 et seq.) to require that wells be resurveyed to an accuracy of one hundredth of a second latitude and longitude. This shall not be considered to require a major modification of the NJPDES permit.

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION – FORM B-LOCATION CERTIFICATION

Name of Permittee: **STONE & WEBSTER**
Name of Facility: **FUSRAP Maywood Superfund Site**
Location: **Maywood, NJ 07607**

NJPDES Number: NJ ____________

LAND SURVEYOR'S CERTIFICATION

Well Permit (As assigned by NJDEP's Water Allocation Section): This number must be permanently affixed to the well casing.		2 6- 6 5 2 2 1 -
		NAD 83
Longitude (one-tenth of a second):	West	74-04-18.50
Latitude (one-tenth of a second):	North	40-53-54.48
Elevation of Top of Casing (cap off) (one-hundredth of a foot):		62.24 (NGVD 29)
Owner's Well Number (As shown on the application or plans):		MW-33D

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

PROFESSIONAL LAND SURVEYOR'S SIGNATURE

ANGELO J. FIORENZA
PROFESSIONAL LAND SURVEYOR'S NAME
(Please print or type)

SEAL

NJ LIC NO. 37586
PROFESSIONAL LAND SURVEYOR'S LICENSE#

The Department reserves the right in cases of violation of permit specified ground water limits or Ground Water Quality Standards (N.J.A.C 7:9-6.1 et seq.) to require that wells be resurveyed to an accuracy of one hundredth of a second latitude and longitude. This shall not be considered to require a major modification of the NJPDES permit.

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION – FORM B-LOCATION CERTIFICATION

Name of Permittee: **STONE & WEBSTER**
Name of Facility: **FUSRAP Maywood Superfund Site**
Location: **Maywood, NJ 07607**

NJPDES Number: NJ ______________

LAND SURVEYOR'S CERTIFICATION

Well Permit (As assigned by NJDEP's Water Allocation Section): This number must be permanently affixed to the well casing.	2 6- 6 5 2 1 8 -
	NAD 83
Longitude (one-tenth of a second):	West 74-04-17.38
Latitude (one-tenth of a second):	North 40-53-53.01
Elevation of Top of Casing (cap off) (one-hundredth of a foot):	60.63 (NGVD 29)
Owner's Well Number (As shown on the application or plans):	MW-34D

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

PROFESSIONAL LAND SURVEYOR'S SIGNATURE

ANGELO J. FIORENZA
PROFESSIONAL LAND SURVEYOR'S NAME
(Please print or type)

SEAL

NJ LIC NO. 37586
PROFESSIONAL LAND SURVEYOR'S LICENSE#

The Department reserves the right in cases of violation of permit specified ground water limits or Ground Water Quality Standards (N.J.A.C 7:9-6.1 et seq.) to require that wells be resurveyed to an accuracy of one hundredth of a second latitude and longitude. This shall not be considered to require a major modification of the NJPDES permit.

APPENDIX I

Well Purging and Sampling Records

Shaw™ Stone & Webster, Inc.

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE ________ WBS ________ DATE 7-2-02

WORK ORDER # ________ NORFAS ________

FIELD INSTRUMENTS: YSI 650 MDS Grundfos pump; PID/O2 H2S; LEL meters; Water level indicator; generator

SAMPLING METHOD Low Flow

Well I.D B38W17B

SAMPLE I.D 20a-024645

MEAS. REF. POINT (Ft. AGS or BGS) BGS

WELL DEPTH (Ft. TOC) 10.58' / 9.58 adjusted to meter

INNER CASING/OPEN HOLE DIAM (In) 2"

DEPTH TO TOP OF SCREEN (Ft TOC) ~~18.72~~ 40.0'

WLL VOLUME (Gal) ________

PUMP INTAKE (Ft. TOC) ________

Sample Time (From/To)	Water Level ~~TOC~~ (Ft ~~TOC~~)	Discharge (milliliter/minute)	Volume Purged ~~(GAL)~~ mL	Temp °C	Specific Cond, (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
0945	~~10.11~~ 9.11	300	1500	18.85	~~2016~~ 2033	6.79	-4.0	18.81	6.3
0950	~~10.17~~ 9.11	180	2400	18.21	2007	6.77	-2.2	27.95	6.9
0955	9.61	480	4800	17.59	2004	6.76	-5.8	33.66	1.2
1000	9.61	540	7500	16.07	2327	6.74	-6.4	35.70	0.1
1005	9.62	600	10500	15.77	2319	6.75	-12.6	34.20	-0.2
1010	9.61	460	12900	16.03	2311	6.76	-15.8	34.83	-0.3
1015	9.61	240	14100	17.03	2308	6.76	-18.5	34.03	-0.2
1020	9.12	280	15500	17.55	2315	6.78	-19.8	33.02	3.1
1025	9.11	340	17200	17.46	2329	6.77	-21	35.72	-0.2
1030	9.11	380	18600	17.56	2317	6.78	-23.0	32.41	-0.3
1040	9.11	350	20350	17.50	2321	6.78	-21.7	33.63	0.2
1045	9.11			17.61	2322	6.78	-20.8	31.64	-0.3
1050	Sample								

APPEARANCE/COLOR Slt. hazy / no color

ODOR Slight odor

SAMPLED BY (PRINT) S. Hall / C. Kassaw

SAMPLED BY ________

SIGNATURE [signature]

SIGNATURE ________

WELL CAP REPLACED AND LOCKED BY G. M.

DATE/TIME 7-2-02 1050

Shaw Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood WBS ________ DATE 7-8-02

WORK ORDER # ________ NORFAS ________

FIELD INSTRUMENTS: YSI Horiba PID, O2, CO LEL, H2S meter; Water level indicator; Control box; submersible pump

SAMPLING METHOD Low flow

Well I.D MISS-02B

SAMPLE I.D 12b-024633

MEAS. REF. POINT (Ft. AGS or BGS) ________

WELL DEPTH (Ft. TOC) ________

INNER CASING/OPEN HOLE DIAM (In) 4"

DEPTH TO TOP OF SCREEN (Ft TOC) 28.5 (open hole)

WLL VOLUME (Gal) ________

PUMP INTAKE (Ft. TOC) ________

used YSI 650 MDS for all readings

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/minute)	Volume Purged (ml)	Temp °C	Specific Cond, (mS/cm)	pH	ORP Eh (mv)	DO (mg/L)	Turbidity (NTU)	
1325	12.10	260	1300	15.89	5079	6.86	-44.0	10.17	16.3	Lt yellow Tnt/Haz
1330	12.10	240	2500	16.25	5069	6.78	-31.4	11.05	17.1	SL odor
1335	12.11	210	3550	16.64	5038	6.75	-26.1	10.75	16.8	"
1340	12.15	420	5650	16.02	4988	6.72	-23.7	10.46	15.7	" "
1345	12.17	420	7750	16.17	4940	6.69	-23.5	10.53	12.6	" "
1350	12.20	420	9850	15.99	4932	6.69	-21.4	11.55	12.3	
1355	12.22	420	11950	16.16	4941	6.66	-23.7	11.70	12.2	
1400	12.21	420	14050	15.94	4919	6.65	-22.3	11.87	9.9	
1405	12.21	400	16050	15.86	4908	6.65	-22.1	11.95	8.7	
1410	12.21	420	18150	16.10	4884	6.64	-20.1	11.67	8.8	
1415	Sample Time									

APPEARANCE/COLOR Clear/Slt. yellow color

ODOR Slight odor

SAMPLED BY (PRINT) S. Hall

SAMPLED BY L. Kauzm

SIGNATURE [signature]

SIGNATURE [signature]

WELL CAP REPLACED AND LOCKED BY [initials]

DATE/TIME 7-8-02 1430

Shaw Stone & Webster, Inc.

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION
WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood WBS ________ DATE 7-9-02

WORK ORDER # ________ NORFAS ________

FIELD INSTRUMENTS: PID LEL O_2 CO & H_2S meter; Control box; submersible pump; YSI; Horiba; Water level indicator

2020 Turbid. meter

SAMPLING METHOD Low flow

Well I.D B38W19D

SAMPLE I.D 12b-024648

MEAS. REF. POINT (Ft. AGS or BGS) ________

WELL DEPTH (Ft. TOC) 50.2'

INNER CASING/OPEN HOLE DIAM (Ia) 2"

DEPTH TO TOP OF SCREEN (Ft TOC) 24'

WLL VOLUME (Gal) ________

PUMP INTAKE (Ft. TOC) ________

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/minute)	Volume Purged (ml)	Temp °C	Specific Cond, (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
1305	16.18	320	640	15.84	3847	6.67	27.4	13.64	80.0
1310	16.18	340	2340	16.01	3822	6.92	15.1	13.98	0.00
1315	16.18	110	2890	16.81	376.4	6.43	12.7	13.14	0.00
1320	16.18	250	4140	16.57	3761	6.50	8.9	13.11	0.00
1325	16.17	250	5390	17.17	3749	6.52	5.2	12.89	0.00
1330	16.16	250	6640	17.02	3758	6.49	3.0	13.28	0.00
1335	16.17	240	7840	17.02	3749	6.30	1.3	12.90	0.00
1340	Sample well								

APPEARANCE/COLOR Clear/no color

ODOR Slight odor

SAMPLED BY (PRINT) Shawn Hall

SAMPLED BY Laura Knox

SIGNATURE [signature]

SIGNATURE [signature]

WELL CAP REPLACED AND LOCKED BY [signature]

DATE/TIME 7-9-02 /

Shaw™ Stone & Webster, Inc.

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION
WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood WBS ________ DATE 7-10-02

WORK ORDER # ________ NORFAS ________

FIELD INSTRUMENTS: YSI 650 MDS; PID, O_2, CO, H_2S & LEL meter; Submersible pump (Grundfos); Control box; water level indicator

SAMPLING METHOD Low

Well I.D B38W25D

SAMPLE I.D 126-024652

MEAS. REF. POINT (Ft. AGS or BGS) ________

WELL DEPTH (Ft. TOC) 30.4'

INNER CASING/OPEN HOLE DIAM (in) 2"

DEPTH TO TOP OF SCREEN (Ft TOC) ________

WLL VOLUME (Gal) ________

PUMP INTAKE (Ft. TOC) ________

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/ minute)	Volume Purged (ml)	Temp °C	Specific Cond. (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
1050	7.78	1000	200	17.73	1154	6.43	-20.9	10.57	-1.5
1055	7.79	2000	200	17.73	1164	6.38	-19.4	7.66	-0.7
1100	7.79	3200	240	18.39	1158	6.37	-15.6	9.65	-0.8
1105	7.80	4850	330	17.22	1161	6.35	-15.2	11.81	-1.0
1110	7.82	6450	320	16.85	1160	6.34	-15.6	13.67	-1.1
1115	7.83	8150	340	16.77	1159	6.33	-15.4	14.17	-1.1
1120	7.83	9850	340	16.91	1160	6.33	-15.8	15.50	-1.2
1130	sampled								

APPEARANCE/COLOR clear / no color

ODOR SH. odor

SAMPLED BY (PRINT) L. Kassian

SAMPLED BY S. Hall

SIGNATURE [signature]

SIGNATURE [signature]

WELL CAP REPLACED AND LOCKED BY SH

DATE/TIME 7-10-02 / 1145

Shaw Stone & Webster, Inc.

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION
WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood WBS ________ DATE 7-11-02

WORK ORDER # ________ NORFAS ________

FIELD INSTRUMENTS: PID, LEL, O_2, CO & H_2S meter; Water level indicator; Grundfos submersible pump; Control box

SAMPLING METHOD Low flow

Well I.D MISS-7B

SAMPLE I.D 126-24638

MEAS. REF. POINT (Ft. AGS or BGS) +2.0

WELL DEPTH (Ft. TOC) 51'

INNER CASING/OPEN HOLE DIAM (Ia) 4"

DEPTH TO TOP OF SCREEN (Ft TOC) Not given

WLL VOLUME (Gal) ________

PUMP INTAKE (Ft. TOC) ________

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/minute)	Volume Purged (ml)	Temp °C	Specific Cond, (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
~~1320~~			error						
1315	11.39	300	1500	16.50	7753	6.92	-28.6	0.50	30.3
1320	11.37	180	1680	18.18	7745	6.92	-37.2	0.36	36.3
1325	11.42	260	2980	17.18	7748	6.91	-40.3	0.35	42.6
1330	11.43	260	4280	16.77	7740	6.91	-43.2	0.29	45.7
1335	11.40	240	5480	17.08	7745	6.92	-45.4	0.27	49.0
1340	11.36	200	6480	17.78	7748	6.93	-42.6	0.33	61.4
1345	11.36	200	7480	17.26	7786	6.92	-44.3	0.29	37.7
1350	11.38	200	8480	17.46	7776	6.91	-41.3	0.27	28.9
1355	11.38	210	9530	17.28	7786	6.91	-41.8	0.27	31.7
1400	11.38	210	10580	17.70	7785	6.91	-40.9	0.26	29.1
Stop & Sample									

APPEARANCE/COLOR Few (possible) rust particles / no color

ODOR No odor

SAMPLED BY (PRINT) Shawn Hall

SAMPLED BY Larry Kearns

SIGNATURE [signature]

SIGNATURE [signature]

WELL CAP REPLACED AND LOCKED BY SH

DATE/TIME 7-11-02 / 1430

Shaw™ Stone & Webster, Inc.

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION
WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood WBS ________ DATE 7-15-02

WORK ORDER # ________ NORFAS ________

FIELD INSTRUMENTS: PID, LEL, O_2, CO, & H_2S meter; Grundfos submersible pump; water level indicator, control box, YSI 650 mbs

SAMPLING METHOD Low flow

Well I.D B38W24D

SAMPLE I.D 10A-024650

MEAS. REF. POINT (Ft. AGS or BGS) 0.0

WELL DEPTH (Ft. TOC) 28'

INNER CASING/OPEN HOLE DIAM (Ia) 2"

DEPTH TO TOP OF SCREEN (Ft TOC) 22'

WLL VOLUME (Gal) ________

PUMP INTAKE (Ft. TOC) 24'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/minute)	Volume Purged (ml)	Temp °C	Specific Cond, (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
1005	9.18	270	1350	19.16	608	6.00	43.4	0.70	68.3
1010	9.18	240	2550	19.40	633	5.98	26.1	0.50	38.6
1015	9.18	230	3700	19.79	638	5.98	16.2	0.44	29.1
1020	9.18	260	5000	20.53	650	5.98	5.0	0.42	27.5
1025	9.20	220	6100	19.93	654	5.98	-1.0	0.41	18.6
1030	9.22	320	7700	19.62	674	5.96	-4.2	0.34	14.4
1035	9.25	380	9600	19.66	691	5.96	-8.8	0.32	8.9
1040	9.25	320	11200	19.69	709	5.96	-10.9	0.29	4.9
1045	9.25	320	12800	19.64	717	5.96	-15.4	0.28	2.2
Sampled									

APPEARANCE/COLOR SH hazy / no color light brown ODOR No odor

SAMPLED BY (PRINT) Shawn Hall SAMPLED BY Laura Kassaw

SIGNATURE [signature] SIGNATURE ________

WELL CAP REPLACED AND LOCKED BY [initials] DATE/TIME 7-15-02 / 1055

Shaw Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood WBS ________ DATE 7-17-02

WORK ORDER # ________ NORFAS ________

FIELD INSTRUMENTS: PID, LEL, O_2, O_2, H_2S meter; Water level indicator; control box; Grundfos submersible pump; YSI 650 MDS

SAMPLING METHOD Low flow

Well I.D B38W2D

SAMPLE I.D 12a-024639

MEAS. REF. POINT (Ft. AGS or BGS) 2.9'

WELL DEPTH (Ft. TOC) 45.9'

INNER CASING/OPEN HOLE DIAM (Ia) 2"

DEPTH TO TOP OF SCREEN (Ft TOC) 39.9'

WLL VOLUME (Gal) ________

PUMP INTAKE (Ft. TOC) 42.5'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/minute)	Volume Purged (ml)	Temp °C	Specific Cond, (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
0920	21.81	210	1680	14.70	487	6.72	236.1	0.55	42.4
0925	~~22.84~~ 21.84	200	2680	14.89	499	6.71	~~503~~ 196.7	0.51	22.3
0930	22.10	200	3680	14.89	538	6.72	171.9	0.47	9.6
0935	22.17	200	4680	15.05	543	6.72	156.1	0.41	7.1
0940	22.45	200	5680	14.91	539	6.72	144.5	0.38	4.9
0945	22.79	280	7080	14.97	538	6.72	127.3	0.34	2.9
0950	22.87	240	8280	15.61	530	6.71	120.2	0.32	2.8
0955	22.88	200	9280	15.40	534	6.70	113.9	0.30	2.6
1000	Sample								

APPEARANCE/COLOR H_2O Clear / No color ODOR No odor

SAMPLED BY (PRINT) S. Hall

SIGNATURE S. Hall/LK

WELL CAP REPLACED AND LOCKED BY SH

SAMPLED BY L. Kasian

SIGNATURE [signature]

DATE/TIME 7/17-02 / 1020

Shaw Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood WBS ________ DATE 7-18-02

WORK ORDER # ________ NORFAS ________

FIELD INSTRUMENTS: PID, LEL, CO, O_2 & H_2S meter; Grundfos submersible pump; control box, generator, YSI 650 MPS Water level indicator

SAMPLING METHOD Low flow

Well I.D B38W18D

SAMPLE I.D ________

MEAS. REF. POINT (Ft. ~~AGS~~ or BGS) ~~+2.7~~ 0.0

WELL DEPTH (Ft. TOC) ~~42.7~~ 40.0

INNER CASING/OPEN HOLE DIAM (la) 4"

DEPTH TO TOP OF SCREEN (Ft TOC) ~~37.7~~ 35.0

WLL VOLUME (Gal) ________

PUMP INTAKE (Ft. TOC) ~~39.6'~~ 37.5'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/ minute)	Volume Purged (ml)	Temp °C	Specific Cond, (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
0850	5.21	240	2400	19.38	668	5.73	367.9	0.47	13.8
0855	5.22	280	3800	19.83	696	5.86	349.2	0.48	12.7
0900	5.21	280	5200	20.15	691	5.86	340.6	0.52	12.1
0905	5.21	280	6600	20.14	696	5.85	337.0	0.55	11.8
0910	5.21	280	8000	20.21	711	5.84	334.6	0.52	11.2
0915	5.21	280	9400	20.29	724	5.84	332.6	0.50	10.9
0920	5.22	280	10800	20.21	737	5.83	331.6	0.47	10.6
0930	Sample well								

APPEARANCE/COLOR ________

SAMPLED BY (PRINT) L. Kassan

SIGNATURE [signature]

WELL CAP REPLACED AND LOCKED BY [initials]

ODOR No odor

SAMPLED BY J. Hayes

SIGNATURE ________

DATE/TIME 7-18-02 / 0940

Shaw Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood WBS ________ DATE 7-18-02

WORK ORDER # ____________ NORFAS ________

FIELD INSTRUMENTS: PID, LEL O_2, CO & H_2S meter; Water level indicator, YSI 650 MDS

SAMPLING METHOD Low flow

Well I.D MISS-1B

SAMPLE I.D 12b-024631

MEAS. REF. POINT (Ft. AGS or BGS) + 1.4

WELL DEPTH (Ft. TOC) 54.9'

INNER CASING/OPEN HOLE DIAM (in) ________

DEPTH TO TOP OF SCREEN (Ft TOC) 24.4'

WLL VOLUME (Gal) ________

PUMP INTAKE (Ft. TOC) 40' (23') See field notes

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/minute)	Volume Purged (ml)	Temp °C	Specific Cond. (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)	
1355	16.71	220	2640	18.40	769	7.13	137.2	3.27	235.4	
1400	16.71	200	3640	19.57	783	7.06	77.1	2.03	164.0	☆
1405	16.72	220	4740	19.42	785	7.07	78.3	1.89	146.2	
1410	16.71	220	5840	18.64	768	7.11	74.5	2.55	143.1	☆
1415	16.71	200	6840	19.57	757	7.12	74.1	1.89	120.5	
1420	Adjusted pump.									
1425	16.71	200	7840	20.65	769	7.14	65.0	1.88	104.6	
1430	16.71	180	8740	20.50	672	7.25	75.0	2.34	153.0	
1435	16.71	180	9640	21.22	652	7.30	104.4	2.43	110.1	
1440	16.71	200	10640	20.93	647	7.31	112.6	2.50	105.1	
1445	16.71	200	11640	20.54	636	7.35	132.9	2.55	99.9	
1450	16.71	200	12640	20.69	638	7.35	143.8	2.43	94.5	
1455		200	13640	20.68	682	7.28	136.0	2.24	87.7	
1500	Sampled									

APPEARANCE/COLOR Hazy / Lt. Brown

ODOR No odor

SAMPLED BY (PRINT) L. Kassaw

SAMPLED BY J. Hayes

SIGNATURE ________

SIGNATURE ________

WELL CAP REPLACED AND LOCKED BY ________

DATE/TIME 7-18-02

☆ Cleaned YSI 650 MDS of debre. (↑ DO)

Shaw Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood WBS ________ DATE 7-24-02

Well I.D B38W14D

WORK ORDER # ________ NORFAS ________

SAMPLE I.D 19a-024641

FIELD INSTRUMENTS: PID, LEL, O_2, CO, H_2S meter; Water level indicator; Grundfos submersible pump; Control box; YSI 650 MDS

MEAS. REF. POINT (Ft. AGS or BGS) -0.5

WELL DEPTH (Ft. TOC) 51.5'

INNER CASING/OPEN HOLE DIAM (In) 2"

DEPTH TO TOP OF SCREEN (Ft TOC) 45.5'

SAMPLING METHOD Low flow

WLL VOLUME (Gal) ________

PUMP INTAKE (Ft. TOC) 48.5'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/minute)	Volume Purged (ml)	Temp °C	Specific Cond. (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
1320	4.32	190	950	18.40	126	6.97	-23.8	1.14	84.0
1325	4.34	200	1950	18.70	128	6.69	-28.5	0.52	72.7
1330	4.29	200	2950	19.19	308	6.67	-35.8	0.49	54.2
1335	4.45	190	3500	17.42	997	6.84	-47.6	2.33	27.5 *
1340	~~4.~~ 4.49	240	5100	18.37	1129	6.84	-47.8	0.35	29.0
1345	4.49	240	6300	18.29	1193	6.85	-42.2	0.35	21.5
1350	4.50	230	7450	18.18	1213	6.88	-35.8	0.34	13.1
1355	4.50	240	8650	16.92	1221	6.89	-27.2	0.32	10.2
1400	4.49	240	9850	18.01	1228	6.90	-19.4	0.31	4.9
1405	Sample								

APPEARANCE/COLOR Clear/Very light Yellow ODOR No odor

SAMPLED BY (PRINT) S. Hall

SAMPLED BY L. Cannon

SIGNATURE [signature]

SIGNATURE [signature]

WELL CAP REPLACED AND LOCKED BY SH

DATE/TIME 7-24-02 / 1930

* Cleaned flow-through cell of debris.

Shaw Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood WBS ________ DATE 7-25-02

WORK ORDER # ____________ NORFAS ________

FIELD INSTRUMENTS: PID/LEL, O_2, CO, H_2S meter; YSI 650 mps; Water level indicator; Submersible Grundfos pump/Control box

SAMPLING METHOD Low flow

Well I.D MW 24D

SAMPLE I.D 12b-021645

MEAS. REF. POINT (Ft. AGS or BGS) Not given (measurements are on well casing.

WELL DEPTH (Ft. TOC) 68'

INNER CASING/OPEN HOLE DIAM (Ia) 2"

DEPTH TO TOP OF SCREEN (Ft TOC) 48'

WLL VOLUME (Gal) ________

PUMP INTAKE (Ft. TOC) 50'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/ minute)	Volume Purged (ml)	Temp °C	Specific Cond, (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
0905	13.02	320	1600	14.42	4768	5.55	47.7	0.53	16.4
0910	13.76	270	2950	14.99	4777	6.50	-44.0	0.42	3.2
0915	13.72	270	4300	15.20	4777	6.56	-55.3	0.38	2.2
0920	13.64	250	5550	15.52	4786	6.58	-60.9	0.35	1.5
0925	13.64	240	6750	15.78	4818	6.57	-58.0	0.34	~~[illegible]~~ 1.4
0930	13.64	250	8000	15.96	4836	6.47	-45.8	0.34	1.3
0935	13.64	250	9250	15.74	4835	6.50	-39.7	0.34	1.2
0940	Sampled								

APPEARANCE/COLOR clear/colorless

ODOR ~~Sl. odor~~ Slight odor

SAMPLED BY (PRINT) Shawn Hall

SAMPLED BY L. Kasian

SIGNATURE Shawn Hall

SIGNATURE L. Kasian

WELL CAP REPLACED AND LOCKED BY SH

DATE/TIME 7-25-02 / 0948

Collected duplicate on ~~w/~~ this well ID # 12b-021648

Shaw · Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood WBS ________ DATE 7-25-02

Well I.D MW 24 DD

WORK ORDER # ________ NORFAS ________

SAMPLE I.D 126-021646

FIELD INSTRUMENTS: PID, LEL, O_2, CO, & H_2S meter; Grundfos submersible pump; YSI 650 MDS; Control box; Water level indicator

MEAS. REF. POINT (Ft. AGS or BGS) Height of sticking is not given

WELL DEPTH (Ft. TOC) 105'

INNER CASING/OPEN HOLE DIAM (Ia) 4"

DEPTH TO TOP OF SCREEN (Ft TOC) 80'

SAMPLING METHOD Low Flow

WLL VOLUME (Gal) ________

PUMP INTAKE (Ft. TOC) 95'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/ minute)	Volume Purged (ml)	Temp °C	Specific Cond, (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
1000	12.53	200	1000	15.63	3629	7.16	-127.2	1.33	25.9
1005	12.66	220	2100	15.72	3654	7.02	-120.2	0.78	19.7
1010	12.63	200	3100	15.81	3656	7.00	-116.7	0.80	24.8
1015	12.63	210	~~4200~~ 4150	15.79	3658	6.98	-113.7	0.83	23.0
1020	12.63	190	5100	15.97	3672	6.96	-107.9	0.80	21.1
1025	12.67	240	6300	15.77	3685	6.94	-103.8	0.77	17.6
1030	Sample								

APPEARANCE/COLOR Clear / Colorless w/ small amount of sediment ODOR Yes

SAMPLED BY (PRINT) S. Hall SAMPLED BY L. Kaswan

SIGNATURE Shawn Hall SIGNATURE L. Kas

WELL CAP REPLACED AND LOCKED BY SH DATE/TIME 7-25-02 / 1040

Shaw Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood WBS ________ DATE 7-25-02

WORK ORDER # ____________ NORFAS ________

FIELD INSTRUMENTS: PID, LEL, O2, CO, H2S meter; YSI 650 MDS; Water level indicator, Grundfos submersible pump, Control box

SAMPLING METHOD Low flow

Well I.D B38W07B

SAMPLE I.D 12b-021647

MEAS. REF. POINT (Ft. AGS or BGS) Not given

WELL DEPTH (Ft. TOC) 54.0

INNER CASING/OPEN HOLE DIAM (Ia) 2"

DEPTH TO TOP OF SCREEN (Ft TOC) Not given

WLL VOLUME (Gal) ________

PUMP INTAKE (Ft. TOC) 49'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/ minute)	Volume Purged (ml)	Temp °C	Specific Cond, (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
1255	10.44	250	3750	15.12	400	6.57	165.9	0.69	44.1
1300	10.44	260	5050	15.48	390	6.48	162.2	0.54	27.7
1305	10.44	240	6250	15.52	398	6.51	156.9	0.47	15.2
1310	10.44	240	7450	15.51	404	6.54	151.1	0.42	11.2
1315	10.44	240	8650	15.36	413	6.55	146.7	0.39	6.9
1320	10.45	260	9950	15.44	416	6.57	143.6	0.36	5.5
1325	10.45	260	11250	15.79	420	6.58	139.7	0.36	3.8
1330	10.45	260	12550	15.73	422	6.59	137.0	0.35	3.1
1335	10.45	240	13750	15.57	427	6.60	133.4	0.32	2.2
1340	Sample								

APPEARANCE/COLOR Clear (some sediment)/no color ODOR SH odor

SAMPLED BY (PRINT) Shawn Hall SAMPLED BY L. Kassan

SIGNATURE Shawn Hall SIGNATURE L. Kas

WELL CAP REPLACED AND LOCKED BY LK DATE/TIME 7-25-02 / 1348

Shaw Stone & Webster, Inc.

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood/VBS DATE 7-26-02

WORK ORDER # ____ NORFAS ____

FIELD INSTRUMENTS: PID, LEL, O_2, CO, & H_2S meter; Water level meter; YSI 650 MDS; Control box; Grundfos submersible pump

SAMPLING METHOD Low flow

Well I.D MW-23D

SAMPLE I.D 126-021651

MEAS. REF. POINT (Ft. AGS or BGS) 0.0

WELL DEPTH (Ft. TOC) 71'

INNER CASING/OPEN HOLE DIAM (In) 2"

DEPTH TO TOP OF SCREEN (Ft TOC) 51'

WLL VOLUME (Gal) —

PUMP INTAKE (Ft. TOC) 55'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/ minute)	Volume Purged (ml)	Temp °C	Specific Cond. (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
0825	11.45	190	760	17.26	2258	6.56	71.4	1.48	198.7
0830	11.74	200	1760	16.63	2291	6.56	-2.5	0.82	312.0
0835	11.84	200	2760	16.93	2284	6.59	-19.5	0.76	291.1
0840	12.02	200	3760	17.11	2272	6.60	-25.7	0.69	220.0
0845	12.13	190	4710	17.16	2240	6.60	-23.4	0.74	135.5
0850	12.28	200	5710	16.79	2226	6.58	-20.2	0.65	75.8
0855	12.42	220	6810	16.67	2212	6.59	-16.8	0.62	42.6
0900	12.48	200	7810	16.86	2205	6.59	-14.8	0.56	30.9
0905	12.56	220	8910	16.64	2210	6.58	-12.7	0.50	24.9
0910	12.58	210	9960	16.96	2210	6.58	-12.6	0.48	34.0
0915	12.58	200	10960	17.25	2209	6.58	-12.0	0.47	19.0
0920	12.59	200	11960	17.09	2216	6.58	-10.9	0.46	16.5
0925	12.61	200	12960	17.02	2230	6.58	-10.3	0.44	15.0
0930	Sample								

APPEARANCE/COLOR Clear / No color

ODOR None detected

SAMPLED BY (PRINT) Shawn Hall

SAMPLED BY Laura Kassew

SIGNATURE [signature]

SIGNATURE [signature]

WELL CAP REPLACED AND LOCKED BY ____

DATE/TIME 7-26-02

Shaw Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood WBS ________ DATE 7-26-02

WORK ORDER # ____________ NORFAS ________

FIELD INSTRUMENTS: PID, O_2, CO, H_2S, LEL meter; Water level indicator; Control box; Grundfos submersible pump; YSI 650 MDS.

SAMPLING METHOD Low flow

Well I.D MW-25D

SAMPLE I.D 126-021652

MEAS. REF. POINT (Ft. AGS or BGS)

WELL DEPTH (Ft. TOC) 60.85'

INNER CASING/OPEN HOLE DIAM (Ia) 6"

DEPTH TO TOP OF SCREEN (Ft TOC) Not given

WLL VOLUME (Gal) —

PUMP INTAKE (Ft. TOC) 55'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/ minute)	Volume Purged (ml)	Temp °C	Specific Cond. (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
1000	13.24	210	2100	14.48	2314	7.48	-201.0	0.46	22.3
1005	13.30	200	3100	14.92	2311	7.46	-200.0	0.42	22.1
1010	13.41	240	4300	14.65	2311	7.48	-195.3	0.35	33.9
1015	13.49	210	5350	15.16	2312	7.49	-189.1	0.24	36.8
1020	13.56	250	6600	15.13	2310	7.51	-199.8	0.21	33.3
1025	13.65	280	8000	15.11	2309	7.51	-196.3	0.20	35.2
1030	13.65	200	9000	15.63	2308	7.48	-214.2	0.17	34.3
1035	13.65	200	10000	15.48	2305	7.49	-212.8	0.18	35.2
1040	Sample								
1045									
1050									
1055									
1100									

APPEARANCE/COLOR Clear / No color

ODOR No odor

SAMPLED BY (PRINT) Shawn Hall

SAMPLED BY Laura Kassaw

SIGNATURE [signature]

SIGNATURE [signature]

WELL CAP REPLACED AND LOCKED BY SH

DATE/TIME 7-26-02 / 1045

Shaw Stone & Webster, Inc.

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood WBS ________ DATE 7-29-02

WORK ORDER # ________ NORFAS ________

FIELD INSTRUMENTS: PID, LEL, O_2, CO, & H_2S meter; YSI MDS 650; Grundfos submersible pump; Control box; Water Level indicator

SAMPLING METHOD Low flow

Well I.D MISS-4B

SAMPLE I.D 12b-021656

MEAS. REF. POINT (Ft. AGS or BGS) + ~1'

WELL DEPTH (Ft. TOC) ~47'

INNER CASING/OPEN HOLE DIAM (Ia) 4"

DEPTH TO TOP OF SCREEN (Ft TOC) not given

WLL VOLUME (Gal) —

PUMP INTAKE (Ft. TOC) ~40'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/ minute)	Volume Purged (ml)	Temp °C	Specific Cond, (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
1020	11.89	300	300	16.38	1592	6.59	-70.0	1.18	16.3
1025	11.89	300	1800	16.38	1582	6.58	-69.3	0.61	35.0
1030	11.90	310	3350	16.26	1566	6.58	-68.0	0.60	68.0
1035	11.91	300	4850	16.22	1568	6.58	-71.0	0.39	78.8 → cleaned flow cell
1040	11.90	260	6150	16.66	1572	6.58	-71.2	0.37	61.1
1045	11.90	260	7450	16.61	1564	6.58	-71.6	0.35	60.3
1050	11.89	260	8750	16.63	1559	6.58	-70.4	0.33	46.0
1055	11.89	250	10000	16.86	1558	6.57	-70.1	0.32	37.6
1100	11.89	250	12500	16.97	1554	6.58	-70.7	0.32	41.2
1105	11.89	250	13750	16.73	1553	6.58	-70.8	0.31	37.0
1110	Sample								
1115									
1120									
1125									

APPEARANCE/COLOR Clear, small amount dk seil/ no clr. ODOR Strong chemical smell

SAMPLED BY (PRINT) Shawn Hall SAMPLED BY Laura Kassaw

SIGNATURE [signature] SIGNATURE [signature]

WELL CAP REPLACED AND LOCKED BY SH DATE/TIME 7-29-02 / 1117

Shaw Stone & Webster, Inc.

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION
WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood WBS ________ DATE 7-29-02
WORK ORDER # ________ NORFAS ________
FIELD INSTRUMENTS: PID, LEL, O_2, CO, + H_2S meter, YSI 650 MDS, Water level indicator, Control box, Grundfos submersible pump.
SAMPLING METHOD Low flow

Well I.D MFSS-3B
SAMPLE I.D 126-021655
MEAS. REF. POINT (Ft. AGS or BGS) + 1'
WELL DEPTH (Ft. TOC) 39.2'
INNER CASING/OPEN HOLE DIAM (In) 4"
DEPTH TO TOP OF SCREEN (Ft TOC) not given
WLL VOLUME (Gal) —
PUMP INTAKE (Ft. TOC) 35'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/minute)	Volume Purged (ml)	Temp °C	Specific Cond. (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
0915	11.23	400	800	15.17	1376	6.20	2.6	0.78	26.3
0920	11.23	350	2550	15.64	1367	6.22	0.4	0.50	21.1
0925	11.20	310	4100	16.22	1365	6.23	-1.7	0.38	18.0
0930	11.20	280	5500	16.22	1358	6.24	-2.6	0.36	15.8
0935	11.21	280	6900	16.21	1357	6.24	-3.2	0.32	13.7
0940	11.21	300	8400	16.30	1360	6.25	-3.5	0.31	12.4
0945	11.21	300	9900	16.46	1364	6.25	-3.8	0.30	11.8
0950	Sample								
0955									

APPEARANCE/COLOR Some sed. d/s Clear / No color
ODOR None noticed
SAMPLED BY (PRINT) Shawn Hall
SAMPLED BY Laura Kassw
SIGNATURE [signature]
SIGNATURE [signature]
WELL CAP REPLACED AND LOCKED BY SH
DATE/TIME 7-29-02 / 1000

MS/MSD collected w/ this sample.

Shaw Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION
WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood WBS ________ DATE 7-30-02

WORK ORDER # ________ NORFAS ________

FIELD INSTRUMENTS: PID, LEL, H_2S, O_2 & CO meter; YSI 650 MDS; Water level meter; Grundfos submersible pump, Control box

SAMPLING METHOD Low flow

Well I.D MW-2D

SAMPLE I.D 23b-021661 & 23b-021662

MEAS. REF. POINT (Ft. AGS or BGS) 0.0'

WELL DEPTH (Ft. TOC) 48.5'

INNER CASING/OPEN HOLE DIAM (In) 4"

DEPTH TO TOP OF SCREEN (Ft TOC) not given

WLL VOLUME (Gal) ——

PUMP INTAKE (Ft. TOC) ~~43.0'~~ 44.0

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/minute)	Volume Purged (ml)	Temp °C	Specific Cond. (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
1310	6.83	240	1920	18.56	1834	7.40	-39.2	0.49	85.1
1315	6.82	260	3220	18.60	1832	7.39	-58.6	0.42	91.1
1320	6.83	260	4520	18.64	1835	7.39	-73.6	0.35	98.2
1325	6.84	270	5870	18.12	1841	7.37	-68.9	1.05	90.0
1330	6.84	260	7170	19.28	1848	7.37	-80.6	0.30	84.9
1335	6.83	260	8470	19.20	1849	7.38	-82.0	0.29	80.7
1340	6.85	260	9770	19.43	1847	7.38	-82.9	0.27	77.3
1345	6.85	260	11070	19.29	1844	7.38	-82.9	0.26	68.4
1350	6.85	260	12370	19.09	1843	7.39	-82.4	0.26	62.7
1355	6.85	260	13670	19.55	1848	7.37	-78.2	0.28	69.2
1400	6.85	260	14970	18.82	1854	7.37	-78.2	0.25	63.2
1405	6.85	250	16220	18.72	1856	7.37	-78.1	0.23	56.1
1410	6.85	250	17470	18.84	1848	7.35	-77.8	0.22	50.1
1415	6.85	250	18720	19.33	1845	7.35	-77.1	0.22	48.8
1420	6.85	250	18960	18.72	1845	7.37	-77.0	0.21	48.3
1425	6.84	250	20210	18.61	1841	7.36	-76.6	0.20	42.5
1430	6.84	250	21460	19.10	1840	7.35	-76.0	0.20	41.4
1435	6.85	260	22760	18.54	1837	7.35	-75.7	0.19	38.2
1440	6.85	260	24060	19.50	1838	7.34	-75.1	0.20	35.4
1445	6.85	210	25110	18.81	1834	7.35	-73.9	0.19	36.5
1450	6.83	180	26010	20.70	1830	7.34	-75.0	0.20	31.9

APPEARANCE/COLOR Clear / no color

ODOR None

SAMPLED BY (PRINT) Shawn Hall

SAMPLED BY Laura Kassaw

SIGNATURE [signature]

SIGNATURE ________

WELL CAP REPLACED AND LOCKED BY ________

DATE/TIME 7-30-02 / 1525

Page 1 of 2

Shaw Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood WBS ________ DATE 7-30-02

WORK ORDER # ____________ NORFAS ________

FIELD INSTRUMENTS: PID, LEL, H_2S, O_2 & CO meter, Grundfos submersible pump, Control box Water level indicator

SAMPLING METHOD ____________

Well I.D MW-2D

SAMPLE I.D. 23b-021661 & 23b-021662 (Filtered)

MEAS. REF. POINT (Ft. AGS or BGS) 0.0'

WELL DEPTH (Ft. TOC) 48.5'

INNER CASING/OPEN HOLE DIAM (in) 4"

DEPTH TO TOP OF SCREEN (Ft TOC) Not given

WLL VOLUME (Gal) ____________

PUMP INTAKE (Ft. TOC) 44.0'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/ minute)	Volume Purged (ml)	Temp °C	Specific Cond, (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
1455	6.84	180	26910	19.94	1835	7.35	-75.5	0.19	33.3
1500	6.85	200	27910	20.37	1831	7.33	-74.2	0.20	31.1
1505									

Sample

APPEARANCE/COLOR ____________

SAMPLED BY (PRINT) ____________

SIGNATURE ____________

WELL CAP REPLACED AND LOCKED BY ____________

ODOR ____________

SAMPLED BY ____________

SIGNATURE ____________

DATE/TIME ____________

Shaw™ Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood WBS ______ DATE 7-30-02

WORK ORDER # ______ NORFAS ______

FIELD INSTRUMENTS: PID, LEL, H_2S, CO, O_2 meter; YSI 650 MDS; Grundfos submersible pump; Water level indicator; Control Box

SAMPLING METHOD Low flow

Well I.D B38W17D

SAMPLE I.D 2GS-021659; 2GS-021660 (Filtered)

☆MEAS. REF. POINT (Ft. AGS or BGS) 0.0'

☆WELL DEPTH (Ft. TOC) ≃ 15'

INNER CASING/OPEN HOLE DIAM (Ia) 2"

☆DEPTH TO TOP OF SCREEN (Ft TOC) unknown

WLL VOLUME (Gal) ——

PUMP INTAKE (Ft. TOC) ~~13'~~ 19'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/ minute)	Volume Purged (ml)	Temp °C	Specific Cond, (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
0945	10.18	440	2200	15.87	2815	6.79	-65.3	0.34	0.4
0950	10.18	340	3900	17.45	2807	6.82	-77.1	0.34	0.9
0955	10.17	380	5800	17.26	2814	6.85	-79.5	0.26	0.3
1000	10.18	380	7700	17.13	2812	6.86	-80.6	0.26	0.1
1005	10.18	360	9500	17.15	2818	6.86	-81.2	0.24	0.0
1010	10.18	380	11400	17.19	2810	6.87	-81.1	0.23	-0.1
1015	10.18	360	13200	17.13	2808	6.87	-81.6	0.23	-0.2
1020	10.18	370	15050	17.11	2804	6.87	-81.6	0.22	-0.3
1025	10.18	380	16950	17.17	2806	6.87	-82.7	0.22	-0.3
1030	10.18	380	18850	17.19	2804	6.87	-82.8	0.22	-0.3
1035	10.18	370	20700	17.24	2796	6.87	-82.8	0.22	-0.3
1040									
1045									

Sampled at 1040 & 1110

APPEARANCE/COLOR Clear / No color

ODOR Moderate odor

SAMPLED BY (PRINT) Shawn Hall

SAMPLED BY Laura Kassan

SIGNATURE [signature]

SIGNATURE [signature]

WELL CAP REPLACED AND LOCKED BY SH

DATE/TIME 7-30-02 / 1125

☆The depth to bottom indicated on well log does not reflect the actual well depth at present

Shaw Stone & Webster, Inc.

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION
WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood WBS ________ DATE 7-31-02

WORK ORDER # ________ NORFAS ________

FIELD INSTRUMENTS: PID, LEL, H_2S, CO, O_2 meter; Water level indicator; YSI 650MDS; Control Box; Grundfos submersible pump

SAMPLING METHOD Low flow

Well I.D. MISS-5B

SAMPLE I.D. 12b-024635 + 12b-0246

MEAS. REF. POINT (Ft AGS or BGS) 2.3'

WELL DEPTH (Ft TOC) 55'

INNER CASING/OPEN HOLE DIAM (In) 4"

DEPTH TO TOP OF SCREEN (Ft TOC) 25'

WLL VOLUME (Gal) —

PUMP INTAKE (Ft TOC) 42'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/minute)	Volume Purged (ml)	Temp °C	Specific Cond. (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
0930	16.63	500	2500	14.49	17,035	6.15	-25.7	0.36	8.0
0935	16.61	280	3900	15.61	16,823	6.17	-42.9	0.28	7.2
0940	16.62	280	5300	15.71	16652	6.18	-50.3	0.33	12.5
0945	16.62	300	6800	15.58	16380	6.17	-57.9	0.38	18.8
0950	16.63	300	8300	15.68	16280	6.17	-62.8	0.46	26.3
0955	16.62	240	9500	16.25	16024	6.17	-61.2	0.55	30.0
1000	16.62	240	10700	16.24	16163	6.17	-57.4	0.62	58.6 cleaned probe
1005	16.63	240	11900	16.54	16058	6.17	-52.0	0.72	32.8 30.1
1010	16.62	240	13100	16.56	16340	6.16	-50.6	0.80	35.5 NTU
1015	16.61	220	18600	17.02	17509	6.15	-65.8	0.88	37.4
1020	16.61	300	20100	16.82	17797	6.13	-72.3	0.91	67.8
1025	16.61	240	21300	16.40	17544	6.14	-72.7	0.96	38.0
1030	16.62	240	22500	16.48	16929	6.14	-71.6	1.02	38.1
1035	16.62	260	23800	16.39	13886	6.18	-74.8	0.98	38.2
1040	16.62	270	25150	16.22	12181	6.23	-76.9	0.93	33.0
1045	16.62	280	26550	16.06	11406	6.25	-77.1	0.91	30.3
1050	16.62	300	28050	16.23	11004	6.27	-77.9	0.91	29.0
1055	16.63	310	29600	16.08	10922	6.26	-77.2	0.92	29.0
1100	16.63	230	30750	16.50	10638	6.27	-77.4	0.95	29.3
1105	16.62	220	31850	16.67	12389	6.20	-81.1	~~0.~~ 1.05	30.3
1110	16.62	200	32850	16.83	13102	6.20	-81.8	1.11	33.0*

APPEARANCE/COLOR Clear / Light brown

ODOR Moderate

SAMPLED BY (PRINT) Shawn Hall

SAMPLED BY Lauren Kasner

SIGNATURE [signature]

SIGNATURE [signature]

WELL CAP REPLACED AND LOCKED BY [initials]

DATE/TIME 7-31-02 / 1215

* Air bubbles in line

Page 1 of 2

Shaw Stone & Webster, Inc.

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION
WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE ________ WBS ________ DATE 7-31-07 Well I.D MISS-5B

WORK ORDER # ________ NORFAS ________ SAMPLE I.D ________

FIELD INSTRUMENTS: See To pg 1 MEAS. REF. POINT (Ft. AGS or BGS) ________

WELL DEPTH (Ft. TOC) ________

INNER CASING/OPEN HOLE DIAM (In) ________

DEPTH TO TOP OF SCREEN (Ft TOC) ________

SAMPLING METHOD Low flow WLL VOLUME (Gal) ________

PUMP INTAKE (Ft. TOC) ________

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/ minute)	Volume Purged (ml)	Temp °C	Specific Cond. (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
1115	16.62	200	33850	16.81	13366	6.19	-97.4	1.15	34.1
1120	16.62	200	34850	16.99	13476	6.17	-94.6	1.18	33.9
1125	16.61	370	36700	15.93	13395	6.15	-87.0	1.09	49.6 *
1130	16.62	260	38000	16.70	10226	6.28	-98.9	0.96	36.6
1135	16.62	220	39100	16.74	12542	6.20	-94.3	1.09	30.3
1140	16.62	230	40250	16.80	13017	6.19	-91.8	1.13	31.7
1145	16.62	220	41350	16.57	13128	6.18	~~-116~~	~~-88.9~~	31.6
~~1150~~							-88.9	1.16	
1155									
1200									
1205									
1210									
1215									
1220									

APPEARANCE/COLOR ________ ODOR ________

SAMPLED BY (PRINT) Shawn Hall SAMPLED BY ________

SIGNATURE [signature] SIGNATURE ________

WELL CAP REPLACED AND LOCKED BY ________ DATE/TIME ________

* Cleaned flow through cell. Page 2 of 2

Shaw Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE ________ WBS ________ DATE 8-1-02

WORK ORDER # ________ NORFAS ________

FIELD INSTRUMENTS: ________

SAMPLING METHOD Submersible Pump

Well I.D MW-4D

SAMPLE I.D 23D-021666

MEAS. REF. POINT (Ft. AGS or BGS) ________

WELL DEPTH (Ft. TOC) 42.71

INNER CASING/OPEN HOLE DIAM (In) 4"

DEPTH TO TOP OF SCREEN (Ft TOC) ________

WLL VOLUME (Gal) ________

PUMP INTAKE (Ft. TOC) 39'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/minute)	Volume Purged (ml)	Temp °C	Specific Cond. (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
1325	5.60	500	2500	16.96	563	7.12	-56.6	0.61	442.9
1330	5.60	360	4300	18.04	561	7.08	-68.6	0.34	512.4
1335	5.58	200	5300	19.39	547	7.11	-72.4	0.40	416.8
1340	5.59	240	6500	20.20	558	7.11	-79.6	0.22	374.2
1345	5.58	260	7800	18.52	556	7.08	-78.6	0.32	320.1
1350	5.59	290	9250	18.42	556	7.05	-75.6	0.36	202.5
1355	5.58	280	10650	18.42	556	7.03	-74.3	0.39	174.1
1400	5.58	200	11650	17.58	573	7.04	-64.2	0.59	253
1405	5.58	200	12650	19.54	576	7.03	-66.7	0.40	161.1
1410	5.58	200	13650	19.79	581	7.04	-63.0	0.46	143.7
1415	5.58	200	14650	19.66	580	7.02	-63.4	0.47	126.4
1420	5.58	200	15650	19.68	580	7.02	-61.7	0.50	120.8
1425	5.58	200	16650	18.59	587	7.03	-57.1	0.53	138.3
1430	5.58	200	17650	19.70	591	7.02	-57.9	0.49	115.9
1435	5.58	200	18650	19.90	592	7.02	-56.4	0.51	103.0
1440	5.59	280	20050	19.08	589	7.02	-56.9	0.51	96.6
1445	5.58	270	21400	18.55	589	7.02	-56.2	0.49	92.6
1450	5.58	260	22700	18.54	588	7.00	-54.6	0.51	84.9
1455	5.58	250	23950	18.62	588	7.00	-52.5	0.55	76.9
1500	5.58	260	25250	18.51	588	7.00	-50.5	0.57	71.4
1505	5.59	260	26550	18.51	588	7.00	-48.2	0.58	87.2

Clean out Flow Through cell

Clean out Flow Through cell

Had to move pump, Discharge was barely 200 ML/min

APPEARANCE/COLOR Orange BR V Turbid → Clear w/ Floating orange Particles ODOR ________

SAMPLED BY (PRINT) Shawn E. Hall

SIGNATURE Shawn E Hall

WELL CAP REPLACED AND LOCKED BY S. Hall

SAMPLED BY ________

SIGNATURE ________

DATE/TIME ________

Shaw Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE ________ WBS ________ DATE 8-1-02

WORK ORDER # ________ NORFAS ________

FIELD INSTRUMENTS: ________

SAMPLING METHOD Submersible Pump

Well I.D MW-4D

SAMPLE I.D 236-021666

MEAS. REF. POINT (Ft. AGS or BGS) ________

WELL DEPTH (Ft. TOC) ________

INNER CASING/OPEN HOLE DIAM (Ia) 4"

DEPTH TO TOP OF SCREEN (Ft TOC) ________

WLL VOLUME (Gal) ________

PUMP INTAKE (Ft. TOC) 39'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/minute)	Volume Purged (ml)	Temp °C	Specific Cond. (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
1510	5.59	260	27850	18.07	588	6.99	-46.2	0.60	66.3
1515	5.59	260	29150	18.11	587	6.99	-44.5	0.61	63.5
1520	5.59	260	30450	18.53	587	6.99	-42.6	0.64	57.0
1525	5.59	260	31750	18.34	587	6.99	-40.1	0.66	55.1
1530									
1535	← SAMPled								
	Spoke w/ Bob D. Said Take the Sample.								

APPEARANCE/COLOR ________

SAMPLED BY (PRINT) Shawn E. Hall

SIGNATURE Shawn E. Hall

WELL CAP REPLACED AND LOCKED BY S. Hall

ODOR ________

SAMPLED BY ________

SIGNATURE ________

DATE/TIME ________

Shaw Stone & Webster, Inc.

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE ________ WBS ________ DATE 8-2-02

WORK ORDER # ____________ NORFAS ________

FIELD INSTRUMENTS: ____________________

SAMPLING METHOD Submersable Pump

Well I.D MW-5D

SAMPLE I.D 23b-021667

MEAS. REF. POINT (Ft. AGS or BGS) ____________

WELL DEPTH (Ft. TOC) 51.87

INNER CASING/OPEN HOLE DIAM (In) 4"

DEPTH TO TOP OF SCREEN (Ft TOC) ____________

WLL VOLUME (Gal) ____________

PUMP INTAKE (Ft. TOC) 45'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/ minute)	Volume Purged (ml)	Temp °C	Specific Cond, (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
0930	9.0	100	500	19.69	464	10.12	170.2	0.55	337.0
0935	9.2	400	2500	18.51	493	10.20	155.8	0.47	373
0940	9.16	240	3700	19.31	479	10.23	143.7	0.27	278.9
0945	9.18	240	4900	19.41	477	10.28	126.1	0.25	209.2
0950	9.18	240	6100	19.48	468	10.30	118.6	0.24	177.8
0955	9.19	240	7300	19.48	453	10.33	105.5	0.24	135.0
1000	9.19	230	8450	19.41	442	10.34	96.0	0.25	123.2
1005	9.18	240	4650	19.41	434	10.31	88.3	0.28	114.3
1010	9.21	240	10850	18.93	419	10.22	113.0	0.47	114.0
1015	9.19	240	12050	19.40	420	10.16	102.1	0.42	95.1
1020	9.18	240	13250	19.25	416	10.06	96.0	0.51	84.3
1025	9.18	260	14550	19.12	414	9.96	96.9	0.61	73.83
1030	9.19	250	15800	19.09	414	9.85	91.2	0.71	70.0
1035	9.19	250	17050	19.13	414	9.76	90.4	0.82	70.5
1040	9.19	250	18300	19.00	417	9.65	90.0	0.94	68.8
1045	9.18	250	19550	19.07	420	9.56	89.8	1.06	61.9
1050	9.18	250	20850	19.06	423	9.47	90.4	1.19	59.2
1055	9.18	260	22150	19.15	431	9.33	87.1	1.28	53.1
1100	9.18	260	23450	19.17	435	9.27	89.6	1.48	52.3
1105	9.19	260	24750	19.08	442	9.17	92.6	1.67	46.7
1110	9.19	260	26050	19.14	446	9.08	95.2	1.79	44.6

cleaned out Flow Through Cell

APPEARANCE/COLOR clear some floating Particulates ODOR ____________

SAMPLED BY (PRINT) Shawn Hall

SIGNATURE Shawn E Hall

WELL CAP REPLACED AND LOCKED BY Shawn Hall

SAMPLED BY ____________

SIGNATURE ____________

DATE/TIME ____________

Shaw - Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE ________ WBS ________ DATE 8-2-02

WORK ORDER # ________ NORFAS ________

FIELD INSTRUMENTS: ________

SAMPLING METHOD Submersible Pump

Well I.D MW-5D

SAMPLE I.D 23b-021667

MEAS. REF. POINT (Ft. AGS or BGS) ________

WELL DEPTH (Ft. TOC) 51.87

INNER CASING/OPEN HOLE DIAM (Ia) 4"

DEPTH TO TOP OF SCREEN (Ft TOC) ________

WLL VOLUME (Gal) ________

PUMP INTAKE (Ft. TOC) 45'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/minute)	Volume Purged (ml)	Temp °C	Specific Cond. (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
1115	9.19	260	27350	19.50	451	9.04	94.7	1.88	47.6
1120	Changed Batteries NO Readings								
1125	9.19	260	28650	19.44	469	8.79	95.6	2.17	37.0
2 hrs – 1130	9.19	260	29950	19.64	478	8.66	107.6	2.46	-1.2
1135	9.19	260	31250	19.53	483	8.59	114.4	2.56	-1.4
1140	9.19	260	32550	19.61	488	8.50	120.8	2.64	29.9
1145	9.19	260	33850	19.71	494	8.41	129.5	2.72	29.1
1150	9.19	260	35150	19.79	499	8.32	137.6	2.79	29.8
1155	9.19	260	36450	19.76	508	8.17	146.2	2.96	26.0
1200	9.19	260	37750	19.66	514	8.11	151.8	3.01	24.2
1205	9.19	270	39100	19.80	520	7.99	159.7	3.11	25.6
1210	9.15	240	40300	20.12	524	7.90	158.9	3.20	21.5
1215	9.14	220	41400	20.13	527	7.86	163.9	3.22	21.8
1220	9.14	220	42500	20.12	534	7.79	168.3	3.28	20.9
1225	9.12	220	43600	20.27	537	7.72	169.4	3.38	19.0
1230	9.12	220	44700	20.21	541	7.68	169.2	3.46	18.4
1235	9.13	210	45750	19.97	492	7.61	168.7	3.51	32.8
1240	9.13	200	46750	20.41	548	7.57	170.6	3.56	31.0
1245	9.15	200	47750	20.41	551	7.53	169.7	3.62	21.0
1250	9.15	220	48850	20.26	554	7.49	165.0	3.71	22.5
1255	9.13	220	49950	20.31	556	7.44	161.6	3.74	20.7

APPEARANCE/COLOR ________

SAMPLED BY (PRINT) Shawn E. Hall

SIGNATURE [signature]

WELL CAP REPLACED AND LOCKED BY [signature]

ODOR ________

SAMPLED BY ________

SIGNATURE ________

DATE/TIME ________

Shaw Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood WBS ________ DATE 8-2-02

WORK ORDER # ____________ NORFAS ________

FIELD INSTRUMENTS: PID, LEL, H_2S, O_2 & CO meter; Control box; water level indicator; Submersible pump; YSI 650 MDS

SAMPLING METHOD Low flow

Well I.D MW-5D

SAMPLE I.D 23b-021667

MEAS. REF. POINT (Ft. AGS or BGS) ~~51.87'~~ error

WELL DEPTH (Ft. TOC) 51.87'

INNER CASING/OPEN HOLE DIAM (Ia) 4"

DEPTH TO TOP OF SCREEN (Ft TOC) ________

WLL VOLUME (Gal) ________

PUMP INTAKE (Ft. TOC) ________

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/ minute)	Volume Purged (ml)	Temp °C	Specific Cond, (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
1300		220	51050	20.30	558	7.44	161.2	3.76	20.9
1305	09.14	230	52200	20.31	560	7.40	158.8	3.80	18.6
1310	09.12	220	53300	20.57	562	7.36	155.3	3.87	17.6
1315	09.13	210	54350	20.37	567	7.34	152.9	3.90	14.7
1320	09.13	210	55400	20.30	568	7.34	152.0	3.97	14.5
1325	09.13	220	56500	20.29	570	7.31	151.2	3.98	14.2
1330	09.13			20.49	572	7.30	149.3	4.02	12.6
1336	SAMPled								
		4hour purge limit reached							

DO kit 3.6 mg/L

APPEARANCE/COLOR ________

SAMPLED BY (PRINT) Shawn E. Hall

SIGNATURE [signature]

WELL CAP REPLACED AND LOCKED BY [signature]

ODOR ________

SAMPLED BY ________

SIGNATURE ________

DATE/TIME ________

3 of 3

Shaw Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood VBS DATE 8-5-02

WORK ORDER # ________ NORFAS ________

FIELD INSTRUMENTS: PID LEL, O_2, CO & H_2S meter; YSI 650 MDS; Grundfos submersible pump; control box; generator; water level indicator

SAMPLING METHOD Low flow

Well I.D MW-7D

SAMPLE I.D 136-021669

MEAS. REF. POINT (Ft. AGS or BGS) 0.0'

WELL DEPTH (Ft. TOC) 45.4'

INNER CASING/OPEN HOLE DIAM (Ia) 4"

DEPTH TO TOP OF SCREEN (Ft TOC) not given

WLL VOLUME (Gal) —

PUMP INTAKE (Ft. TOC) 40'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/minute)	Volume Purged (ml)	Temp °C	Specific Cond. (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
0740	10.18	240	1440	16.00	1437	6.82	-132.0	0.15	1827.9
0745	10.18	220	2540	16.28	1440	6.87	-137.0	0.11	1692.0
0750	10.19	240	3740	16.17	1441	6.91	-140.0	0.07	1360.0
0755	10.18	220	4840	16.47	1440	6.94	-139.7	0.10	698.3
0800	10.25	360	6640	16.08	1441	6.91	-118.9	0.17	526.0
0805	10.21	280	8040	16.25	1443	6.94	-125.0	0.13	379.5
0810	10.15	240	9240	16.65	1443	6.95	-123.2	0.13	348.2
0815	10.14	240	10440	16.52	1443	6.96	-126.5	0.13	337.0
0820	10.14	240	11640	16.54	1443	6.96	-124.1	0.12	296.5
0825	10.14	230	12790	16.52	1442	6.97	-122.7	0.13	273.9
0830	10.13	240	13990	16.50	1442	6.97	-120.9	0.12	275.0
0835	10.14	200	14990	16.44	1431	6.92	-112.1	0.27	336.3 *
0840	10.10	210	16040	16.52	1439	6.97	-124.1	0.14	270.3
0845	10.10	230	17190	16.58	1439	6.96	-124.2	0.13	261.2
0850	10.11	230	19490	16.44	1438	6.97	-123.0	0.11	288.3
0855	10.13	240	20690	16.40	1437	6.97	-123.9	0.10	266.4
0900	10.12	250	21940	16.44	1435	6.97	-123.0	0.10	222.3
0905	10.12	~~20~~ 210	22990	16.50	1435	6.97	-124.0	0.10	224.2
0910	10.12	210	24040	16.64	1436	6.96	-125.9	0.10	217.1
0915	10.15	220	25140	16.54	1431	6.93	-116.2	0.12	214.0
0920	10.13	230	26290	16.50	1436	6.95	-119.3	0.10	200.3

APPEARANCE/COLOR Hazy / light brown

ODOR none observed

SAMPLED BY (PRINT) S. Hall

SAMPLED BY C. Kassaw

SIGNATURE [signature]

SIGNATURE [signature]

WELL CAP REPLACED AND LOCKED BY SH

DATE/TIME 8-5-02 / 1104

* Cleaned flow-through cell.

Page 1 of 2

Shaw Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood WBS ________ DATE 8-5-02

WORK ORDER # ____________ NORFAS ________

FIELD INSTRUMENTS: ____________

SAMPLING METHOD ____________

Well I.D MW-7D

SAMPLE I.D 236-021669

MEAS. REF. POINT (Ft. AGS or BGS) 0.0'

WELL DEPTH (Ft. TOC) 45.4'

INNER CASING/OPEN HOLE DIAM (Ia) 4"

DEPTH TO TOP OF SCREEN (Ft TOC) Not given

WLL VOLUME (Gal) ____________

PUMP INTAKE (Ft. TOC) 40'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/minute)	Volume Purged (ml)	Temp °C	Specific Cond, (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
0925	10.13	230	27440	16.44	1437	6.94	-118.8	0.10	189.2
0930	10.13	230	28590	16.45	1435	6.94	-117.3	0.09	188.2
0935	10.13	240	29790	16.44	1435	6.94	-116.8	0.09	192.2
0940	10.13	240	30990	16.52	1435	6.92	-115.8	0.09	181.1
0945	10.13	240	32190	16.50	1434	6.92	-114.8	0.09	175.7
0950	10.13	230	33340	16.56	1433	6.90	-112.5	0.09	166.6 *
0955	10.15	220	34440	16.15	1425	6.85	-98.3	0.48	210.5 *
1000	10.15	220	35540	16.58	1424	6.86	-106.0	0.10	202.1
1005	10.12	220	36640	16.42	1427	6.86	-107.6	0.10	155.9
1010	10.12	220	37740	16.36	1429	6.85	-104.2	0.08	149.0
1015	10.09	210	38790	16.69	1429	6.83	-103.9	0.09	144.0
1020	10.11	220	39890	16.54	1427	6.81	-101.6	0.08	142.8
1025	10.10	220	40990	16.51	1426	6.79	-98.6	0.08	135.7
1030	10.10	200	41,990	16.64	1424	6.77	-96.0	0.08	130.9
1035	10.11	200	42990	16.59	1423	6.75	-92.1	0.08	129.5
1040	10.11	220	44090	16.66	1423	6.73	-89.7	0.08	125.2
1045	10.11	220	45190	16.69	1422	6.72	-85.8	0.08	126.7
1050	SAMpled								
1055									
1100									
1105									

APPEARANCE/COLOR ____________ ODOR ____________

SAMPLED BY (PRINT) ____________ SAMPLED BY ____________

SIGNATURE ____________ SIGNATURE ____________

WELL CAP REPLACED AND LOCKED BY ____________ DATE/TIME ____________

* Changed flow-through cell

Page 2 of 2

Shaw - Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood WBS ________ DATE 8-5-02

WORK ORDER # ____________ NORFAS ____________

FIELD INSTRUMENTS: PID, LEL, O_2, CO, & H_2S meter; YSI 650 MDS; Water level indicator; generator; Grundfos submersible pump; control box

SAMPLING METHOD Low flow

Well I.D MW-20D

SAMPLE I.D ____________

MEAS. REF. POINT (Ft. AGS or BGS) 0.0

WELL DEPTH (Ft. TOC) 55'

INNER CASING/OPEN HOLE DIAM (Ia) 4"

DEPTH TO TOP OF SCREEN (Ft TOC) not given

WLL VOLUME (Gal) ____________

PUMP INTAKE (Ft. TOC) 50'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/ minute)	Volume Purged (ml)	Temp °C	Specific Cond, (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
1255	10.25	180	1440	17.13	4189	6.83	-79.5	0.66	-5.6
1300	10.26	210	2490	16.02	4197	6.81	-75.8	0.58	-5.6
1305	10.26	220	3590	16.11	4197	6.80	-74.7	0.46	-5.6
1310	10.18	220	4690	16.33	4187	6.79	-75.6	0.37	-5.6
1315	10.27	220	5790	16.01	4190	6.79	-75.9	0.32	-5.6
1320	10.27	220	6890	16.19	4190	6.80	-75.8	0.30	-5.7
1325	10.27	220	7990	16.20	4180	6.79	-75.8	0.28	-5.6
1330	10.27	220	9090	16.14	4172	6.80	-75.6	0.25	-5.7
1335	10.27	240	10290	15.92	4192	6.80	-75.1	0.23	-5.6
1340	10.28	240	11490	16.16	4174	6.80	-75.4	0.21	-5.6
1345	10.28	240	12690	16.09	4185	6.80	-75.1	0.20	-5.6
1350	10.28	240	13890	15.92	4193	6.80	-75.1	0.18	-2.4
1355	10.28	240	15090	15.88	4190	6.80	-75.1	0.18	-6.0
1400	10.28	240	16290	15.90	4191	6.80	-75.3	0.17	-4.3
1405	10.28	220	17390	16.20	4191	6.80	-75.1	0.16	-0.6
1410	10.28	220	18490	15.90	4189	6.81	-75.2	0.16	0.0
1415	10.28	220	19590	16.04	4186	6.81	-75.3	0.16	-5.1
1420	10.28	220	20690	16.06	4192	6.81	-75.1	0.14	-5.6
1425	10.28	240	21890	16.00	4189	6.81	-75.4	0.13	-6.7
1430	10.29	240	23090	15.77	4157	6.82	-63.3	0.21	-5.0 ☆
1435	10.29	240	24290	15.72	4194	6.81	-69.8	0.11	-5.0

APPEARANCE/COLOR Clear except some black sediment / no color ODOR Slt. odor

SAMPLED BY (PRINT) S. Hull SAMPLED BY L. Kasner

SIGNATURE [signature] SIGNATURE [signature]

WELL CAP REPLACED AND LOCKED BY ____________ DATE/TIME 8-5-02 /

☆ Cleaned flow through cell.

Page 1 of 2

Shaw Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood WBS ________ DATE 8-5-02

WORK ORDER # ________ NORFAS ________

FIELD INSTRUMENTS: See page 1 of 2

SAMPLING METHOD ________

Well I.D MW-200

SAMPLE I.D ________

MEAS. REF. POINT (Ft. AGS or BGS) 0.0'

WELL DEPTH (Ft. TOC) 55'

INNER CASING/OPEN HOLE DIAM (in) 4"

DEPTH TO TOP OF SCREEN (Ft TOC) not given

WLL VOLUME (Gal) ________

PUMP INTAKE (Ft. TOC) 50'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/minute)	Volume Purged (ml)	Temp °C	Specific Cond, (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
1440	10.29	240	26690	15.66	4181	6.81	-71.3	0.10	-5.5
1445	10.29	240	27890	15.89	4184	6.81	-72.3	0.11	-5.6
1450	Sample								
1455									
1500									
			Collected MS/MSD/Split						
					& Duplicate				

APPEARANCE/COLOR ________ ODOR ________

SAMPLED BY (PRINT) ________ SAMPLED BY ________

SIGNATURE ________ SIGNATURE ________

WELL CAP REPLACED AND LOCKED BY ________ DATE/TIME ________

Shaw Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood WBS ________ DATE 8-6-02

WORK ORDER # ____________ NORFAS ________

FIELD INSTRUMENTS: PID, LEL, O_2, CO, & H_2S meter; YSI 650 MDS, Turbidmeter; Grundfos submersible pump; generator; water level indicator; control box

SAMPLING METHOD Low flow

Well I.D BRPZ-4

SAMPLE I.D 126-021684

MEAS. REF. POINT (Ft. AGS or BGS) 0.0'

WELL DEPTH (Ft. TOC) 61.3'

INNER CASING/OPEN HOLE DIAM (In) 6"

DEPTH TO TOP OF SCREEN (Ft TOC) not given

WLL VOLUME (Gal) —

PUMP INTAKE (Ft. TOC) 56'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/minute)	Volume Purged (ml)	Temp °C	Specific Cond, (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
0930	10.80	180	1080	15.93	14192	5.97	-32.1	0.30	11.3
0935	10.85	200	2080	16.34	14256	6.03	-31.1	0.20	10.11
0940	10.85	240	3280	15.39	14259	6.04	-26.6	0.21	10.59
0945	10.90	270	4630	15.66	14432	6.05	-32.6	0.12	10.08
0950	10.91	260	5930	15.57	14503	6.05	-31.2	0.12	11.70
0955	10.92	260	7230	15.67	14330	6.05	-34.0	0.12	9.12
1000	10.91	240	8430	15.57	14517	6.05	-34.2	0.12	9.74
1005	10.93	230	9580	15.71	14520	6.04	-34.0	0.10	11.50
1010	10.94	240	10780	15.21	14607	6.02	-35.0	0.09	9.50
1015	10.94	230	11930	14.92	14992	6.01	-34.7	0.08	9.63
1020	10.94	230	13080	14.92	14770	6.01	-33.7	0.07	8.07
1025	10.94	240	14280	14.94	14537	6.01	-34.1	0.07	10.04
1030	10.94	240	15480	14.76	14885	6.01	-33.5	0.07	9.53
1035	10.94	250	16730	14.78	14900	6.00	-34.4	0.07	10.15
D.O. kit is zero. 1040	10.94	240	17930	15.46	14798	6.01	-35.6	0.06	10.27
1045	10.94	240	19130	15.71	14837	6.00	-36.4	0.07	11.27
1050	10.94	230	20280	15.80	14647	6.00	-39.6	0.08	9.78
1055	10.94	250	21530	15.64	14536	6.00	-49.2	0.05	8.52
1100	10.94	240	22730	15.48	14400	6.00	-50.9	0.04	8.99
1105	10.94	240	23930	15.64	14309	6.01	-55.4	0.04	8.60
1110									

APPEARANCE/COLOR Clear w/small Black Particulates

SAMPLED BY (PRINT) Shawn E. Hall

SIGNATURE [signature]

WELL CAP REPLACED AND LOCKED BY S.H.

ODOR Yes

SAMPLED BY S.H./L.K.

SIGNATURE ____________

DATE/TIME 8-6-02 1255

Shaw Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood WBS ——— DATE 8-7-02

WORK ORDER # ——— NORFAS ———

FIELD INSTRUMENTS: PID, LEL, O_2, CO, + H_2S meter; YSI 650 MDS; Control box; Grundfos submersible pump; Water level indicator;

SAMPLING METHOD Low Flow

Well I.D BRPZ-9

SAMPLE I.D 12b-021672

MEAS. REF. POINT (Ft. AGS or BGS) 0.0'

WELL DEPTH (Ft. TOC) 56.7'

INNER CASING/OPEN HOLE DIAM (Ia) 6"

DEPTH TO TOP OF SCREEN (Ft TOC) 32'

WLL VOLUME (Gal) ———

PUMP INTAKE (Ft. TOC) 40'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/ minute)	Volume Purged (ml)	Temp °C	Specific Cond. (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
0845	11.47	100	800	14.83	9691	6.53	-101.7	0.55	12.4
0850	11.64	205	1825	15.10	9900	6.46	-91.3	0.38	12.2
0855	11.79	190	2775	15.48	9891	6.43	-91.1	0.30	15.0
0900	11.87	240	3975	15.22	9754	6.43	-87.1	0.30	13.8
0905	12.04	200	4975	15.53	9703	6.45	-93.4	0.23	8.54
0910	12.18	240	6175	15.27	9519	6.46	-95.4	0.21	8.05
0915	12.25	200	7175	15.36	9469	6.48	-98.3	0.16	9.47
0920	12.30	190	8125	15.43	9457	6.47	-96.0	0.16	9.77
0925	12.45	260	9425	15.19	9462	6.45	-88.4	0.15	10.01
0930	12.50	240	10625	15.50	9510	6.45	-88.6	0.13	9.42
0935	12.60	240	11825	15.33	9469	6.45	-89.7	0.13	8.64
0940	12.61	200	12825	15.52	9433	6.47	-91.9	0.12	11.50
0945	12.73	260	14125	15.25	9574	6.42	-86.9	0.10	7.30
0950	12.77	240	15325	15.39	9404	6.47	-90.6	0.11	8.63
0955	12.81	200	16325	15.46	9422	6.46	-92.6	0.10	12.00
1000	12.82	200	17325	15.56	9883	6.37	-85.8	0.09	7.35
1005	12.83	200	18325	15.82	10272	6.30	-81.7	0.09	6.50
1010	12.86	240	19525	15.46	10536	6.25	-78.3	0.09	7.67
1015	12.88	210	20575	15.64	10607	6.26	-78.8	0.09	6.69
1020	12.90	200	21575	15.66	10520	6.26	-77.5	0.08	9.06
1025	12.91	210	22621	15.84	10839	6.22	-72.8	0.07	6.08

APPEARANCE/COLOR Small amount black sediment / no color

ODOR None noticed

SAMPLED BY (PRINT) S. Hall

SAMPLED BY L. Kassaw

SIGNATURE

SIGNATURE [signature]

WELL CAP REPLACED AND LOCKED BY SH

DATE/TIME 8/7/02 / 1243

Sample 1030

Shaw Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood WBS ________ DATE 8-7-02

WORK ORDER # ________ NORFAS ________

FIELD INSTRUMENTS: PID, O_2, CO, LEL, H_2S meter, Water level indicator, Grundfos submersible pump, Control box, TSI 650, generator

SAMPLING METHOD Low flow

Well I.D BRPZ-5

SAMPLE I.D 12b-021671

MEAS. REF. POINT (Ft. AGS or BGS) 0.0'

WELL DEPTH (Ft. TOC) 62'

INNER CASING/OPEN HOLE DIAM (Ia) 2"

DEPTH TO TOP OF SCREEN (Ft TOC) 42'

WLL VOLUME (Gal) —

PUMP INTAKE (Ft. TOC) 58'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/minute)	Volume Purged (ml)	Temp °C	Specific Cond, (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
1255	12.05	230	1380	15.00	20799	5.63	-54.3	1.21	1736.4
1300	13.50	180	2280	16.77	21485	5.81	-128.7	3.61	1740.5
1305	14.55	160	3080	17.47	22215	5.85	-218.4	6.02	1742.5
1310	15.98	200	4080	15.95	22354	5.90	-253.0	5.90	1737.6
1315	16.39	240	5280	16.58	22396	5.94	-276.7	4.79	344.1
1320	16.70	200	6280	16.52	22360	5.94	-280.4	2.04	1739.3
1325	16.90	200	7280	17.55	22746	5.94	-281.0	8.80	1456.5
1330	17.01	180	12680	18.24	22391	5.96	-282.5	14.51	1717.9
1335	—	—	—	18.53	22820	6.00	-264.0	1.94	203.7
1340	18.10	200	13680	18.15	22567	6.01	-272.2	1.90	410.1
1345	18.18	200	14680	17.75	22411	5.96	-289.7	2.47	195.5
1350	18.25	160	15480	17.10	22308	5.95	-293.8	2.76	120.3
1355	18.42	180	16380	17.54	22424	5.95	-304.0	2.12	105.1
1400	18.70	260	17680	16.74	22126	5.93	-315.0	2.03	73.0
1405	17.90	210	18730	17.12	22070	5.87	-320.6	2.67	391.5
1410	19.00	200	19730	17.62	22440	5.87	-278.2	1.52	1746.1
1415	19.05	200	20730	18.61	22208	5.80	-304.9	1.53	1750.3
1420	19.05	180	21630	18.81	22014	5.79	-329.3	1.73	733.7
1425	19.60	240	22830	16.45	22087	5.75	-338.6	4.10	105.3
1430	19.70	200	23830	18.96	21589	5.73	-347.5	4.17	259.3
1435	19.77	200	24830	19.30	21383	5.71	-347.1	5.17	89.4 *

APPEARANCE/COLOR Clear/Dark gray to black

ODOR Strong odor/sulfur-like

SAMPLED BY (PRINT) S. Hull

SAMPLED BY ________

SIGNATURE ________

SIGNATURE ________

WELL CAP REPLACED AND LOCKED BY SH

DATE/TIME 8-7-02 / 1743

* Cleaned lines of air.

* For turbidity, used Turbidimeter 2020

Shaw - Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood WBS ______ DATE 8-7-02

WORK ORDER # \ NORFAS \

FIELD INSTRUMENTS: See 1 of 3 page

SAMPLING METHOD Low flow

Well I.D M BRP2-S

SAMPLE I.D 126-021671

MEAS. REF. POINT (Ft. AGS or BGS) 0.0

WELL DEPTH (Ft. TOC) 62'

INNER CASING/OPEN HOLE DIAM (Ia) 2"

DEPTH TO TOP OF SCREEN (Ft TOC) 42'

WLL VOLUME (Gal) —

PUMP INTAKE (Ft. TOC) 58'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/ minute)	Volume Purged (ml)	Temp °C	Specific Cond, (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)	
1440	19.78	200	25830	18.33	21605	5.71	-348.3	1.56	61.6	
1445	19.75	190	26780	18.96	21806	5.70	-353.6	0.39	46.9	
1450	19.85	200	27780	19.09	21812	5.70	-355.2	0.99	32.1	
1455	19.90	190	28730	18.63	21819	5.72	-356.5	0.65	25.3	
1500	19.96	300	30230	17.63	21650	5.73	-270.3	1.80	31.7	
1505	—	—	—	—	—	—	—	—	—	*Turbidimeter
1510	23.07	260	31530	18.27	21138	5.64	-316.8	3.74	~~96~~ error	17.8
1515	—	—	—	19.39	20990	5.79	-262.9	1.74	—	*
1520	—	—	—	—	—	—	—	—	—	*
1525	—	—	—	—	—	—	—	—	—	*
1530	21.70	230	32680	18.28	20383	5.62	-281.0	15.78	~~4.14~~ error	414
1535	21.64	200	33680	18.99	20363	5.62	-283.7	18.87	294	
1540	21.63	200	34680	19.22	20425	5.65	-283.7	5.36	406	
1545	21.49	180	35580	19.03	20504	~~5.68~~ 5.65	-285.1	3.79	114	
1550	21.35	220	36680	18.91	20629	5.66	-286.5	3.72	96.0	
1555	21.56	240	37880	18.99	20769	5.67	-288.8	4.68	71.3	
1600	21.70	260	38927	18.53	20802	5.65	-291.3	4.13	66.7	
1605	21.68	200	39927	19.08	21200	5.67	-294.2	3.96	46.9	
1610	21.59	180	40827	18.92	21437	5.66	-308.0	3.08	45.2	
1615	21.51	200	41827	19.42	21492	5.66	-317.2	3.65	36.9	
1620	21.41	220	42920	18.61	21658	5.65	-323.8	3.68	29.0	

*Changed pumps:

APPEARANCE/COLOR ______

SAMPLED BY (PRINT) ______

SIGNATURE ______

WELL CAP REPLACED AND LOCKED BY ______

ODOR ______

SAMPLED BY ______

SIGNATURE ______

DATE/TIME ______

* Adjusting Grundfos rate (pump). Rate continually dropping.

Page 2 of 3

Shaw Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood WBS ________ DATE 7Aug02

WORK ORDER # ________ NORFAS ________

FIELD INSTRUMENTS: See Page 1 of

SAMPLING METHOD Low Flow

Well I.D BRPZ5

SAMPLE I.D 126-021671

MEAS. REF. POINT (Ft. AGS or BGS) 0.0

WELL DEPTH (Ft. TOC) 62

INNER CASING/OPEN HOLE DIAM (Ia) 2"

DEPTH TO TOP OF SCREEN (Ft TOC) 42'

WLL VOLUME (Gal) /

PUMP INTAKE (Ft. TOC) 58'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/ minute)	Volume Purged (ml)	Temp °C	Specific Cond. (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
1625	21.59	220	44020	18.62	21598	5.65	-331.6	1.78	51.1
1630	21.56	200	45020	18.34	21576	5.65	-334.6	1.63	40.0
1635	21.59	220	46120	17.18	21646	5.65	-334.9	1.65	27.7
1640	21.59	220	47220	17.12	21581	5.60	-331.5	1.31	31.0
1645	21.58	200	48220	16.97	21583	5.65	-330.9	1.26	24.8
1650	21.59	200	49220	16.96	21590	5.65	-331.1	1.27	22.3
1655	21.58	200	50220	16.88	21458	5.66	-329.4	1.33	27.5
1700	21.42	200	51220	16.97	21606	5.66	-328.4	1.26	21.7
1705	21.42	200	52220	17.39	21510	5.66	-329.7	2.64	28.7
1710	21.43	240	53420	18.15	21501	5.68	-334.9	1.89	27.0
1715	21.49	200	54420	17.10	21636	5.68	-334.0	1.86	22.0
1720	21.22	200	55400	17.28	21693	5.68	-331.5	1.59	24.3
1725	21.22	200	56400	18.18	21809	5.68	-331.4	1.66	21.5
1730	21.16	200	57400	18.63	21948	5.69	-332.6	1.58	21.00

Sample @ 1735

APPEARANCE/COLOR ________ ODOR ________

SAMPLED BY (PRINT) ________ SAMPLED BY ________

SIGNATURE ________ SIGNATURE ________

WELL CAP REPLACED AND LOCKED BY ________ DATE/TIME ________

Shaw Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood WBS ________ DATE 8-8-02

WORK ORDER # ________ NORFAS ________

FIELD INSTRUMENTS: PID, O_2, CO, H_2S, LEL meter; Grundfos submersible pump; water level indicator; water level meter; control box; generator

SAMPLING METHOD Low flow

Well I.D MW-3D

SAMPLE I.D 12a-021665

MEAS. REF. POINT (Ft. AGS or BGS) 0.0

WELL DEPTH (Ft. TOC) 55'

INNER CASING/OPEN HOLE DIAM (Ia) 4"

DEPTH TO TOP OF SCREEN (Ft TOC) Not given

WLL VOLUME (Gal) —

PUMP INTAKE (Ft. TOC) 50'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/ minute)	Volume Purged (ml)	Temp °C	Specific Cond, (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
1425	8.71	100	700	16.22	12532	6.53	-8.3	1.10	3.5
1430	8.81	140	1400	15.24	12452	6.35	-16.1	1.28	9.4
1435	8.96	200	2400	15.02	12386	6.39	-17.5	1.07	5.1
1440	9.15	180	3300	15.11	12271	6.38	-19.2	0.91	4.6
1445	10.45	320	4900	15.01	11568	6.38	-21.9	0.65	7.8
1450	9.36	160	5700	14.98	10417	6.37	-24.4	0.62	9.0
1455	9.41	240	6900	14.96	9671	6.38	-26.1	0.63	11.1
1500	9.41	260	8200	14.95	9149	6.37	-26.8	0.62	11.5
1505	9.43	220	9300	14.89	8807	6.37	-28.8	0.57	11.6
1510	9.43	240	10500	14.90	8632	6.37	-29.4	0.55	12.4
1515	9.43	230	11650	14.92	8559	6.37	-30.1	0.53	11.8
1520	9.43	220	12750	14.80	8517	6.37	-30.8	0.52	12.3
1525	9.43	220	13850	14.79	8473	6.37	-31.1	0.52	10.9
1530	9.43	220	14950	14.86	8458	6.37	-31.7	0.52	9.9
1535									

Sample at 1535

APPEARANCE/COLOR Clear / No color

ODOR None detected

SAMPLED BY (PRINT) S. Hall

SAMPLED BY L. Kasjnw

SIGNATURE [signature]

SIGNATURE ________

WELL CAP REPLACED AND LOCKED BY ________

DATE/TIME 8-8-02 /

Shaw - Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood WBS ________ DATE 8-13-02

WORK ORDER # ____________ NORFAS ________

FIELD INSTRUMENTS: PID, LEL, O_2, CO & H_2S meter; Grundfos submersible pump; Water level indicator; Control box; generator; YSI 650 MDS

SAMPLING METHOD Low flow

Well I.D BRPW-1D

SAMPLE I.D 126-021664

MEAS. REF. POINT (Ft. AGS or BGS) 0.0'

WELL DEPTH (Ft. TOC) 110'

INNER CASING/OPEN HOLE DIAM (In) 2"

DEPTH TO TOP OF SCREEN (Ft TOC) 90'

WLL VOLUME (Gal) ________

PUMP INTAKE (Ft. TOC) 95'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/minute)	Volume Purged (ml)	Temp °C	Specific Cond, (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
1350	12.45	180	900	16.87	2823	6.90	63.3	1.42	26.4
1355	12.45	160	1700	16.97	2943	6.87	58.3	1.16	62.3
1400	12.45	160	2500	17.64	2966	6.84	19.2	1.24	~~5~~19.6
1405	12.45	300	4000	16.21	2983	6.81	-71.2	1.05	33.8
1410	12.45	300	5500	15.91	2984	6.79	-356.2	0.96	19.7
1415	12.44	180	6400	17.61	2979	6.79	-357.0	0.95	24.0
1420	12.45	220	7500	16.39	2981	6.77	-316.2	0.83	23.7
1425	12.45	220	8600	16.27	2983	6.76	-290.9	0.84	18.8
1430	12.45	210	9650	16.25	2977	6.74	-273.5	0.82	23.4
1435	12.45	240	10850	16.33	2987	6.71	-265.7	0.75	22.1
1440	12.45	240	11050	16.44	2991	6.70	-262.1	0.74	23.4
1445	12.45	230	12200	16.33	2997	6.68	-262.0	0.73	24.9
1450	12.45	220	13300	16.15	3000	6.69	-256.3	0.71	21.4
1455	12.45	220	14400	15.82	3012	6.66	-254.6	0.68	21.2
1500	12.45	220	15500	16.10	3019	6.68	-259.6	0.68	25.1
1505	12.45	230	16650	16.16	3027	6.68	-254.7	0.64	25.2
1510									
1515									
1520									
1525									
1530									

Sampled

APPEARANCE/COLOR Clear/No Color

ODOR None

SAMPLED BY (PRINT) Larry Kusson

SAMPLED BY Tom Hirsche

SIGNATURE [signature]

SIGNATURE ________

WELL CAP REPLACED AND LOCKED BY [signature]

DATE/TIME 8-13-02 / :

Shaw Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood WBS ________ DATE 8-13-02

WORK ORDER # ____________ NORFAS ________

FIELD INSTRUMENTS: PID, LEL, O_2, CO, + H_2S meter; YSI 650 MDS; 2020 Turbidimeter; generator; Water level indicator; control box; Submersible pump

SAMPLING METHOD Low flow

Well I.D BRPZ 3

SAMPLE I.D 126-021670

MEAS. REF. POINT (Ft. AGS or BGS) 0.0'

WELL DEPTH (Ft. TOC) 57'

INNER CASING/OPEN HOLE DIAM (Ia) 2"

DEPTH TO TOP OF SCREEN (Ft TOC) Not given

WLL VOLUME (Gal) —

PUMP INTAKE (Ft. TOC) 52'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/minute)	Volume Purged (ml)	Temp °C	Specific Cond, (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
15 min 0940	12.20	280	4200	16.63	8364	6.07	-1.8	0.68	948
0945	12.19	260	5500	16.63	8011	6.11	-85.0	0.65	17.0
0950	12.19	280	6900	16.88	7602	6.14	-567.9	0.61	439
0955	12.17	250	8150	17.10	7303	6.16	-586.2	0.59	322
1000	12.12	200	9150	17.45	7132	6.17	-585.7	0.58	194
1005	12.13	190	10100	17.55	7056	6.18	-569.7	0.58	145
1010	12.14	220	11200	17.52	6872	6.17	-556.5	0.58	119
1015	12.14	220	12300	17.63	6799	6.17	-567.1	0.54	66.2
1020	12.12	200	13300	17.81	6835	6.17	-573.4	0.54	61.2
1025	12.12	200	14300	17.97	6834	6.17	-565.8	0.55	45.8
1030	12.19	240	15500	17.26	6708	6.16	-567.8	0.54	33.4
1035	12.18	240	16700	17.15	6707	6.05	-581.8	0.53	30.1
1040	12.19	260	18000	17.62	6697	6.16	-582.1	0.53	46.1
1045	12.18	240	19200	17.53	6644	6.14	-575.1	0.52	~~23.0~~ 46.0
1050	12.21	240	20400	17.31	6627	6.14	-578.6	0.48	91.7
1055	12.15	200	21400	18.05	6685	6.14	-578.0	0.48	43.2
1100									
1105									
1110	Sampled @ 1100								
1115									
1120									

APPEARANCE/COLOR Slt hazy / White (gray) to no color

ODOR Moderate odor

SAMPLED BY (PRINT) L. Kershaw

SAMPLED BY T. Hirsche

SIGNATURE ________

SIGNATURE ________

WELL CAP REPLACED AND LOCKED BY [signature]

DATE/TIME 8-13-02 / 1120

Shaw Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood WBS ________ DATE 8-14-02

WORK ORDER # ____________ NORFAS ________

FIELD INSTRUMENTS: PID, LEL, H_2S, O_2, CO meter; Grundfos submersible pump; control box; YSI 650 MDS; Water level indicator; generator

SAMPLING METHOD Low-flow

Well I.D MW-6D

SAMPLE I.D 236-021668

MEAS. REF. POINT (Ft. AGS or BGS) 0.0'

WELL DEPTH (Ft. TOC) 34.8'

INNER CASING/OPEN HOLE DIAM (In) 4"

DEPTH TO TOP OF SCREEN (Ft TOC) Not given

WLL VOLUME (Gal) ________

PUMP INTAKE (Ft. TOC) ~30'

Vol Purged ml	Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/minute)	Volume Purged (ml)	Temp °C	Specific Cond, (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)	
1400	1225	8.05	280	4200	20.38	853	7.40	37.0	1.33	49.1	
2800	1230	8.03	280	8400	20.66	851	7.48	-317.0	0.66	55.9	
4200	1235	8.05	280	12600	20.44	852	7.50	-581.8	0.62	61.0	
5500	1240	8.02	260	13900	20.26	849	7.50	-498.0	0.55	156.6	
6650	1245	7.90	230	15050	20.87	834	7.44	-623.3	0.63	1292.0	- Clean Line.
50	1250	8.35	260	16350	17.23	749	7.58	-629.6	0.41	107.7	
9650	1255	8.30	340	18050	20.17	799	7.66	-634.0	0.42	180.2	- adjust
	1300	8.21	280	11050	19.95	835	7.64	-624.9	0.51	29.4	
	1305	8.10	300	12550	20.78	842	7.63	-635.6	0.46	278.4	
	1310	7.91	220	13650	22.04	834	7.50	-609.6	0.56	257.3	
	1315	7.91	240	14850	20.94	828	7.42	-607.8	0.53	296.3	
	1320	7.81	200	15850	22.29	828	7.47	-581.0	0.61	504.1	
	1325	8.40	220	16950	21.98	821	7.32	-420.3	0.45	756.0	
	1330	7.80	220	18050	22.01	823	7.32	-320.3	0.58	883.0	- Clean line
	1335	8.10	220	19150	18.21	820	7.36	-640.5	0.43	470.6	
	1340	8.00	300	20650	21.33	814	7.23	-612.3	0.50	1726.7	
	1345	7.87	200	21650	21.80	816	7.21	-561.9	0.53	1441.8	
	1350	7.91	280	24050	22.32	816	7.21	-390.6	0.56	1082.8	
	1355	7.91	280	25450	21.50	828	7.20	-320.0	0.50	1012.9	
	1400	7.90	280	26850	21.33	824	7.23	-322.0	0.48	957.1	
	1405	7.91	260	27150	20.78	818	7.22	-302.3	0.54	891.7	

APPEARANCE/COLOR Cloudy/Med brown ODOR None noticed

SAMPLED BY (PRINT) L. Kassaw SAMPLED BY T. Hirsche

SIGNATURE [signature] SIGNATURE ________

WELL CAP REPLACED AND LOCKED BY LK DATE/TIME 8-14-02/

Page 1 of 2

Shaw Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE ________ WBS ________ DATE ________

WORK ORDER # ________ NORFAS ________

FIELD INSTRUMENTS: ________

See page 1 of 2

SAMPLING METHOD ________

Well I.D MW-6D

SAMPLE I.D 23b-021668

MEAS. REF. POINT (Ft. AGS or BGS) 0.0'

WELL DEPTH (Ft. TOC) 34.8'

INNER CASING/OPEN HOLE DIAM (In) 4"

DEPTH TO TOP OF SCREEN (Ft TOC) Not given

WLL VOLUME (Gal) ________

PUMP INTAKE (Ft. TOC) ~30'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/ minute)	Volume Purged (ml)	Temp °C	Specific Cond, (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
1410	7.89	270	28650	21.15	820	7.23	-282.4	0.55	1001.4
1415	7.91	280	29050	20.87	820	7.22	-246.6	0.44	903.4
1420	7.91	270	30580	20.82	821	7.22	-215.4	0.42	798.0
1425	7.91	270	32050	20.82	820	7.23	-187.0	0.42	752.0
1430	7.91	260	33350	20.59	819	7.21	-164.7	0.56	660.9
1435									
1440									
1445									
1450									
1455									
1500									

Sample 1435

APPEARANCE/COLOR ________ ODOR ________

SAMPLED BY (PRINT) ________ SAMPLED BY ________

SIGNATURE ________ SIGNATURE ________

WELL CAP REPLACED AND LOCKED BY ________ DATE/TIME ________

Shaw - Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE Maywood WBS ________ DATE 8-15-02

WORK ORDER # ________ NORFAS ________

FIELD INSTRUMENTS: PID, LEL, O_2, CO_2, H_2S meter; Grundfos Submersible pump; Control box; YSI 650 MDS; Water level indicator; generator

SAMPLING METHOD Low flow

Well I.D MD-26D

SAMPLE I.D 126-021703/126-021704

MEAS. REF. POINT (Ft. AGS or BGS) ~3'

WELL DEPTH (Ft. TOC) 53.4'

INNER CASING/OPEN HOLE DIAM (In) 4"

DEPTH TO TOP OF SCREEN (Ft TOC) Not given

WLL VOLUME (Gal) —

PUMP INTAKE (Ft. TOC) ~48'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/minute)	Volume Purged (ml)	Temp °C	Specific Cond. (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
1140	12.82	200	3000	18.03	8785	6.78	-258.4	1.42	6.7
1145	12.99	180	3900	19.08	8763	6.80	-352.1	1.14	10.3
1150	13.12	180	4800	19.05	8772	6.85	-520.9	1.21	13.4
1155	13.32	200	5800	18.95	8748	6.90	-541.3	1.25	7.7
1200	13.36	180	6700	18.88	8724	6.92	-544.2	1.31	8.1
1205	13.47	100	7200	19.73	8737	6.92	-552.4	1.39	7.8
1210	13.55	180	8100	19.51	8748	6.97	-545.8	1.43	9.3
1215	13.65	200	9100	20.08	8733	6.98	-550.1	1.52	11.8
1220	13.71	180	10000	19.74	8737	6.98	-535.9	1.51	9.2
1225	13.77	180	10900	19.90	8704	6.96	-528.3	1.57	9.7
1230	13.98	280	12300	17.87	8775	6.98	-497.8	1.43	5.8 *
1235	14.06	200	13300	19.12	8780	6.95	-562.1	1.55	4.1
1240	14.12	180	14200	20.77	8838	7.02	-497.2	1.75	3.7
1245	14.30	180	15100	21.19	8851	7.02	-535.4	1.80	6.2
1250	14.31	240	16300	20.58	8839	7.02	-533.1	1.67	6.1
1255	14.32	200	17300	19.43	8733	7.00	-525.9	1.69	7.6
1300	14.42	200	18300	20.42	8705	6.96	-525.8	1.75	3.4
1305	14.57	220	19400	19.62	8731	6.94	-506.1	1.56	7.6
1310	14.65	180	20300	20.45	8749	6.95	-577.6	1.78	2.6
1315	14.71	180	21200	20.01	8753	6.95	-590.6	1.85	4.3
1320	14.78	180	22100	20.26	8772	6.92	-594.5	1.83	8.4

APPEARANCE/COLOR Clear / Lt gray

ODOR Slight

SAMPLED BY (PRINT) L. Khosravi

SAMPLED BY ________

SIGNATURE L. K.

SIGNATURE ________

WELL CAP REPLACED AND LOCKED BY LK

DATE/TIME 8-15-02/1435

* Air bubble in line. ↑ Rate to rid of bubble. (Reason - DO mg/L was increasing

Page 1 of 2

√

FUSRAP MAYWOOD [illegible]
WELL SAMP[illegible]

SITE ________ WBS ________ DATE 10/14/02

WORK ORDER # ________ NORFAS ________

FIELD INSTRUMENTS: ________
YSI-6920
(YSI 650 MDS / 6920)

SAMPLING METHOD ________

Well I.D. MW-27D

SAMPLE I.D. ________

MEAS. REF. POINT (Ft. AGS or BGS) 15

WELL DEPTH (Ft. TOC) 61.55 / 15.55

INNER CASING/OPEN HOLE DIAM (In) ________

DEPTH TO TOP OF SCREEN (Ft TOC) ________

WLL VOLUME (Gal) ________

PUMP INTAKE (Ft. TOC) ~58.5'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/minute)	Volume Purged (ml)	Temp °C	Specific Cond, (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
13:35	15.55	220		15.18	3.607	6.76	-57.4	1.31	10.8
13:45	20.55	260		15.44	3.613	6.80	-61.0	1.21	9.3
13:55	21.15	2[illegible]		15.64	3.640	6.83	-64.5	1.17	8.3
14:15	22.60	Lost Flow -							
14:25	22.91	430		15.63	3.72	6.88	-70.1	1.14	9.5
14:40	23.51	440		15.77	3.77	6.86	-69.5	0.95	8.1
14:55	24.20	290		16.14	3.8	6.87	-63.7	.93	8.3
15:04	24.35	250		16.15	3.[illegible]	6.87	-63.5	.94	8.0
1519	24.52	175		[illegible]	3.22	[illegible]	-[illegible]	.97	8.3
1525	24.60	150		16.41	3.23	6.87	-68.1	.94	8.3
15:30	24.60	150		16.17	3.96	6.96	-66.5	.91	7.3
15:45	24.70	140		16.39	3.88	6.84	-64.7	.92	7.7
16:00	24.71	130		16.41	3.87	6.84	-64.5	.92	7.3
16:15	24.70	130		16.38	3.87	6.84	-64.4	.92	7.3
		Collected sample @ 16:15							

APPEARANCE/COLOR Clear

SAMPLED BY (PRINT) SAL KOKOL

SIGNATURE Sal Kokol

WELL CAP REPLACED AND LOCKED BY S.K.

ODOR —

SAMPLED BY ________

SIGNATURE ________

DATE/TIME 10/14/02; 1700

FUSRAP MAYWOOD SU[illegible] [illegible]ENTAL REMEDIATION
WELL SAMPLING [illegible]

SITE ________ WBS ________ DATE 10/15/02

Well I.D. MW-28 D

WORK ORDER # ________ NORFAS ________

SAMPLE I.D. ________

FIELD INSTRUMENTS: YSI 650 MDS / 6920

MEAS. REF. POINT (Ft. AGS or BGS) ________

WELL DEPTH (Ft. TOC) 61.20 / 16.15

INNER CASING/OPEN HOLE DIAM (In) ________

DEPTH TO TOP OF SCREEN (Ft TOC) ________

SAMPLING METHOD ________

WLL VOLUME (Gal) ________

PUMP INTAKE (Ft. TOC) ________

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/minute)	Volume Purged (ml)	Temp °C	Specific Cond. (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
0845	16.15								
0900	17.28	1000		14.39	2.66	6.78	-63.9	1.91	13.7
0915	18.32	780		14.90	2.66	6.56	-57.3	1.12	11.0
0930	19.06	320		15.10	2.68	6.65	-50.8	0.94	9.8
0945	19.54	560		15.29	2.71	6.78	-67.6	0.82	11.6
10:00	20.02	5.60		15.31	2.72	6.78	-69.3	0.74	10.4
10:20	20.55	560		15.48	2.74	6.78	-70.2	0.75	10.0
10:30	21.70	380		15.50	2.85	6.77	-70.7	0.75	9.0
10:35	21.71	300		15.49	2.84	6.77	-70.7	0.72	8.5
10:40	21.71	300		15.50	2.86	6.77	-71.0	0.72	8.3
10:45	21.71	300		15.53	2.88	6.75	-71.0	0.72	7.7
10:50	21.71	300		15.53	2.89	6.75	-71.0	0.73	7.8
10:55	21.71	300		15.7	2.89	6.75	-71.1	.73	7.7
11:00	→	115	Collect Samples @ 11: AM.						

APPEARANCE/COLOR Clear

ODOR —

SAMPLED BY (PRINT) Sal Kokol

SAMPLED BY ________

SIGNATURE Sal Kokol

SIGNATURE ________

WELL CAP REPLACED AND LOCKED BY S.K.

DATE/TIME 10/15/02

/ √

FUSRAP MAYWOOD
WELL SAMPL

SITE ________ WBS ________ DATE 10-15-02 | Well I.D. MW-33D

WORK ORDER # ________ NORFAS ________ | SAMPLE I.D. ________

FIELD INSTRUMENTS: ________ | MEAS. REF. POINT (Ft. AGS or BGS) ________

YSI 650 MDS / 6920 | WELL DEPTH (Ft. TOC) 70.00 / 14.30 (11:45 AM

INNER CASING/OPEN HOLE DIAM (In) ________

DEPTH TO TOP OF SCREEN (Ft TOC) ________

SAMPLING METHOD ________ | WLL VOLUME (Gal) ________

PUMP INTAKE (Ft. TOC) ________

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/minute)	Volume Purged (ml)	Temp °C	Specific Cond. (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
12:50	14:30	1500		14.38	8.91	6.64	-37.2	1.15	25.2
13:05	16.50	1500		14.58	8.62	6.57	-41.4	0.96	12.7
13:15	16.70	1500		14.80	8.29	6.53	-42.5	0.89	7.0
13:25	16.90	1500		14.76	8.05	6.50	-44.8	0.82	6.7
13:35	16.98	1500		14.77	8.07	6.49	-45.4	0.80	2.3
13:50	16.98	1500		14.74	8.09	6.49	-47.3	0.80	1.3
14:00	16.98	1500		14.72	8.10	6.49	-47.4	0.80	1.2
14:10	16.98	1500		14.76	8.11	6.49	-47.2	0.80	1.0
		Reduced flow to ~120 ml/m							
		Collected Sample @ 14:15							

APPEARANCE/COLOR Clear | ODOR —

SAMPLED BY (PRINT) Sal Valdal | SAMPLED BY ________

SIGNATURE Sal Valdal | SIGNATURE ________

WELL CAP REPLACED AND LOCKED BY SV | DATE/TIME 10/15/02

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION
WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE ________ WBS ________ DATE ________

WORK ORDER # ________ NORFAS ________

FIELD INSTRUMENTS: YSI 650 MDS/6920

SAMPLING METHOD ________

Well I.D. MW-34D

SAMPLE I.D. ________

MEAS. REF. POINT (Ft. AGS or BGS) ________

WELL DEPTH (Ft. TOC) 55.5 / 09.98 (15:00)

INNER CASING/OPEN HOLE DIAM (In) ________

DEPTH TO TOP OF SCREEN (Ft TOC) ________

WLL VOLUME (Gal) ________

PUMP INTAKE (Ft. TOC) ~45'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/minute)	Volume Purged (ml)	Temp °C	Specific Cond. (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
15:20	9.95	2100		14.89	4.11	7.23	-80.4	1.95	1.7
15:25	10.26	680		15.67	4.10	6.87	-78.2	0.81	1.8
15:35	10.70	650		15.98	4.11	6.76	-76.9	0.71	1.7
15:50	11.30	660		16.04	4.11	6.68	-74.6	0.61	1.5
16:10	12.60	660		16.11	4.11	6.67	-72.8	0.57	1.6
16:15	12.60	300		16.15	4.11	6.66	-71.8	0.58	1.7
16:20	12.61	300		16.16	4.11	6.66	-71.4	0.58	1.7
16:25	12.60	300		16.16	4.11	6.66	-71.3	0.58	1.7
16:30	12.61	300		16.20	4.11	6.66	-71.3	0.59	1.7

Reduced flow to 110 ml/m
Collected Sample 16:40

APPEARANCE/COLOR Gray/transparent

SAMPLED BY (PRINT) SAL KOZOL

SIGNATURE Sal Kozol

WELL CAP REPLACED AND LOCKED BY S. Kozol

ODOR Slight

SAMPLED BY ________

SIGNATURE ________

DATE/TIME 10-15-02

Shaw Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE ________ WBS ________ DATE 10/17/02

WORK ORDER # ________ NORFAS ________

FIELD INSTRUMENTS: ________

YSI 650MDS /

SAMPLING METHOD ________

Well I.D BR P2-9

SAMPLE I.D ________

MEAS. REF. POINT (Ft. AGS or BGS) ________

WELL DEPTH (Ft. TOC) 56.5' / 9.15' DTW

INNER CASING/OPEN HOLE DIAM (In) ~~9.15~~

DEPTH TO TOP OF SCREEN (Ft TOC) ________

WLL VOLUME (Gal) ________

PUMP INTAKE (Ft. TOC) 50'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/minute)	Volume Purged (ml)	Temp °C	Specific Cond. (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
12:05	9.15	2400		13.49	1.815	6.12	-43.3	1.98	49.0
12:20	11.44	2400		13.52	1.829	6.18	-43.5	1.36	41.0
12:35	13.81	2400		13.51	1.822	6.12	-43.7	1.22	34.0
12:55	15.45	2400		13.50	1.813	6.12	-46.4	1.19	27.0
13:15	16.67	1850		13.98	1.82	6.14	-48.0	1.19	22.6
13:25	16.85	330		14.20	1.66	6.17	-56.1	1.18	18.4
13:40	16.70	1900		13.61	1.85	6.26	-39	1.16	24.2
13:50	18.01	200		13.77	1.63	6.18	-54	1.13	~~[illegible]~~ 24.0
13:55	17.90	200		13.62	1.58	6.18	-56	1.11	21.0
14:00	17.85	200		13.70	1.76	6.17	-57.1	1.10	20.6
14:05	17.80	200		13.81	1.85	6.18	-58.-	1.11	21.3
14:10	17.75	200		13.94	1.88	6.16	-58.2	1.12	20.2
14:15	17.75	200		14.22	1.88	6.17	-58.1	1.11	20.1
14:20	17.75	200		14.21	1.87	6.18	-58.2	1.12	20.1
		Start Collecting @ 14:25							

APPEARANCE/COLOR Clear

SAMPLED BY (PRINT) SAL KOKOL

SIGNATURE Sal Kokol

WELL CAP REPLACED AND LOCKED BY S.K.

ODOR Slight

SAMPLED BY ________

SIGNATURE ________

DATE/TIME ________

Shaw Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE ________ WBS ________ DATE 10/~~16~~ 17 SK /02

WORK ORDER # ________ NORFAS ________

FIELD INSTRUMENTS:

YSI 650 MDS / 6920

SAMPLING METHOD ________

Well I.D. MISS-5B

SAMPLE I.D. ________

MEAS. REF. POINT (Ft. AGS or BGS) ________

WELL DEPTH (Ft. TOC) 56.85 / 14.65 @ 15:20

INNER CASING/OPEN HOLE DIAM (In) ________

DEPTH TO TOP OF SCREEN (Ft TOC) ________

WLL VOLUME (Gal) ________

PUMP INTAKE (Ft. TOC) ~50'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/minute)	Volume Purged (ml)	Temp °C	Specific Cond. (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
15:40	14.65	1800		12.50	2.69	6.70	-58.6	4.32	16.7
				~~2.69~~ SK					
15:50	SK 15.75 ~~14.75~~	1800		12.56	1.63	6.55	-68.9	2.01	8.3
15:55	15.80	1800		12.55	1.56	6.53	-71.3	1.09	6.3
16:00	15.80	1800		12.62	0.886	6.58	-78.8	0.80	4.4
16:10	15.80	1800		12.64	0.686	6.63	-81.3	0.68	1.6
16:20	15.80	1800		12.64	0.648	6.63	-79.5	0.65	1.2
16:30	15.80	1800		12.64	0.646	6.64	-79.4	0.65	1.2
16:40	15.80	1800		12.64	0.647	6.63	-79.4	0.65	1.2

Collected samples @ 16:45

APPEARANCE/COLOR Clear

SAMPLED BY (PRINT) SAL KOKOL

SIGNATURE Sal Kokol

WELL CAP REPLACED AND LOCKED BY S.K.

ODOR Slight odors

SAMPLED BY ________

SIGNATURE ________

DATE/TIME 10/16/02

Shaw - Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE ________ WBS ________ DATE 3/13/03

WORK ORDER # ____________ NORFAS ________

FIELD INSTRUMENTS: Generator

YSI 650

Rediflow Control box

SAMPLING METHOD Grundfos Rediflow II

Well I.D MW-31D

SAMPLE I.D ____________

MEAS. REF. POINT (Ft. AGS or BGS) (BGS)

WELL DEPTH (Ft. TOC) 45'

INNER CASING/OPEN HOLE DIAM (Ia) 6"

DEPTH TO TOP OF SCREEN (Ft TOC) 20'

WLL VOLUME (Gal) ____________

PUMP INTAKE (Ft. TOC) 40'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/minute)	~~Volume Purged (ml)~~	Temp °C	Specific Cond. (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
10:25	6.02						(ORP)		
10:38	5.99	Pump In well							
10:40		950	(pH mV)	13.55	3.77	6.87	73.1	0.3	1200
10:45	~~5.98~~ 6.98	600	↓	13.45	4.10	7.21	14.4	0.09	1400
10:50	6.01	370		13.36	4.09	7.27	-25.2	0.04	1049
10:55	6.02	350		13.74	4.09	7.31	-43.9	0.04	763
11:00	6.02	350		13.84	4.09	7.33	-54.7	0.04	420
11:05	6.02	270	-44.7	13.85	4.01	7.34	-59.6	0.03	326
11:10	6.02	270	-46.1	13.75	4.01	7.34	-60.0	0.03	281
11:15	6.02	270	-47.6	13.79	4.01	7.34	-61.3	0.03	192
11:20	6.02	270		13.77	4.01	7.35	-62.4	0.03	104
11:25	6.02	270		13.79	4.00	7.34	-68.6	0.03	148
11:30	6.02	270	-51.1	13.78	4.01	7.34	-66.8	0.03	90
11:35	6.02	270		13.84	4.00	7.35	-66.2	0.02	107
11:40	6.02	270		13.88	3.98	7.35	-66.4	0.02	91
11:45	6.02	270	-52.1	13.93	2.96	7.46	-60.7	0.02	80
11:50	6.02	270	-53.6	13.97	2.96	7.47	-67.5	0.02	62
11:55	6.02	270	-53.7	13.97	2.94	7.46	-68.3	0.03	61.7
12:00	6.02	270	-54.2	13.98	2.95	7.47	-68.6	0.02	54.7
12:15			-56.6	13.97	2.94	7.47	-71.4	0.02	38.4
12:30	602	270							34.4

APPEARANCE/COLOR Originally iron scum on surface

ODOR NONE detected

SAMPLED BY (PRINT) S.K.

SAMPLED BY S.K.

SIGNATURE [signature]

SIGNATURE [signature]

WELL CAP REPLACED AND LOCKED BY S.K.

DATE/TIME 3/13/03 ; 12:00-12:30

Shaw - Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION
WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE ______ WBS ______ DATE 3/18/03

WORK ORDER # ______ NORFAS ______

FIELD INSTRUMENTS: Grundfos Rediflow II
Control box
Generator
YSI 650

SAMPLING METHOD Low Flow

Well I.D 38W-15D

SAMPLE I.D ______

MEAS. REF. POINT (Ft. AGS or BGS) ______

WELL DEPTH (Ft. TOC) 47.5

INNER CASING/OPEN HOLE DIAM (In) 2" ø

DEPTH TO TOP OF SCREEN (Ft TOC) ______

WLL VOLUME (Gal) ______

PUMP INTAKE (Ft. TOC) 44'

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/minute)	pH mV ~~Volume Purged (ml)~~	Temp °C	Specific Cond. (mS/cm)	pH	ORP	DO (mg/L)	Turbidity (NTU)
11:45	3.38								
12:05	3:35		-94.3	12.78	1.227	8.11	248.4	0.17	6.3
12:15	4.38	370	-112.4	13.40	0.974	8.54	237.9	0.28	2.0
12:25	4.45	300	-82.3	13.93	1.32	7.88	237.7	0.13	1.0
12:30	4.05	240	-56.1	14:00	1.85	7.51	236.4	0.04	-1.2
12:35	4.01	240	-53.8	14.02	1.96	7.46	225.5	0.04	-1.2
12:40	4.00	240	-52.9	13.94	1.98	7.45	221.8	0.04	-1.3
12:45	4.00	240	-32.1	13.92	2.05	7.44	219.3	0.04	-1.2
12:50	4:00	240	-51.9	13.94	2.05	7.43	218.9	0.04	-1.2
12:55	4:00	240	-52.1	13.95	2.05	7.43	218.3	0.04	-1.4

Stop purging @ 12:55
Collected 1 set of VOC samples
(3 X 40ml vials)

APPEARANCE/COLOR Clear

SAMPLED BY (PRINT) SAL KOKOL

SIGNATURE Sal Kokol

WELL CAP REPLACED AND LOCKED BY S.K.

ODOR NONE DETECTED

SAMPLED BY SAL KOKOL

SIGNATURE Sal Kokol

DATE/TIME 3/18/03

Shaw Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE ________ WBS ________ DATE 5/28/03

WORK ORDER # ____________ NORFAS ________

FIELD INSTRUMENTS: ________________________

SAMPLING METHOD Low Flow

Well I.D MW-32 D

SAMPLE I.D ________________

MEAS. REF. POINT (Ft. AGS or BGS) ____________

WELL DEPTH (Ft. TOC) 57'

INNER CASING/OPEN HOLE DIAM (In) 6"

DEPTH TO TOP OF SCREEN (Ft TOC) ____________

WLL VOLUME (Gal) ____________

PUMP INTAKE (Ft. TOC) 46'

	Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/minute)	~~Volume Purged~~ pH/mV	Temp °C	Specific Cond. (mS/cm)	pH	ORP (mv)	DO (mg/L)	Turbidity (NTU)
	[illegible]	4.31								~~28.1~~
	11:15	4.62		-48.2	14.26	3.47	7.22	40.3	0.82	28.1
	11:20	4.68	300	-47.5	14.41	3.48	7.34	25.4	0.45	28.8
	11:25	4.67	280	-46.9	14.42	3.47	7.32	20.2	0.21	20.2
	11:30	4.67	280	-46.3	14.41	3.46	7.34	11.4	0.08	21.0
	11:35	4.67	280	-46.4	14.42	3.46	7.33	2.9	0.06	19.2
	11:40	4.65	260	-46.4	14.41	3.46	7.34	-12.3	0.05	18.0
	11:45	4.67	260	-48.6	14.52	3.46	7.37	-58.3	0.05	18.2
	11:50	4.67	210	-48.8	14.61	3.46	7.37	-61.7	0.05	16.9
	11:55	4.68	210	-49.2	14.60	3.46	7.37	-64.7	0.05	16.5
	12:00	4.68	210	-49.4	14.60	3.46	7.37	-68.3	0.05	14.2
		OK	OK	OK		OK	OK	OK	~~OK~~	OK
Final:	12:30	4:68	210	-50.7	14.62	3.46	7.37	-70.1	0.06	4.8

Stop purging @ 12:00

Start Collecting Samples.

APPEARANCE/COLOR Clear

SAMPLED BY (PRINT) SAL KOKOL

SIGNATURE Sal Kokol

WELL CAP REPLACED AND LOCKED BY ____________

ODOR NONE

SAMPLED BY Sal Kokol

SIGNATURE ____________

DATE/TIME 5/28/03

Shaw Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE ________ WBS ________ DATE 7-1-03

WORK ORDER # ________ NORFAS ________

FIELD INSTRUMENTS: YSI 650 SONDE 6820

Well I.D B38W15D

SAMPLE I.D 20a-024737 / Filtered 20a-024789 ~~8~~ SEH 7-1-03

MEAS. REF. POINT (Ft. AGS or BGS) 0.5 BGS

WELL DEPTH (Ft. TOC) 46.5

INNER CASING/OPEN HOLE DIAM (In) 2"

DEPTH TO TOP OF SCREEN (Ft TOC) 40'

WLL VOLUME (Gal) ________

SAMPLING METHOD Grundfos Low Flow

PUMP INTAKE (Ft. TOC) 42'

3.62

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/minute)	Volume Purged (ml)	Temp °C	Specific Cond. (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
	3.59								
1107	4.1	210	210	15.42	1873	7.63	-20.0	3.07	3.3
1112	4.1	210	1060	15.36	1945	7.45	-29.7	0.75	4.6
1117	4.1	220	1160	15.49	1948	7.43	-40.4	0.51	5.4
1122	4.1	220	2260	15.50	2165	7.36	-42.0	0.45	2.8
1127	4.1	220	3360	15.60	2260	7.32	-42.7	0.40	1.3
1132	4.1	220	4460	15.71	2271	7.31	-43.8	0.35	0.9
1137	4.1	220	5560	15.59	2277	7.30	-46.4	0.33	0.8
1142	4.1	220		15.65	2282	7.30	-46.4	0.33	0.5
1147	4.1	220		15.74	2278	7.30	-45.2	0.31	0.5
1152	4.1	220		15.71	2276	7.29	-43.7	0.30	0.4
1200	NONFiltered	Sample		20a-024737					
1205	Filtered	Sample		20a-024790		for Fe+Mn			

APPEARANCE/COLOR Clear

SAMPLED BY (PRINT) Shawn Hall

SIGNATURE Shawn Hall

WELL CAP REPLACED AND LOCKED BY SH

ODOR NONE

SAMPLED BY TODD K LIPPMAN

SIGNATURE Todd K Lippman

DATE/TIME 7-1-03 1200 + 1205

Shaw Stone & Webster, Inc

FUSRAP MAYWOOD SUPERFUND SITE ENVIRONMENTAL REMEDIATION

WELL SAMPLING RECORD/FIELD WATER QUALITY SAMPLE AND ANALYSIS

SITE ________ WBS ________ DATE 7-1-03

WORK ORDER # __________ NORFAS ________

FIELD INSTRUMENTS: YSI 650 SONDE 6820

SAMPLING METHOD Grundfos Lowflow

Well I.D MW 31D

SAMPLE I.D Filtered 20a-024789 / Unfiltered 20a-024788

MEAS. REF. POINT (Ft. AGS or BGS) ________

WELL DEPTH (Ft. TOC) 50'

INNER CASING/OPEN HOLE DIAM (In) 6"

DEPTH TO TOP OF SCREEN (Ft TOC) ________

WLL VOLUME (Gal) ________

PUMP INTAKE (Ft. TOC) 35'

5.34

Sample Time (From/To)	Water Level (Ft TOR)	Discharge (milliliter/ minute)	Volume Purged (ml)	Temp °C	Specific Cond. (mS/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
	5.34								
1347	5.35	290	290	16.92	2148	7.56	-189.7	2.02	11.8
1352	5.36	290	1640	15.99	2511	7.30	-140.8	0.66	4.0
1357	5.36	300	3140	16.31	2524	7.28	-138.1	0.45	6.2
1402	5.35	300	4640	16.33	2501	7.27	-136.1	0.39	6.4
1407	5.35	300	6140	16.37	2445	7.28	-136.4	0.33	7.3
1412	5.36	300	7640	16.37	2404	7.29	-134.6	0.30	8.3
1417	5.36	300	9140	16.31	2368	7.29	-134.8	0.27	8.5
1422	5.36	300	10640	16.39	2355	7.30	-134.5	0.25	8.7
1427	5.36	310	12190	16.06	2336	7.30	-137.7	0.24	8.3
1432				16.46	2313	7.30	-135.9	0.22	8.2
1440	SAMPLE TIME			NON Filtered		Fe + Mn only		20a-024788	
1445	Filtered SAMPLE					Fe + Mn only		20a-024789	

APPEARANCE/COLOR Clear

SAMPLED BY (PRINT) Shawn Hall

SIGNATURE Shawn Hall

WELL CAP REPLACED AND LOCKED BY SH

ODOR None

SAMPLED BY TODD K LIPPMAN

SIGNATURE Todd K L

DATE/TIME 7-1-03 1440/1445

APPENDIX J
QUALITY CONTROL SUMMARY REPORT (QCSR)

Appendix J:
Quality Control Summary Report (QCSR)

Groundwater Remedial Investigation Addendum Report

New York District
Formerly Utilized Sites Remedial Action Program
Maywood Superfund Site

Prepared by:

Shaw® Shaw Environmental, Inc.
100 West Hunter Ave.
Maywood, New Jersey 07607

for:
US Army Corps of Engineers - Kansas City District
Formerly Utilized Sites Remedial Action Program
Contract No. DACW41-99-D-9001

US Army Corps of Engineers®

March 2004, Revision 3

This page intentionally left blank.

DRAFT
QUALITY CONTROL SUMMARY REPORT (QCSR) FOR THE GROUNDWATER REMEDIAL INVESTIGATION ADDENDUM REPORT

FUSRAP MAYWOOD SUPERFUND SITE
MAYWOOD, NEW JERSEY

SITE-SPECIFIC ENVIRONMENTAL RESTORATION
CONTRACT NO. DACW41-99-D-9001
TASK ORDER 0001
WAD 05, WBS 15

Submitted to:

Department of the Army
U.S. Army Engineer District, New York
Corps of Engineers
FUSRAP Project Office
26 Federal Plaza
New York, New York 10278

Department of the Army
U.S. Army Engineer District, Kansas City
Corps of Engineers
700 Federal Building
Kansas City, Missouri 64106

Submitted by:

Shaw Environmental, Inc.
100 West Hunter Avenue
Maywood, New Jersey 07607

October 2003
Revision 0

Issued to: ____________________ Date: ____________

Copy No. ________ ☐ Controlled ☐ Uncontrolled

This page intentionally left blank.

DRAFT
QUALITY CONTROL SUMMARY REPORT (QCSR) FOR THE GROUNDWATER REMEDIAL INVESTIGATION ADDENDUM REPORT

FUSRAP MAYWOOD SUPERFUND SITE
MAYWOOD, NEW JERSEY

SITE-SPECIFIC ENVIRONMENTAL RESTORATION
CONTRACT NO. DACW41-99-D-9001
TASK ORDER 0001
WAD 05, WBS 15

Submitted to:

Department of the Army
U.S. Army Engineer District, New York
Corps of Engineers
FUSRAP Project Office
26 Federal Plaza
New York, New York 10278

Department of the Army
U.S. Army Engineer District, Kansas City
Corps of Engineers
700 Federal Building
Kansas City, Missouri 64106

Submitted by:

Shaw Environmental, Inc.
100 West Hunter Avenue
Maywood, New Jersey 07607

October 2003
Revision 0

Prepared by: ______________________ Date: __________

Brian Tucker
Project Chemist

This page intentionally left blank.

RECORD OF REVISIONS

Revision Number	Description of Revision	Date
Draft Revision 0	Initial electronic submittal to USACE for review and comment.	August 2003
Revision 0	Submittal to the USACE CX for review and comment	October 2003

This page intentionally left blank.

TABLE OF CONTENTS

LIST OF TABLES

ATTACHMENTS

Note: * Due to their size, Attachments A and B are presented electronically on CD-ROM.
** Due to regulatory requirements, the HAZSITE Deliverable portion of Attachment C is presented electronically on a CD-ROM

ABBREVIATIONS AND ACRONYMS

%D	response factor percent difference
%R	percent recovery
%RSD	percent relative standard deviation
BOD	Biological Oxygen Demand
BTEX	benzene, toluene, ethylbenzene, and xylenes
CCB	continuing calibration blank
CCC	continuing calibration compound
COC	Chain of Custody
COD	Chemical Oxygen Demand
CDQMP	Chemical Data Quality Management Plan
FMSS	FUSRAP Maywood Superfund Site
FUSRAP	Formerly Utilized Sites Remedial Action Program
GWRI	Groundwater Remedial Investigation
J	Estimated value
Kestrel	Kestrel Environmental Technologies, Inc.
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
µg/L	micrograms per liter
mg/L	milligrams per liter
MS	matrix spike
MSD	matrix spike duplicate
Paragon	Paragon Analytics, Inc.
PDI	Pre-Design Investigation
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
QCSR	Quality Control Summary Report
RPD	Relative Percent Difference
RRF	Relative Response Factor
SDG	Sample Delivery Group
Shaw	Shaw Environmental, Inc. (formerly Stone & Webster, Inc., a Shaw Group Company)
SPCC	system performance check compound
STL-CT	Severn Trent Laboratories, Inc. of Shelton, CT
Stone & Webster	Stone & Webster, Inc., a Shaw Group Company (now Shaw Environmental, Inc.)
TCL	Target Compound List
TOC	total organic carbon
U	Undetected
USACE	U.S. Army Corps of Engineers
Validata	Validata Chemical Services, Inc.
VOC	Volatile Organic Compound

1.0 INTRODUCTION

Shaw Environmental, Inc. (Shaw), formerly Stone & Webster, Inc., a Shaw Group Company, conducted a Groundwater Remedial Investigation Addendum (GWRI Addendum) of commercial and government properties at the Formerly Utilized Sites Remedial Action Program (FUSRAP) Maywood Superfund Site (FMSS). The purpose of the investigation is to augment information collected during the Groundwater Remedial Investigation (GWRI). The location of the wells sampled are presented in the *Draft Groundwater Remedial Investigation (GWRI) Addendum Report* (USACE 2003d).

This *GWRI Addendum Quality Control Summary Report* (QCSR) addresses data from analysis of groundwater samples collected from July 2002 to May 2003. The primary objective of the GWRI Addendum Investigation was to further define the extent and limit of benzene in the bedrock aquifer. Other parameters were studied to support evaluation of natural attenuation as a remedial alternative. The results of 11 samples collected as part of the Environmental Monitoring Program 2002 effort were also used for the *Draft GWRI Addendum Report*. Quality control considerations for these results are described within Appendix G of the *Annual Environmental Monitoring Report, 2002* (USACE 2003b). The *GWRI Addendum QCSR* will support the preparation of the project QCSR. GWRI Addendum samples were analyzed for volatile organic compounds, total and dissolved iron and manganese, and wet chemistry parameters. The wet chemistry parameters included methane, nitrate, sulfate, phosphorus, ammonia, sulfide, total organic carbon, biochemical oxygen demand (BOD), and chemical oxygen demand (COD). Additionally, samples from select monitoring wells were analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX) Degrader Heterotrophs and Total Heterotroph analysis. As part of Maywood's radiological dose assessment program, work area and personnel air samples were also collected and analyzed for radiological constituents of concern. BTEX Degrader Heterotrophs and Total Heterotroph data, and radiological air sample data were not validated, so that data is not discussed within this report.

The QCSR is organized into seven sections as follows:

- Section 1.0, Introduction
- Section 2.0, Data Collection
- Section 3.0, Data Analysis and Validation
- Section 4.0, Data Summaries
- Section 5.0, System Audits
- Section 6.0, Analytical and Quality Assurance / Quality Control (QA/QC) Problems Encountered
- Section 7.0, References
- Attachment A, Data Validation Reports
- Attachment B, Data Packages
- Attachment C, Site Remediation Program Electronic Data Interchange Manual

2.0 DATA COLLECTION

GWRI Addendum data collection procedures were evaluated for any deviations / modifications that may have occurred in the areas of sample handling and custody, equipment calibration and maintenance, and analytical methods.

2.1 SAMPLE HANDLING AND CUSTODY

There were no sample handling discrepancies noted by the off-site laboratory. All chain of custody forms (COCs) received by the off-site laboratory were properly signed and dated. The sample receipt checklist indicated that custody seals were present and unbroken for each cooler except for the volatile organic compound (VOC) sample cooler for Sample Delivery Group (SDG) 203763. No data qualification was required. Custody seals were not present on individual sample bottles. Internal custodies were submitted for all batches except for the two VOC SDGs submitted by Paragon Analytics, Inc. of Fort Collins, CO (Paragon). Submittal of internal custodies is not a SDG deliverable requirement. The following other exceptions are noted:

- For VOC SDG 201523, the COC lists a sample as 12b-0216663. The sample was reported as 12b-021663. It appears that an extra digit was added to the COC sample identity.
- For wet chemistry parameters SDG 201523, the analyses originally indicated for sample 12b-024721 were crossed out. Sample 12b-024721 was not analyzed for wet chemistry parameters. It appeared that these analyses were also crossed out for rinseate blank sample 12b-021657, however these analytes were reported for sample 12b-021657.
- In SDG 203763, the temperature of sample 23b-021741 was 6.7°C upon arrival at the laboratory, which exceeded the 6°C QC limit. Since the sample was a field rinsate blank, no action was taken.
- In SDG 203763, sample 23b-021743, the trip blank, was reported by the lab as having “headspace”. Since this was the trip blank, no data qualification action was taken.
- In SDG 202237, the laboratory improperly identified sample 12b-021279 as 12b-011729. They were asked to correct this error.
- In data package 0302099 for VOCs, the sample cooler temperature was 9.2°C. The acceptance criteria is 2° to 6°C. All sample results for the one sample in this data package, 23b-021730, were qualified as estimated (J for detects and UJ for non-detects). There is potential for greater loss of VOCs and therefore a low bias.

2.2 EQUIPMENT CALIBRATION AND MAINTENANCE

For the chemical analysis, off-site laboratory calibration QC exceedances are described in Section 6.2.1 of this QCSR. There were no on-site laboratory or field equipment calibration QC concerns.

2.3 ANALYTICAL METHODS

A total of three laboratories were employed for chemical analysis.

Severn Trent Laboratories, Inc. in Shelton, CT (STL-CT) and Paragon analyzed groundwater samples. STL-CT and Paragon analyzed for the parameters (except for Total Heterotrophs and BTEX Degrader Heterotrophs) in **Table 2-1** using the indicated methods. New Jersey Analytical analyzed for Total Heterotrophs and BTEX Degrader Heterotrophs.

Table 2-1
GWRI Addendum Analytical Test Parameters and Methods

Parameter	Method
VOCs	SW-846 8260B
Iron and manganese, total and dissolved	SW-846 6010B
Methane	SW-846 8015A modified
Nitrate	MCA 300
Sulfate	MCA 300
Phosphorus	MCA 365.2
Ammonia	MCA 350.1
Sulfide	MCA 376.1
Total organic carbon	MCA 415.1
BOD	MCA 405.1
COD	MCA 410.4
BTEX Degrader Heterotrophs	SM9215M
Total Heterotrophs	SM9215B

Notes:
SW-846: EPA's Test Methods for Evaluating Solid Waste Physical / Chemical Methods
MCA: EPA's Methods for Chemical Analysis of Water and Wastes
SM: Standard Methods for the Examination of Water and Wastewater

There were no deviations / modifications in analytical methods from those specified in the *GWRI Addendum - Proposed Source and Plume Delineation Work Plan* (USACE, 2002).

2.4 MODIFICATIONS TO THE WORK PLAN

There were no modifications to the measurement techniques described in the *GWRI Addendum - Proposed Source and Plume Delineation Work Plan*.

3.0 DATA ANALYSIS AND VALIDATION

Kestrel Environmental Technologies, Inc. (Kestrel) and Validata Chemical Services, Inc. (Validata) performed data evaluation of all data. They evaluated 100% of the off-site GWRI sample results. Data was evaluated using the USACE's CENWK-EC-EF *Data Quality Evaluation Guidance* for chemical results, as presented in the *Chemical Data Quality Management Plan* (CDQMP) *Quality Assurance Project Plan* (QAPP), Appendix F (USACE 1999, USACE 2000). The data validation reports for the off-site laboratory chemical results are provided as Attachment A. The data packages themselves are presented on CD-ROM as Attachment B to this QCSR. Electronic deliverables were submitted in accordance with the New Jersey Department of Environmental Protection (NJDEP) required Site Remediation Program Electronic Data Interchange Manual (NJDEP 1999 and Attachment C). Within this manual, Option 2, Database Format, is used. Treatment of outliers was performed as per Section 3.1.3 of the *CDQMP QAPP* (USACE 2000).

4.0 DATA SUMMARIES

Data summaries for the laboratory data can be found on the Attachment B Data Packages CD-ROM.

5.0 SYSTEM AUDITS

The off-site laboratories utilized for testing of GWRI samples, STL-CT, New Jersey Analytical Laboratory, and Paragon have not been audited by Shaw.

6.0 ANALYTICAL AND QUALITY ASSURANCE / QUALITY CONTROL (QA/QC) PROBLEMS ENCOUNTERED AT OFF-SITE LABORATORIES

The off-site laboratories used for testing of GWRI samples for chemical parameters were STL-CT, New Jersey Analytical Laboratory, and Paragon. Twelve (12) GWRI chemical data package results were evaluated for this QCSR. All of the data packages, with the exception of that for SDG 203763, were validated by Kestrel. Validata validated the data package for SDG 203763.

6.1 CALIBRATION

Qualifications based upon calibration criteria exceedances were required only for VOCs. All other calibration results for other parameters were acceptable. For data packages with VOCs, calibration responses for all system performance check compounds (SPCCs) and continuing calibration compounds (CCCs) were within method acceptance criteria.

For VOC initial and continuing calibrations, if a relative response factor (RRF) was < 0.05, the percent relative standard deviation (%RSD) for initial calibrations exceeded 15%, and/or the percent difference (%D) between the average RRF of the initial calibration and the RRF of the continuing calibration exceeded 20%, results were estimated J for positive results and UJ for non-detects. Note that if the RRF < 0.05 for a given compound and the LCS for that compound was outside acceptance criteria, non-detect results for that compound were rejected. The following samples were qualified as noted for the specified parameters. As indicated in **Table 6-1**, benzene data was not affected by calibration issues.

Table 6-1
Calibration Qualifiers

SDG	Parameter	Qualifier	Reason for Qualification	Samples Affected
0302099	Acetone	J	RRF < 0.05, %RSD > 15%, and %D > 20%	23b-021730
0303084	Acetone	UJ	RRF < 0.05, %RSD > 15%, and %D > 20%	20a-021738 and 20a-021739
	2-butanone	UJ	%RSD > 15%	
203211	Bromomethane	UJ	%RSD > 15% and %D > 20%	20a-021731, -021732, and -021733; 23b-021734, -021735, and -021736
	Acetone	J (021733), UJ (021732 and 021736) R (021731 and 021734)	%RSD > 15% and %D > 20%	20a-021731, -021732, and -021733; 23b-021734, -021735, and -021736
	2-butanone	R for 021731, 34, and 35; UJ for 021732, 33, and 36	%RSD > 15% and %D > 20%	20a-021731, -021732, and -021733; 23b-021734, -021735, and -021736
	Methylene chloride	UJ	%RSD > 15%	20a-021731, -021732, and -021733; 23b-021734, -021735, and -021736
	Bromoform	UJ	%RSD > 15%	20a-021731, -021732, and -021733; 23b-021734, -021735, and -021736
	2-Hexanone	UJ	%RSD > 15% and %D > 20%	20a-021731, -021732, and -021733; 23b-021734, -021735, and -021736
	4-methyl-2-pentanone	UJ	%D > 20%	20a-021732 and 021733; 23b-021736
	1,1,2,2-tetrachloroethane	UJ	%D > 20%	20a-021732 and 021733; 23b-021736
203588	Acetone	R	RRF < 0.05	23b-021740
	2-butanone	UJ	%RSD > 15% and %D > 20%	
	Methylene chloride	UJ	%RSD > 15% and %D > 20%	
	2-hexanone	UJ	%D > 20%	
	1,1,2,2-tetrachloroethane	UJ	%RSD > 15%	
	Chlorobenzene	UJ	%RSD > 15%	
202204	Acetone	All R except 12b-021721 and -021724 which were J	Contin. Cal RRF < 0.05	All samples
	2-butanone	All UJ except 12b-021720 and -021724 which were J	%RSD > 15% and %D > 20%	
	Methylene chloride	UJ	%RSD > 15% and %D > 20%	
	4-methyl-2-pentanone	All UJ except 12b-021723, which was J	%RSD > 15%	
	Chloromethane	UJ	%RSD > 15%	
	Bromomethane	UJ	%RSD > 15%	
	Chloroethane	UJ	%RSD > 15%	
	Cis-1,3-dichloropropene	UJ	%D > 20%	
201924	Acetone	R for TRIP BLANK, and J for 12b-021715 and -021717	RRF < 0.05	All samples
	2-butanone	R	RRF < 0.05	All samples

SDG	Parameter	Qualifier	Reason for Qualification	Samples Affected
201523	Acetone	All GWRI samps are J except 23b-021661, UJ	RRF < 0.05, %RSD > 15%, and %D > 20%	All samples
	2-butanone	UJ	%RSD > 15% and %D > 20%	All samples
	Methylene chloride	All GWRI samps are UJ except 12b-021663 is J	%RSD > 15%	All samples
	Chloromethane	UJ	%D > 20%	All samples. Except 23b-021661
	Bromomethane	UJ	%RSD > 15% and %D > 20%	All samples
201638	Acetone	J	RRF < 0.05; RSD > 15%	12b-021708, -021710, -021711, 021714, and -021
		UJ		12b-021664, -021670, -021699, -021700, -021701, -021702, and 23b-021668
	2-butanone	UJ	RRF < 0.05; RSD > 15%; %D > 20%	All samples
	Methylene chloride	J 12b-021702 and -021714; UJ 23b-021668, 12b-021699, -021700, 021701, and -021708	%RSD > 15%	23b-021668, 12b-021702, -021714, -021699, 021700, 021701, and -021708
	Bromomethane	UJ	%RSD > 15%	All samples
201507	Acetone	UJ	RRF < 0.05; %D > 20%	All samples
	Bromomethane	UJ	%RSD > 15% and %D > 20%	All samples
	2-butanone	UJ	%D > 20%	12b-021651 and -021652
	Methylene chloride	UJ	%RSD > 15%	All samples
	Chloromethane	UJ for all except J for 12b-021649	%D > 20%	All samples
203763	Bromomethane	UJ	%D > 20%	All samples
	2-butanone	UJ	%RSD > 15% and %D > 20%	All samples
	Methylene chloride	UJ	%RSD > 15% and %D > 20%	All samples
	2-hexanone	UJ	%D > 20%	All samples

6.2 BLANKS

6.2.1 Wet Chemistry Parameters

Several samples were analyzed for the wet chemistry parameters nitrate, sulfate, sulfide, ammonia, BOD, COD, methane, total organic carbon (TOC), and total phosphorus.

SDG 202237

Based upon the method blank results and equipment blank results, the total phosphorus result for 12b-021729 was reported as non-detected (U) at the reported concentration.

SDG 203211

Due to the method blank and continuing calibration blank (CCB) results (highest value was 0.306 milligrams per liter [mg/L]), the sulfate result for sample 23b-021735 (0.33 mg/L) was qualified as non-detected (U) at the reported concentration.

Due to the phosphorus CCB result of 0.0043 mg/L, the phosphorus result for sample 20a-021733 (0.0166 mg/L) was qualified as non-detected (U) at the reported concentration.

The TOC result for sample 20a-021733 (0.55 mg/L), 23b-021734 (0.78 mg/L), and 23b-021735 (0.80 mg/L), were qualified as non-detected (U) at the reported concentration due to method blank and CCB results.

SDG 201523

The BOD result for sample equipment blank 12b-021657 was reported as non-detected at the reported concentration due to a method blank BOD level of 0.40 mg/L.

The TOC results for samples 12b-021657, 20a-021659 and 23b-021661 were reported as non-detected at the reported concentration due to a TOC initial calibration blank result of 0.54 mg/L.

Based upon the nitrate rinseate blank result of 0.031 mg/L, nitrate was reported as non-detected (U) at the reported concentration for sample 23b-021661.

SDG 203763

There was either no blank contamination or sample concentrations were greater than blank action levels so that no qualifications were required based upon blank contamination.

6.2.2 Elements

All initial and continuing calibration blank results for iron and manganese were reported as non-detected for the ICP analyses and all preparation blank results were reported as non-detected (U) for SDGs 202237, 203211, and 203763.

6.2.3 Volatile Organic Compounds

All the field and/or laboratory blanks were non-detect for benzene. The following discussion summarized those compounds present in field and laboratory blanks.

SDG 201507

There was no contamination in the method blanks. Based upon the rinseate and trip blank contamination, the following qualifications were made:

Chloromethane (maximum blank concentration of 0.6 micrograms per liter [µg/L] in the rinseate blank) - qualified UJ in 12b-021651 and -021652;

Toluene (maximum blank concentration of 0.2 µg/L in the trip blank) - qualified U in 12b-021652;

Acetone (maximum blank concentration of 19 µg/L in the rinseate blank) - all results qualified UJ;

Methylene chloride (maximum blank concentration of 0.5 µg/L in the trip blank) - all results qualified UJ.

SDG 201638

This SDG contained four method blanks, four trip blanks, and two rinseate blanks There was methylene chloride detected in the method blanks, trip blanks, and rinseate blanks. Acetone and toluene were detected in the trip blanks and rinseate blanks, and chloroform was detected in one trip blank only. Qualifications made based upon the maximum concentration of each parameter in any of the blanks are given in **Table 6-2**.

Table 6-2
Qualifications Based upon the Maximum Concentration of Each Parameter in any of the Blanks

Parameter	Maximum Blank Concentration	Action Level	Sample Qualifiers
Methylene chloride	5	50	Non-detect U in 12b-021708DL, -021670, -021711, -021702, -021714, and 23b-021668
Acetone	240	2400	Estimated non-detect, UJ, at the reported concentrations for samples 12b-021670, -021701, and -021699.
Toluene	0.2	1.0	No data validation qualifiers *
Chloroform	0.1	1.0	Non-detect U in sample 12b-021664

Notes: *Data is reported as estimated J for results falling between the MDL and reporting limit.

SDG 201924

There was one trip blank and no equipment rinseate. Only methylene chloride was detected in the method and trip blanks at a maximum concentration of 0.5 µg/L. The trip blank result was qualified non-detect due to the method blank result of 0.4 µg/L. Methylene chloride was not detected in field samples 12b-021715 and -021717 so qualifications were required.

SDG 202204

The results of two equipment rinseates and two trip blanks were evaluated for this SDG. The trip blank and rinseate blank methylene chloride results were qualified non-detect, U, due to the methylene chloride concentration in the method blank. Based upon the methylene chloride method blank results, methylene chloride results in non-blank field samples 12b-021719, -021720, -021723, and -021724 were qualified non-detect, U. These qualifiers were changed to estimated non-detect (UJ) based upon initial and continuing calibration results.

SDG 203588

There were no equipment blanks or trip blanks reported with this SDG. Therefore, only method blank contamination was evaluated. The methylene chloride result for sample 23b-021740 was qualified as non-detected (U) at the reported concentration due to contamination at 0.48 µg/L in the method blank. This qualifier was changed to estimated non-detect (UJ) based upon initial and continuing calibration results.

SDG 0302099

There were no equipment blanks or trip blanks reported with this SDG. The one reported laboratory method blank showed no contamination. Therefore, no qualifications were required.

SDG 0303084

There were no equipment blanks and one trip blank reported with this SDG. Neither the trip blank nor the one reported laboratory method blank showed any contamination. Therefore, no qualifications were required.

SDG 203211

No equipment rinseate blanks, one trip blank, and one laboratory method blank were reported with this SDG. Methylene chloride results in the trip blanks, as well as in field samples 20a-021733 and 23b-021735 were qualified non-detect U at the reported concentration due to contamination of 0.5 to 0.8 µg/L in the two method blanks. The methylene chloride results for these samples were later qualified as non-detected estimated (UJ) due to initial calibration %RSD results. Acetone reported in one of the method blanks required qualification of the acetone result in sample 23b-021735 as non-detect. This qualifier was changed to rejected (R) due to acetone LCS/LCD results.

SDG 201523

There were two equipment rinseate blanks, two trip blanks, and four laboratory method blanks associated with this SDG. Only toluene was detected in the method blanks at 0.12 µg/L, and that concentration represented the maximum toluene concentration in any of the blanks. All samples associated with that blank were non-detect for toluene so qualifiers were required. Acetone and methylene chloride were detected in both the rinseate and trip blanks at maximum levels of 7 and 0.6 µg/L, respectively. All positive acetone results and the methylene chloride result in sample 23b-021661 were qualified estimated non-detect (UJ) due to rinseate blank contamination and initial and continuing calibration results.

SDG 203763

Methylene chloride was detected in the trip and rinseate blanks, but these results were qualified non-detect due to methylene chloride contamination (maximum level of 0.64 µg/L) in the method blanks. The non-blank field sample result for methylene chloride in this SDG sample was non-detect, so no qualification was required. Acetone was detected in both the trip and rinseate blanks so the acetone result in 23b-021742 was qualified undetected (U) at the reported concentration. Chloroform was detected in the rinseate blank at 0.2 µg/L but was non-detect in the non-blank field sample so no qualification was required.

TOC was reported at 2.1 mg/L in field rinsate blank 23b-021741. The positive result for TOC in the only non-blank SDG sample 23b-021742, which was less than 5X the blank amount, was flagged as undetected (U).

6.3 MATRIX SPIKE (MS) AND MATRIX SPIKE / MATRIX SPIKE DUPLICATE (MS/MSD)

In SDGs 201523, 203211, 203763, and 202237, only non-Maywood samples were used as matrix spikes for iron and manganese. Iron and manganese met acceptance criteria of 75 to 125% spike recovery in those SDGs.

For wet chemistry parameters, all spike recoveries were within acceptance limits for SDG 201523, 202237, and 203763. In SDG 203211, all MS results met laboratory acceptance criteria for percent recovery, except one of the four COD MS. The non-compliant MS result was analyzed using a non-Maywood sample that had an inherently high COD result. The Maywood samples were all reported by the laboratory as non-detected (U) for COD. The Maywood sample results for COD were therefore evaluated against the other three COD MS, some of which were analyzed using samples with lower native COD values. No Maywood COD values were qualified due to MS results.

For VOCs, no MS/MSD sample pair was submitted for SDGs 203211, 203588, and 201924. Accuracy could not be evaluated in the sample matrix but was evaluated for the method from the LCS and LCSD. Non-Maywood samples were analyzed as MS/MSD pairs in SDGs 202204, 201638, and 201507. MS/MSD recoveries were within limits for all spike compounds. .For SDGs 203763, 0303084, and 201523, Maywood samples were used to generate MS/MSD QC samples. All spike recovery acceptance criteria were met for MS/MSD results in these SDGs. In SDG 0303084, spike compound 1,1-dichloroethene was substituted for cis-1,2-dichloroethene and trans-1,2-dichloroethene. Shaw was notified of this discrepancy at the time of analysis and instructed the laboratory to continue with the analysis. No qualifications were made to cis-1,2-dichloroethene and trans-1,2-dichloroethene results based upon this substitution.

6.4 LABORATORY CONTROL SAMPLE / LABORATORY CONTROL SAMPLE DUPLICATE (LCS/LCSD)

All LCS/LCSD percent recoveries (%Rs) and relative percent differences (RPDs) between %Rs were within acceptance criteria except for the following:

In VOC SDG 203211, the RPDs between LCS and LCSD %Rs were 31, 30, and 63%, for 1,1-dichloroethene, acetone, and 2-butanone, respectively. The maximum acceptable RPD is 20%. USACE guidance states that the sample results associated with these outside of criteria LCSs are to be rejected; so, the 1,1-dichloroethene, acetone, and 2-butanone results were rejected in samples 20a-021731, 23b-021734, and 23b-021735.

In VOC SDG 203588, the acetone LCS and LCSD recoveries were 146 and 182%, respectively, and the RPD between these recoveries was 22%. The acetone result for sample 23b-021740, the lone sample comprising this SDG, was rejected as per USACE guidance.

In SDG 203763, the 2-hexanone LCS %R was 22%, slightly higher than the 20% maximum criterion. The validator did not qualify the 2-hexanone results since 2-hexanone is not a usual spike compound and only the RPD exceeded limits.

The impacts of the rejected data to the investigation is inconsequential since benzene data was not impacted due to poor LCS/LCSD data.

6.5 SURROGATE RECOVERIES

All surrogate recoveries for the VOC analyses were within acceptance criteria with the following exceptions:

In SDG 203763, the %R of toluene-d8 was 214% for sample 23b-021742, which exceeded the 70-127% QC limits. The Case Narrative states that these sample results exhibited "suppression of internal standard areas, a surrogate recovery out of criteria and high TIC peaks." This sample was reanalyzed at a 2 times dilution with acceptable surrogate recoveries. For SDG 201638, the toluene-d8 recovery in sample 12b-021708 was 50% (acceptance criteria 70-127%). No corrective action was taken; therefore, all VOC results in sample 12b-021708, a rinseate blank, were rejected.

6.6 FIELD AND LABORATORY DUPLICATES

In SDG 201924 for VOCs, samples 12b-021715 and 12b-021717 were a field duplicate pair. All precision criteria were met for the two sample results. No other field duplicate pairs were submitted for VOCs. The project-required field duplicate collection percentage is 5%. One VOC field duplicate was collected for 18 non-blank field samples, a percentage of 5.5%; therefore the duplicate percentage requirement was met.

There were no field duplicates submitted with any of the 11 non-blank field samples for iron and manganese and wet chemistry parameters; therefore the duplicate percentage requirement was not met for these parameters.

Laboratory duplicates were analyzed with every batch for iron and manganese and wet chemistry parameter batches. All precision criteria were met.

6.7 ICP INTERFERENCE CHECK SAMPLE AND SERIAL DILUTION RESULTS (ELEMENTS ONLY)

All ICP interference check sample criteria were met. In SDG 202237 for iron and manganese total and dissolved analyses, sample 12b-021729 was analyzed as the ICP serial dilution sample. The iron and manganese ICP serial dilution results differed by 11.6 and 15.3% from the original analysis for iron and manganese, respectively (acceptance criterion maximum is 10%). The iron and manganese results for sample 12b-021729, total and dissolved, were reported as estimated (J).

6.8 HOLDING TIMES

All sample analyses holding time requirements were met.

7.0 REFERENCES

NJDEP 1999, New Jersey Department of Environmental Protection (NJDEP). *Site Remediation Program Electronic Data Interchange Manual*. April 1999.

USACE 1999, U.S. Army Corps of Engineers. *CENWK-EC-EF Data Quality Evaluation Guidance*. July 26, 1999.

USACE 2000, U.S. Army Corps of Engineers. *Chemical Data Quality Management Plan*. Prepared for the USACE by Stone & Webster, Inc. February 2000 (presently under revision).

USACE 2002, U.S. Army Corps of Engineers. *PDI Stepan Building Characterization Survey QCSR*. Prepared for the USACE by Stone & Webster, Inc. April 2002

USACE 2003a, U.S. Army Corps of Engineers. *Draft Groundwater Remedial Investigation Report*. Prepared for the USACE by Stone & Webster, Inc. June 2003.

USACE 2003b, U.S. Army Corps of Engineers. *Draft Final – Annual Environmental Monitoring Report, 2002*. Prepared for the USACE by Stone & Webster, Inc. June 2003.

USACE 2003c, U.S. Army Corps of Engineers. *USACE Radionuclide Data Quality Evaluation Guidance for Alpha and Gamma Spectroscopy Modified for the Maywood Project*. Prepared for the USACE by Shaw Environmental, Inc. July 2003 .

USACE 2003d, U.S. Army Corps of Engineers. *Draft Groundwater Remedial Investigation (GWRI) Addendum Report*. Prepared for the USACE by Shaw Environmental, Inc. Scheduled for issue August 2003

This page intentionally left blank.

ATTACHMENT A*
DATA VALIDATION REPORTS

Note: *Due to its size, Attachment A is presented electronically on a CD-ROM.

This page intentionally left blank.

ATTACHMENT B*
DATA PACKAGES

Note: *Due to its size, Attachment B is presented electronically on a CD-ROM

This page intentionally left blank.

ATTACHMENT C**
SITE REMEDIATION PROGRAM ELECTRONIC DATA INTERCHANGE MANUAL AND HAZSITE DELIVERABLE

Note: **Due to regulatory requirements, the HAZSITE Deliverable portion of Attachment C is presented electronically on a CD-ROM

This page intentionally left blank.