Draft Final

Technical Memorandum Work Plan for the Plume Characterization

at
Former Fire Training Area
Marshall Army Airfield
Fort Riley, Kansas

12 January 1998

Prepared for

U.S. Army Corps of Engineers
Kansas City District

Prepared by

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Contract Number: DACA41-96-D-8010
Project Number: 96-806-4-007

Table of Contents

Figures

Tables

Appendices

LIST OF ACRONYMS AND ABBREVIATIONS

ASTM	American Society of Testing Materials
BMcD	Burns & McDonnell Engineering, Inc.
bgs	Below Ground Surface
CAS	Continental Analytical Services, Inc.
CEC	Cation Exchange Capacity
CENWK	Kansas City District Corps of Engineers
C.I.H.	Certified Industrial Hygienist
DCE	cis-1,2-Dichloroethylene
DES	Directorate of Environment and Safety
DQCR	Data Quality Control Report
DQO	Data Quality Objectives
FFTA	Former Fire Training Area
FFTA-MAAF	Former Fire Training Area - Marshall Army Airfield
FSM	Field Site Manager
GAC	Granular Activated Carbon
GC/MSD	Gas Chromatograph/Mass Selective Detector
GC	Gas Chromatograph
GSI	Geocore Services, Inc.
IDW	Investigation-Derived Waste
IDWMP	Investigation-Derived Waste Management Plan
KDHE	Kansas Department of Health and Environment
MAAF	Marshall Army Airfield
MCL	Maximum Contaminant Level
MRR	Missouri River Region
MS/MSD	Matrix Spike/Matrix Spike Duplicate
MWIP	Monitoring Well Installation Plan
NAD	North American Datum
PCE	Tetrachloroethylene
PES	Plains Environmental Services
PID	Photoionization Detector
QA	Quality Assurance
QA LAB	Chemistry and Materials Quality Assurance Laboratory
QC	Quality Control
SAP	Sampling and Analysis Plan
SSHP	Site Safety and Health Plan
TCE	Trichloroethylene
TCLP	Toxic Characteristic Leaching Procedure
TOC	Total Organic Carbon
USACE	U.S. Army Corps of Engineers
USAEHA	U.S. Army Environmental Hygiene Agency
USEPA	U.S. Environmental Protection Agency
USATHMA	U.S. Army Toxic and Hazardous Materials Agency
UST	Underground Storage Tank
UTM	Universal Transverse Mercator

LIST OF ACRONYMS AND ABBREVIATIONS (Cont'd)

VOC	Volatile Organic Compound
892/FFTA	892 Fire Fighters Training Area

1.0 Introduction

Burns & McDonnell Engineering, Inc. (BMcD) has been contracted by the Kansas City District Corps of Engineers (CENWK) to determine the downgradient vertical and horizontal extent of groundwater contamination north of the Former Fire Training Area, Marshall Army Airfield (FFTA-MAAF), Fort Riley, Kansas. Figures 1-1 and 1-2 illustrate the location of Fort Riley and the FFTA-MAAF.

Specific procedures and guidelines for conducting the scheduled field activities are described in the Comprehensive Basic Documents for the sites at Fort Riley including:

- Site Safety and Health Plan (SSHP)(BMcD, 1997a)
- Investigation-Derived Waste Management Plan (IDWMP)(BMcD, 1996)
- Monitoring Well Installation Plan (MWIP)(BMcD, 1996a)
- Sampling and Analysis Plan (SAP)(BMcD, 1997b)

This technical memorandum work plan discusses planned field activities and the rationale for conducting these activities. The work plan also identifies activities that deviate from the procedures described in the Comprehensive Basic Documents. Proposed procedures that are not described in or deviate from the Comprehensive Basic Documents as well as rationale for the changes are further detailed in this memorandum work plan.

1.1 Scope

Work associated with the additional plume characterization investigation includes:

- preparation of appropriate work plans with addendums to existing basic plan documents as necessary

- groundwater screening for monitoring well placement

- drilling and installation of monitoring wells

- collection and analysis of soil (geotechnical) and groundwater samples

- topographic surveying of groundwater screening and monitoring well locations

- preparation of summary reports

1.2 Objective

The objective of this project is to define the vertical and horizontal extent of groundwater contamination at the downgradient edge of the chlorinated solvent plume near FFTA-MAAF. This will be accomplished by collecting groundwater screening samples and installing four additional monitoring well clusters. Field activities will meet Remedial Investigation (RI) data gathering objectives. Analytical results of groundwater samples collected during this field effort will be incorporated into the nature and extent and risk assessment portions of the RI. Data collected pertaining to natural attenuation studies will be used for the feasibility study (FS).

1.3 Background

The FFTA-MAAF was operated from the mid-1960s through 1984 to conduct fire suppression training exercises (USAEHA, 1979; USATHMA, 1984). During this period, the burn pit consisted of a crushed stone pad (approximately 200 feet by 200 feet) with no subsurface liner. Flammable liquids were temporarily stored in drums near the burn pit for use during training exercises.

During fire training exercises, flammable liquids were dumped into the burn pit, ignited, and then extinguished. Predominant fuels used for fire training exercises were petroleum hydrocarbons, including JP-4, diesel, and MOGAS (a generic term for motor vehicle gasoline often used to refer to gasolines with lead alkyds).

A Site Investigation (SI) of the FFTA-MAAF (site) was conducted in three phases. The purpose of SI activities was to confirm whether contamination existed at the site and to support decision-making processes regarding the need for additional investigations or no further action. Environmental sampling was performed during the SI to characterize physical conditions and contamination at the site.

Results of the SI indicated that petroleum hydrocarbons and chlorinated solvents, including tetrachloroethylene (PCE) and trichloroethylene (TCE), were present in the subsurface environment (soil and groundwater). Additionally, contaminants similar to those detected at the FFTA-MAAF were detected in groundwater along the reservation boundary and in an off-post private well, approximately 1,000 feet north of the FFTA-MAAF.

Based on results of the SI, additional site investigation activities were performed. Additional investigations were conducted in the immediate area of the FFTA-MAAF and in areas north of the reservation boundary where groundwater contamination was detected. As part of these investigations additional shallow, intermediate, and deep monitoring wells were installed for horizontal and vertical plume definition.

1.4 Site Geology and Hydrogeology

Fort Riley lies in the Osage Plains section of the Central Lowlands physiographic province and within the Flint Hills physiographic province of Kansas. The Nemaha Anticline is the prominent structural feature in the area, and Fort Riley is situated on the western limb of this fold (Merriam, 1963). Bedrock in the area dips gently to the west-northwest and consists of alternating limestones and shales of the Permian-age Chase and Council Grove Groups. The bedrock has been dissected in the upland areas by intermittent and perennial streams and in the lowlands by the Smoky Hill River and Republican River which merge to form the Kansas River near Fort Riley. Numerous tributaries also drain the area. The resultant topography is composed of upland bluff areas adjacent to alluvial plains and associated terraces.

As determined from previous investigations at the FFTA-MAAF, groundwater flows generally toward the north-northeast, and the groundwater surface is typically between 20 and 25 feet below ground surface (BMcD, 1997).

In the alluvial plains, sand, silt, and gravel deposits reach a combined thickness of up to 100 feet near the rivers and generally decrease in thickness toward the river bluffs. The alluvium consists primarily of sand and gravel deposits with minor lenses of silt and clay. The alluvium tends to coarsen with depth down to the bedrock surface. Previous investigations at FFTA-MAAF indicate that bedrock is approximately 60 to 70 feet below ground surface and is composed of alternating limestone and shale units (BMcD, 1997).

2.0 Project Organization

The plume characterization investigation at the FFTA-MAAF site will be conducted by BMcD. Key project personnel, subcontractors, and other parties involved with the field activities and oversight during this project are identified in this section.

2.1 U.S. Army Corps of Engineers (USACE)

The USACE Kansas City District is the administrator of the additional plume characterization investigation at the FFTA-MAAF. Mr. Glen Shonkwiler is the USACE Technical Manager for this project and will serve as the primary point of contact for BMcD.

The USACE Kansas City District will have an on-site USACE representative to provide oversight and assure field activities are conducted in accordance with the work plan. Mr. Michael Greene, geologist, is the on-site USACE representative to be present during field activities.

2.2 Burns and McDonnell

BMcD has been retained by USACE to conduct the activities described in this work plan. Figure 2-1 shows BMcD's project organization chart.

Mr. Mark Schulze will serve as the BMcD Project Manager. Mr. Schulze will be the point of contact and liaison between BMcD and the USACE for the work required under this project. Mr. Schulze will be responsible for complete coordination of the work to be accomplished, including adequate internal controls and review procedures to eliminate conflicts, errors, and to verify technical accuracy. In addition, Mr. Schulze is responsible for overseeing activities involving sampling, laboratory analyses, and audits of performance so that the data quality objectives (DQOs) are met. Mr. Schulze can be contacted at 816-822-3126.

Ms. Suzanne Bailey will serve as the BMcD Field Site Manager (FSM). Ms. Bailey will supervise the field activities relevant to this project and will have direct responsibility for site-specific activities and decisions regarding the immediate safety of investigation personnel. Ms. Bailey will report to the BMcD Project Manager and the Safety and Health Officer. Ms. Bailey can be contacted at 816-333-8787, extension 5406.

Mr. Tracy Cooley will serve as project geologist. Mr. Cooley will provide field and office support during field investigation activities. Mr. Cooley can be contacted at 816-822-3369.

Mr. Frank Scherffius, Certified Industrial Hygienist (C.I.H.), will serve as BMcD's Safety and Health Officer for this project and will have ultimate responsibility for the health and safety of field personnel. Mr. Scherffius can be contacted at 816-822-3483.

2.3 Subcontractors

2.3.1 Direct-Push Contractor

Plains Environmental Services (PES), P.O. Box 6288, Salina, Kansas 67401, has been selected to perform direct-push services for this project. The services performed by PES personnel will include operating the hydraulic equipment for collection of groundwater samples for on-site analysis and abandonment of boreholes. The groundwater samples will be analyzed with a field gas chromatograph (GC), operated by PES personnel. A copy of the PES Field Procedures Manual is included in Appendix A. This manual is a standard PES document that describes all of the field procedures that PES offers and is not intended to address only the requirements of this investigation.

2.3.2 Drilling Contractor

Geocore Services, Inc. (GSI), P.O. Box 386, Salina, Kansas 67402, has been selected to perform the drilling and monitoring well installation services for this project. GSI will provide the necessary equipment and services to conduct drilling, soil sample collection, well installation, and decontamination of drilling equipment activities for this project.

2.3.3 Surveyor

KAW Valley Engineering, 2319 N. Jackson, Junction City, Kansas 66441, a licensed surveyor, has been selected to perform surveying of all direct-push boring and monitoring well locations. Direct-push borings will be surveyed to determine horizontal locations and ground surface topographic elevations. Monitoring wells will be surveyed to provide horizontal locations, elevations of the ground surface, survey monument, and the top of well casing. The surveying will be performed in accordance with procedures outlined in Section 4.8 of the SAP.

2.3.4 Analytical Laboratory

Continental Analytical Services, Inc. (CAS), 1804 Glendale Road, Salina, Kansas 67401, has been selected to perform the off-site analytical testing for samples collected from monitoring wells. All groundwater samples will be analyzed in accordance with procedures outlined in the *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods* (SW-846) (EPA, 1986). CAS is currently certified by the USACE-Missouri River Region (MRR) and the State of Kansas.

2.4 Quality Assurance Laboratory

The USACE Chemistry and Materials Quality Assurance Laboratory (QA Lab, USACE MRR Analytical Laboratory) will analyze quality assurance (QA) samples collected during direct-push groundwater screening activities and from the monitoring wells installed for this project. The address and lab coordinator are provided below.

Chemistry and Materials
Quality Assurance Laboratory
420 S. 18th Street
Omaha, Nebraska 68102
402-444-4314
Attn: Laura Percifield
LIMS # 4836

2.5 Utility Clearance

Prior to any field work involving subsurface activities, utility clearance will be required. On this project, utilities will be located with the aid of site personnel, landowners, and Kansas One-Call (800-DIG-SAFE), a utility location service. A 48-hour notification is required for utility location by Kansas One-Call prior to commencing intrusive activities, and work must start within 10 days of the request. Utility clearance activities, including the ticket number, utilities notified, and the names of all persons granting utility clearance will be recorded on the Field Safety Checklist, Intrusive Activities, located in the SSHP. Since all intrusive field work planned for this project will be conducted off-post, a Fort Riley utility clearance will not be required.

Subsurface activities will not be conducted within five feet of any marked underground utilities. Due to the potential presence of underground or overhead utilities, it may be necessary to offset boring locations. This will be done with the approval of the FSM and will be documented in the field logbook. Notification of the relocation of boring locations due to utility or other interference will be reported to Fort Riley and the USACE field representative.

2.6 Logistics

Table 2-1 summarizes the logistical tasks and contacts that are required prior to beginning field activities. Coordination of all requests for installation support services will be made through Mr. Kyle Kirchner of Fort Riley.

BMcD is responsible for the following items:

- Water Supply - supplying equipment to draw, transport, and store non-chlorinated or distilled, potable water.
- Equipment Decontamination - supplying a decontamination area lined with plastic sheeting to prevent seepage of decontamination water into the soil. Water generated during decontamination procedures will be managed in accordance with Section 4.0.
- Personnel and Vehicle Identification - including photo badges for BMcD and subcontractor personnel, and signs on both sides of all BMcD and subcontractor vehicles.

- Site Clearing and Restoration - seeding disturbed grass areas to establish a sufficient stand of grass to prevent erosion and repairing any concrete or asphalt surfaces damaged during field activities.

- Coordinating and obtaining clearance for all off-post utilities.

- Field crew will wear orange safety vests during off-installation activities.

2.7 Reporting

2.7.1 Daily Quality Control Report (DQCR)

The FSM will record daily activities on the standard BMcD DQCR form as outlined in the SAP. A DQCR will be completed daily and submitted in draft form to Fort Riley, the USACE Technical Manager, and the Fort Riley USACE Resident Office by 8:00 a.m. the next day. The reports will be reviewed by Fort Riley and USACE. Comments will be provided as appropriate to the BMcD Project Manager. BMcD will correct the reports in accordance with comments.

2.7.2 Weekly Summary Report

BMcD will prepare a Weekly Summary Report, which will be forwarded to KDHE and the U.S. Environmental Protection Agency (USEPA) upon approval by Fort Riley, the USACE, and the Fort Riley USACE Resident Office. A Weekly Summary Report will be prepared for each week of field work. The DQCR will be submitted in place of a weekly report for any field work that is completed in one day.

2.8 Schedule

Field work for this project is anticipated to begin in late January 1998. The groundwater screening survey (direct-push) will commence within one week of the conclusion of the soil-gas survey conducted at 892/FFTA. The direct-push activities are planned to be completed in five days.

Immediately following the direct-push activity at the FFTA-MAAF site, the boring locations will be surveyed, and a map will be developed showing analytical results. BMcD will propose locations for three monitoring well clusters to delineate the plume, and a fourth well cluster will be located further downgradient of the current estimated extent of the plume. This information will be forwarded to Fort Riley and the USACE for discussion, review, and approval. BMcD anticipates that the location of the four monitoring well clusters will be selected and approved approximately one week after the conclusion of the direct-push activities. Well installation will then begin within one week from well cluster location approval.

Monitoring well drilling, installation, and development is expected to begin in February 1998 and take approximately five weeks to complete (six days per well cluster). Groundwater sampling will be conducted approximately one week following the conclusion of the well installation and development activities.

3.0 Field Activities

This section outlines the field activities to be conducted for plume characterization. The intent of this field effort is to determine the horizontal and vertical extent of the groundwater plume downgradient (north) of the FFTA-MAAF. To accomplish this objective, the following field activities will be performed:

- Groundwater screening using direct-push equipment and on-site field GC analyses.
- Installation of four monitoring well clusters to monitor horizontal and vertical extent and to identify the leading edge of the plume.
- Topographic and areal surveying of all direct-push and monitoring well locations.
- Groundwater sampling for volatile organic compounds (VOCs) at the four new monitoring well clusters.

3.1 Groundwater Screening Activities

3.1.1 Rationale and Procedures for Field Screening Locations

Prior to conducting field work, an estimate of the extent of the plume was determined to establish an area where direct-push activity would begin. The contaminant fate and transport model previously developed for the Remedial Investigation/Feasibility Study Work Plan (BMcD, 1997 [*FFTA-MAAF RI/FS Work Plan*]) was used with the same model parameters to initially estimate the extent of the plume. An arbitrarily placed imaginary well was input into the model and the calculated contaminant concentration (PCE was the compound used in the model) was identified at that point. This process was repeated until calculated downgradient chemical concentrations along a longitudinal axis (aligned parallel to groundwater flow direction) were established. At a point approximately 2,500 feet downgradient of the FP-96-23 well cluster, the model calculated the chemical concentration to be below the limits of detection (0.065 ug/L). From this information, a starting point (B-1) for the direct-push groundwater screening activities was selected 2,500 feet downgradient of the FP-96-23 well cluster (see Figure 3-1).

A sampling plan was developed that describes procedures that will be used to approximate the extent of the plume based upon analytical results from the field GC. The sampling plan is designed to collect sufficient groundwater screening data to identify four potential locations for monitoring well clusters. Analytical data from groundwater samples collected from the monitoring well clusters will then be used to confirm delineation of the horizontal and vertical extent of the plume. The sampling plan is also designed to describe procedures to locate the plume if migration has occurred in a direction other than the predominant direction of groundwater flow. The proposed sampling plan developed for the groundwater screening activity is presented in Appendix B.

3.1.2 Groundwater Screening From Wells

Prior to advancing direct-push probe holes for the screening activity, groundwater samples will be collected from Wells FP-96-23b and I-1 at the site, and analyzed with the portable field GC for targeted VOCs. The VOCs targeted for analysis during the direct-push activities will be PCE, TCE, and cis-1,2-dichloroethylene (DCE). Detection limits reported for analysis of the targeted compounds will meet maximum contaminant levels (MCLs). The wells will be purged in accordance with procedures described in Section 4.0 of the SAP. Monitoring Well FP-96-23b will be sampled using the dedicated bladder pump and Well I-1 will be sampled using a manual, inertial lift pump.

Targeted VOC screening results will be compared to the laboratory analytical results for VOCs obtained from these wells during the August 1997 sampling event. This will provide a baseline comparison for the other groundwater samples analyzed during the field screening activities. The targeted VOC laboratory analytical results from Wells FP-96-23b and I-1 during August 1997 were 5.1 ug/L and nondetect for PCE, 7.8 ug/L and nondetect for TCE, and 280 ug/L and 1.9 ug/L DCE, respectively.

3.1.3 Field Screening With Direct-Push Equipment

Groundwater screening will be conducted using direct-push equipment to establish the approximate extent of the plume and determine locations for installation of the monitoring well clusters. Groundwater screening samples will be collected from three different aquifer depths at locations described in the sampling plan (Appendix B) and analyzed with the field GC for targeted VOCs. The target sampling depth ranges for groundwater screening are shallow (20 to 30 feet bgs), intermediate (40 to 50 feet bgs), and deep (60 to 70 feet bgs or the encountered bedrock surface).

Groundwater plume screening will be conducted utilizing truck or van-mounted direct-push sampling equipment (e.g., Geoprobe). Direct-push sampling uses hydraulically-powered percussion/probing equipment to advance rods into the subsurface. Soil samples will not be collected during direct-push field activities. However, groundwater samples will be collected from probe holes and analyzed on-site with the field GC mounted in the direct-push unit.

Groundwater screening samples will be collected in accordance with procedures described in the SAP. See Appendix A for PES standard operating and quality assurance procedures and drawings of the groundwater sampling equipment.

Field duplicate and method blanks will be analyzed on-site at a rate of 10% of the groundwater screening samples. In addition, confirmation samples will be collected on a 10% frequency (minimum of 2) and sent to a State of Kansas certified laboratory for VOC analyses. Quality Control (QC) samples will also be submitted to the certified laboratory and the QA Lab. The QC sample set will include a duplicate and matrix spike/matrix spike duplicate (MS/MSD). Trip blanks will accompany all coolers with aqueous VOC samples. The groundwater samples will be packed and shipped as described in Section 6.0 of the SAP.

Each groundwater screening sample will be given a unique number that associates the sample with the FFTA-MAAF plume characterization project. The probehole and sample collection depths will be noted in the log book. The sample number will be preceded by FFTA-MAAF. Samples will be numbered consecutively as GW1, GW2, etc. QC (field duplicate) samples for on-site analyses will be noted by adding D to the end of the sample number. Method blanks analyzed on-site will be identified as BLANK with a consecutive number beginning with 01. Confirmation samples submitted to the QA Lab for off-site analyses will have C after the sample number. QC samples for off-site analyses will be identified by adding QC after the associated sample number. MS/MSD samples for off-site analyses will have MS/MSD after the sample number. Examples of groundwater sample numbers are shown below.

FFTA-MAAF-GW1	(groundwater screening sample/on-site analyses)
FFTA-MAAF-GW1-D	(groundwater screening sample duplicate/on-site analyses)
BLANK-01	(method blank/on-site analyses)
FFTA-MAAF-GW1-C	(groundwater confirmation sample/off-site analyses)
FFTA-MAAF-GW1-QC	(groundwater confirmation sample duplicate/off-site analyses)
FFTA-MAAF-GW2 MS/MSD	(groundwater confirmation sample MS/MSD/off-site analyses)

3.1.4 Unexpected Field Conditions

Sampling locations for the direct-push screening activity are described in the sampling plan included in Appendix B. Access to the proposed sampling points located on property where previous field activities have been conducted is not expected to be a problem. However, vehicle access to sample points past the extent of the irrigated property is uncertain. If proposed direct-push sampling locations are inaccessible, alternate locations will be identified to reflect actual field conditions. In these instances, on-site BMcD and USACE personnel will determine alternate locations for sampling, and the reason(s) for choosing alternate location(s) will be recorded on the DQCR and in the weekly field report.

From previous experience at the site, there may be points where the desired sampling depths (shallow - 20 to 30 feet bgs, intermediate - 40 to 50 feet bgs, or deep - 60 to 70 feet bgs [or bedrock surface]) cannot be attained with direct-push equipment. If this condition occurs after reasonable attempts have been made to attain the desired depth within the original probe hole, a sample should be collected if the sampling tool is within the specified target sampling depth. If the sampling tool is not within the target sampling depth, the first probe hole will be offset (by 25 to 50 feet) and another probe hole advanced to the desired sampling depth (up to two attempts should be made to obtain the desired depth with an offset probe hole). If the subsequent probe holes fail to achieve the desired sampling depth, the cluster location will be identified and temporarily abandoned. A groundwater sample will be collected from the failed probe hole location using cable tool methods. The cable tool drilling rig will be mobilized, and the missing groundwater screening sample collected as soon as possible after identification of the problem and consultation between Fort Riley, USACE, and BMcD. The intent is to collect the missing sample while direct-push activities continue at other probe hole locations at the site. All cable tool methods will be conducted in accordance to procedures described in the MWIP. Groundwater samples will be collected through the cable tool pipe by use of a disposable bailer.

3.2 Monitoring Well Activities

3.2.1 Monitoring Well Locations and Rationale

Placement of monitoring well clusters will be determined based on field analytical results from the direct-push groundwater screening activity. The placement of wells will consist of two clusters located laterally (east and west) outside of the plume (well clusters FP-98-27 and 29, see Figure 3-1), and one well cluster along the longitudinal axis (parallel to groundwater flow direction) inside the approximate edge of the plume (well cluster FP-98-28).

A fourth well cluster will be installed further downgradient (north) of the leading edge of the plume (well cluster FP-98-30). This well cluster will be located at a distance estimated at between two and three years contaminant migration time, beyond the leading edge of the plume. This distance was calculated using the retarded seepage velocity of the compound DCE for static groundwater conditions. The retarded seepage velocity was calculated to be approximately 315 feet/year. Therefore, the distance beyond the leading edge of the plume to locate the fourth well cluster will be between 600 and 900 feet.

Placement of the four monitoring well clusters will be determined based on analytical results from the direct-push groundwater screening activity. A site map will be developed showing the proposed location of the four well clusters incorporating horizontal survey data from the direct-push locations. The site map will be presented to Fort Riley and USACE for comment, discussion, and approval before commencement of monitoring well drilling and installation. BMcD anticipates that the locations of the proposed monitoring well clusters will be selected and approved approximately one week after the conclusion of the direct-push field activities conducted at FFTA-MAAF. Field locations of the approved monitoring well clusters will be determined by BMcD by measuring from the direct-push probe holes previously surveyed. This will be done prior to mobilization by the drilling contractor.

3.2.2 Monitoring Well Drilling and Installation

Monitoring wells will be installed using procedures and specifications presented in the MWIP unless otherwise stated. In general, wells will be installed consistent with previous monitoring wells at the site. The well depths are anticipated to be at 30, 50, and 70 feet for shallow, intermediate, and deep monitoring wells, respectively. The deep well will be the first installed at each cluster location. Soil from each deep well boring will be logged and described for geologic definition. Information obtained from the geology at the deep well location will be used to confirm the depth for the intermediate and shallow wells in the cluster. Shallow and intermediate well borings will not be logged or described for geologic definition.

During the drilling and well installation activities, well construction and drilling supplies will be temporarily staged at the pilot study building at the FFTA-MAAF. This area is secured by a locked chain. Access to this area will be provided by the FSM.

3.2.2.1 Shallow Wells

Shallow wells will be constructed in accordance with specifications described in the MWIP.

Shallow wells (anticipated to be 30 feet in depth) will consist of 2-inch diameter, 15-foot stainless steel screens (0.010-inch slot) with carbon steel risers. These wells will be installed consistent with other shallow wells previously installed at the site (mechanically driven) and are anticipated to be set to approximately 7 feet below the water table to account for seasonal low groundwater conditions expected at the site. This will allow the screen to intersect the groundwater surface with approximately 7 feet below and 8 feet above. However, water levels will be verified at the site prior to drilling and well installation activities to determine exact screen placement. A pilot hole will be drilled with a cable tool or hollow stem auger drilling rig to approximately 10 feet below ground surface. The pilot hole will serve three primary purposes: 1) to minimize smearing of fine grained material (clay and silt) on the well screen; 2) to reduce friction as the well is being driven, thereby reducing the compressive force on the casing, couplings and screen; 3) to create an annulus for installation of the bentonite seal. The 10-foot pilot portion of the borehole will be backfilled with bentonite to provide an annular surface seal in compliance with Kansas Department of Health and Environment (KDHE) requirements.

A total of four shallow monitoring wells are anticipated to be installed as part of this investigation. Each of these wells will be part of four 3-well clusters consisting of a shallow, intermediate, and deep monitoring well. Dedicated bladder pumps will be installed in the shallow wells.

3.2.2.2 Intermediate Wells

The intermediate monitoring wells (anticipated to be 50 feet in depth) will be drilled using the cable tool method and installed in accordance with the MWIP. Specifically, the wells will consist of 2-inch diameter PVC with 10-foot, 0.020-inch machine-slotted screen, an appropriate length of PVC riser and 10-20 grade silica sand filter pack. The intermediate well screens will be set consistent with other intermediate wells installed at the site at a depth approximately halfway between the centers of the shallow well screen and the deep well screen.

Packers will be installed in the intermediate wells approximately one to two feet above the screened intervals. This will reduce the purge water volume, which reduces the amount of IDW and the time required to purge the wells during sampling events. Dedicated bladder pumps will also be installed in the intermediate wells.

A total of four intermediate monitoring wells will be installed as part of this investigation. Each of these wells will be part of four 3-well clusters consisting of shallow, intermediate, and deep monitoring wells. The boreholes for the intermediate wells will be drilled using cable tool drilling techniques.

3.2.2.3 Deep Wells

Boreholes for the deep monitoring wells will be drilled using the cable tool method. Installation of the deep monitoring wells (60 to 70 feet in depth) will be consistent with the MWIP. These wells will consist of 2-inch diameter PVC with 10-foot, 0.020-inch machine-slotted screen, an appropriate length of PVC riser, and 10-20 grade silica sand filter pack. The deep monitoring well screens will be installed so that the lowest screen slot will be below the alluvium/bedrock interface. Bedrock is expected to occur approximately 70 feet below ground surface.

Packers will be installed in the deep monitoring wells approximately one to two feet above the top of the screened intervals. This will reduce the purging time, purge volume, and IDW during sampling events. Dedicated bladder pumps will also be installed in the deep wells.

A total of four deep monitoring wells will be installed as part of this investigation. Each of these wells will be part of the four, 3-well clusters consisting of shallow, intermediate, and deep monitoring wells.

3.2.3 Soil Sampling

Soil samples will be collected from deep monitoring well borings for geotechnical testing (grain size analysis, specific gravity, moisture content, total organic carbon [TOC], and cation exchange capacity [CEC]), geologic description, and archival purposes.

TOC and CEC soil samples will be collected at specific intervals (see Table 3-1) from the deep borings for Wells FP-98- 27c and FP-98- 28c. This will provide data from a well located outside and inside the extent of the plume. The TOC and CEC samples will be collected from the drive barrel sampler and preserved on ice for transport to the laboratory.

Samples for geotechnical analyses will be collected from the same interval specified for TOC and CEC in Table 3-1. Samples for CEC analyses will be collected only in clay. The sample will be collected from the drive barrel and contained in glass mason jars for delivery to the laboratory. Geotechnical samples will be analyzed for grain size analysis (ASTM D422) and specific gravity (ASTM D854). Soil samples analyzed for moisture content (ASTM D2216) will be collected at five feet intervals from ground level to a depth of 20 feet bgs.

Archival samples will be collected every five feet from each of the four deep well borings as a record of geologic material encountered within each boring. Samples will be placed in glass mason jars (or resealable plastic bags) and labeled with the date, well identification number, and sample depth. These samples will be stored at the MAAF pilot study building for the Fort Riley Directorate of Environment and Safety (DES).

3.2.4 Monitoring Well Development

Well development will be performed according to procedures described in the MWIP with the following modifications.

Intermediate and deep monitoring wells will be developed with a Waterra inertial lift pump. The MWIP specifies that surging will be performed with a surge block, followed by pumping to remove sediment. The Waterra pump simultaneously surges with a surge block and pumps the well, as opposed to alternately surging with a surge block and then pumping.

The shallow wells will be developed with an electric submersible pump. The surging action will be created by repeated raising and lowering of the pump, and /or repeatedly allowing water in the tubing to drain back into the well.

3.3 Groundwater Sampling

The twelve newly installed monitoring wells will be purged and sampled using dedicated bladder pumps installed in the wells. Analyses to be performed on groundwater samples collected from these wells is presented in Table 3-2. Purging and sampling activities will be conducted in accordance with procedures described in the SAP and the *Technical Memorandum, Groundwater Sampling, Marshall Army Airfield (MAAF)* (8 August 1997) (BMcD, 1997c).

Field parameters (pH, temperature, specific conductance, turbidity, dissolved oxygen, oxygen reduction potential, and ferrous iron) will be measured with calibrated field instruments before and after each well volume is purged. This data will be recorded in the field logbook and on the appropriate field forms. Purging will cease after pH, specific conductance, and temperature are within 10 percent of the last reading and turbidity is less than 30 NTUs. Upon stabilization, sampling will commence using the bladder pump. The bladder pump will be operated at a pumping rate of approximately 100 milliliters per minute (ml/min) when sampling for VOCs. Groundwater samples will be collected within 24 hours of purging. Groundwater samples from each well in the four monitoring well clusters will be analyzed for VOCs using EPA Method 8260 by the offsite contract laboratory.

Upon completion of the sampling event, the compressor will be shut off and the well secured. All fluids generated during well purging will be retained for subsequent disposition.

One QA sample, one QC sample, and an MS/MSD sample set will be collected during groundwater sampling. Trip blanks will accompany each cooler containing samples for VOC analysis. Temperature blanks will accompany each cooler shipped to the laboratory.

3.4 Surveying

Direct push locations and the newly installed monitoring wells will be surveyed according to the MWIP. The direct-push locations will be surveyed after the field screening investigation and prior to placement of the proposed monitoring well locations. Horizontal and topographic elevation data will be established for each of the direct-push locations. Survey monuments will be installed in the concrete pad of each well and engraved with the well identification and the elevations for the monument and top of casing, relative to mean sea level. The northing and easting coordinates will be to the nearest 0.1 foot and referenced to the Universal Transverse Mercator (UTM). Elevations of ground surface, survey monument, and top of casing will be determined to the nearest 0.01 foot using North American Datum (NAD) 83.

4.0 Investigation-Derived Waste

During the field investigation, liquid and solid waste will be generated that will require proper analysis and disposal. This investigation-derived waste (IDW) is not anticipated to be a characteristic hazardous waste; however, it may contain some listed hazardous compounds.

Correspondence between Fort Riley, U.S. EPA, and the KDHE, dated August 6 and 7, 1996 (Appendix D), provided guidance regarding the disposal of Site IDW. The disposal of IDW generated during the plume characterization field activities will be consistent with these guidelines.

4.1 Solid IDW

Solid IDW consists of soil cuttings, surface soil, sediment, and solid waste (i.e., personal protective equipment and trash). This waste will be generated during drilling and monitoring well installation. Personal protective equipment and miscellaneous trash will be managed as nonhazardous solid waste and disposed within the post trash collection system. Disposal of trash using the post collection system will be coordinated through Fort Riley.

Soil encountered during drilling activities will originate from the saturated and unsaturated portions of the alluvial aquifer. The monitoring wells to be installed during this investigation are located toward the downgradient end of the contaminant plume, away from the potential "hot-spot" area. Accordingly, soil cuttings derived from the unsaturated portion of the subsurface are not expected to contain contaminants transported by groundwater and will therefore, unless otherwise indicated by photoionization detector (PID) readings, be evenly spread on the ground surface near the well.

The soil encountered near or below the groundwater surface may have been impacted by contaminants transported with groundwater. This soil will be temporarily containerized in sealable containers (buckets or drums). Prior to the end of each day, the soil-filled containers will be transported to the FFTA-MAAF and deposited in a lined, covered, roll-off container in such a manner that soil from the four well clusters will be placed in two separate, identifiable piles within the roll-off container. Soil from the well cluster location expected to be inside the plume extent (cluster FP-98-28) shall be placed in one pile, and soil from cluster locations expected to be outside the plume extent (clusters FP-98-27, 29, and 30) shall be placed in the second pile. During transportation, access to MAAF will be provided through the locked, northeast gate. Transportation of potentially impacted soils over public access roads will be limited to the gravel portion of Race Track Road.

After completion of drilling and well installation, one discrete soil sample will be collected from each of the two soil piles and analyzed for VOCs (Method 8260). In addition, a third soil sample will be collected that consists of a composite from two aliquots from each of the two soil piles. The third (composite) soil sample will be analyzed for Toxic Characteristic Leaching Procedure

(TCLP) analysis consisting of volatile, semi-volatiles, and metals, only if chlorinated solvents are detected in the discrete (VOC) samples. All three soil samples will be packaged and shipped to the off-site contract laboratory in accordance with procedures described in the SAP. The two VOC samples will be analyzed immediately. Analysis of the composite sample for TCLP analysis will be held pending results of the VOC samples. If chlorinated solvents are not detected in soil from VOC analysis, the soil will be used as daily cover for the construction debris landfill pending approval from Fort Riley and KDHE.

If chlorinated solvents are detected in the VOC samples, the TCLP soil sample will be analyzed. If the composite (TCLP) sample is analyzed, the contracted, off-site disposal facility will be contacted to send a representative to the site to collect soil samples for their TCLP and other characteristic analyses. Based on results of these TCLP analyses, a disposal method for the soil will be proposed for approval.

4.2 Liquid IDW

Liquid IDW consists of sampling tool decontamination fluids, purge water, and well development water generated during monitoring well installation and sampling procedures.

Prior to completion of daily field activities, water from wells and decontamination fluid from sampling equipment will be transported to the FFTA-MAAF in sealed portable tanks. The fluid will then be transferred from the transport tanks into the 2,100-gallon water tank at the FFTA-MAAF. After the IDW fluids have been transferred into the 2,100-gallon tank, aeration of the fluid will be conducted by pumping air through a length of perforated hose placed in the tank. The transport route for liquid IDW will be the same as for the solid IDW: using the gravel portion of Race Track Road and obtaining access to FFTA-MAAF through the locked northeast gate.

The drill rig will be decontaminated between well cluster locations. If VOCs have been detected (based on continuous PID air monitoring) in the soil generated during drilling activity at a well cluster location, the decontamination water from the drill equipment used on that cluster will be collected and transferred to the 2,100-gallon tank. This will require construction of a temporary decontamination area for the drilling equipment. If VOCs have not been detected in soil generated during the drilling activity at a well cluster, then the corresponding decontamination water will be discharged onto the ground surface in the designated area east of the FFTA-MAAF.

After field activities have been completed, a water sample will be collected from the 2,100-gallon tank and analyzed for VOCs (Method 8260) by the off-site contract laboratory. If VOC concentrations are below MCLs, the water will be drained onto the ground surface in a designated area east of the FFTA-MAAF pending approval from Fort Riley and KDHE. Because water stored in the tank is subject to freezing, analyses to determine method of disposal will be expedited.

If VOC concentrations from the water sample are above MCLs, the water will require treatment on-site with a granular activated carbon (GAC) unit. Subsequent to treatment, the water will be resampled. After achieving VOC detections below MCLs and receipt of Fort Riley and KDHE approval, the water will be discharged onto the ground surface in the appropriate area. Spent carbon from the GAC unit will be disposed of at an approved off-site facility.

5.0 References

Burns & McDonnell Engineering Company, Inc., 1997. *Remedial Investigation/Feasibility Study Work Plan for the Former Fire Training Area at Marshall Army Airfield, Fort Riley, Kansas*, 11 April.

Burns & McDonnell Engineering Company, Inc., 1997a. *Working Draft Site Safety and Health Plan for Environmental Investigations at Fort Riley, Kansas,* 1 April.

Burns & McDonnell Engineering Company, Inc., 1997b. *Working Draft Sampling and Analysis Plan for Environmental Investigations at Fort Riley, Kansas*, 11 April.

Burns & McDonnell Engineering Company, Inc., 1997c. *Technical Memorandum, Groundwater Sampling, Marshall Army Airfield (MAAF),* 8 August.

Burns & McDonnell Engineering Company, Inc., 1996. *Working Draft Investigative Derived Waste Plan Management Plan for Environmental Investigations at Fort Riley, Kansas,* 3 October.

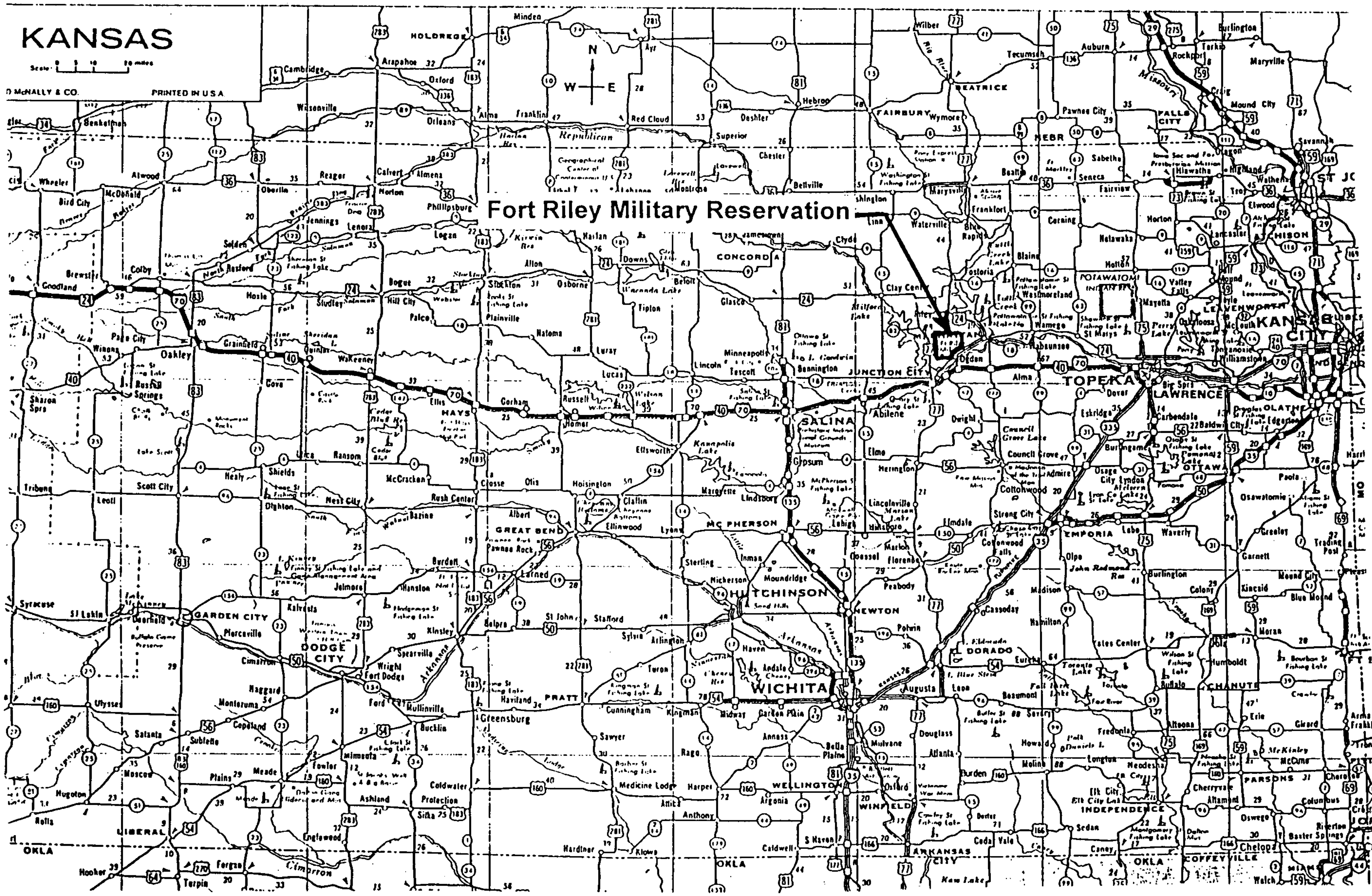
Burns & McDonnell Engineering Company, Inc., 1996a. *Working Draft Monitoring Well Installation Plan for Environmental Investigations at Fort Riley, Kansas.* 3 October.

Meriam, Daniel F., 1963. *The Geologic History of Kansas, Kansas Geological Bulletin 162.* December.

USAEHA, 1979, U.S. Army Environmental Hygiene Agency. Industrial Hygiene Comprehensive Survey Report. May.

USATHMA, 1984, U.S. Army Toxic and Hazardous Materials Agency, *Installation Assessment of the Headquarters, 1st Infantry Division (Mechanized) and Fort Riley, Kansas,* December.

FIGURES

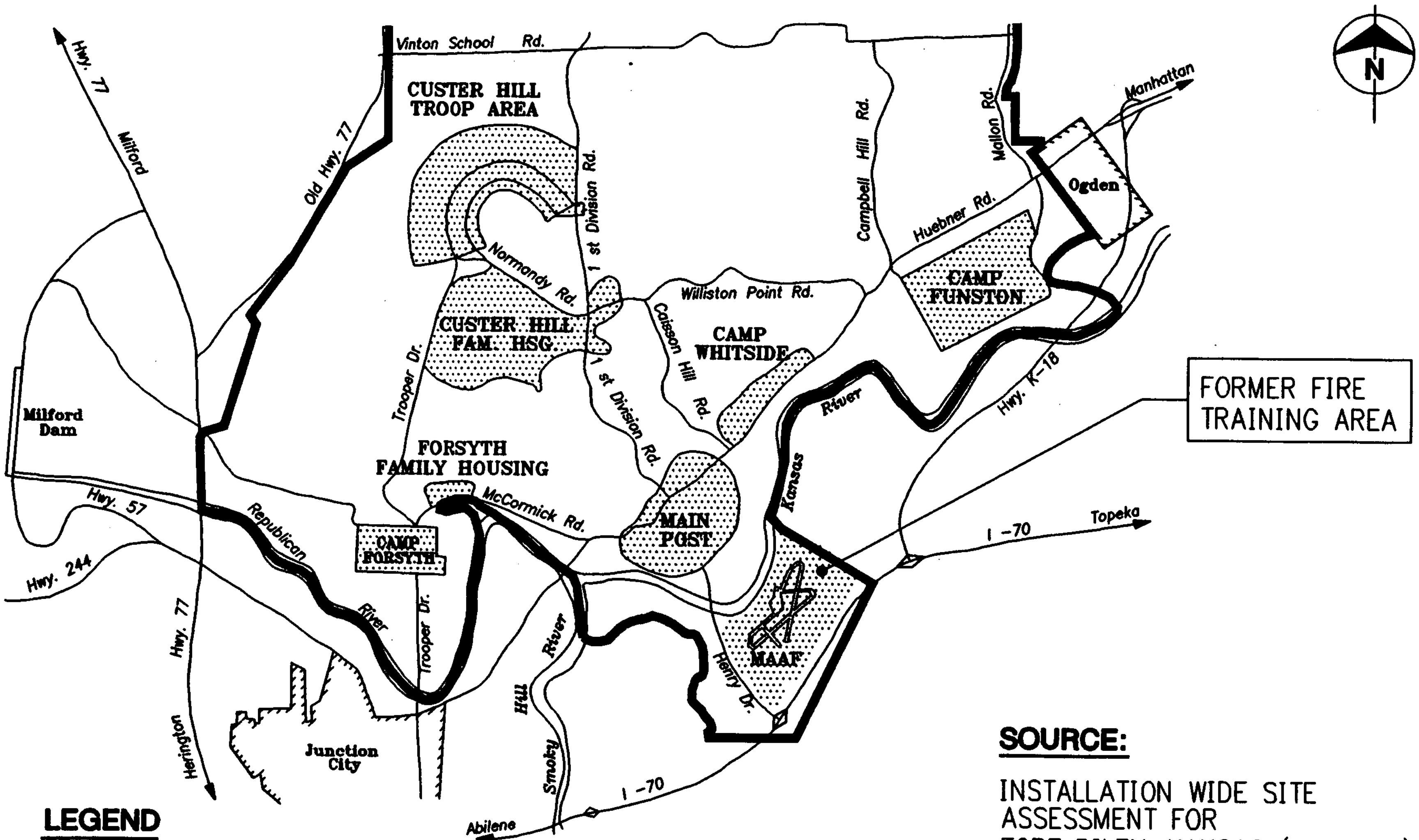


Burns & McDonnell

FIGURE 1-1

FORT RILEY LOCATION MAP
MARSHALL ARMY AIRFIELD
FORT RILEY, KANSAS

MAAF-FFTA



LEGEND

CANTONMENT AREAS

ROADS

CITY OR TOWN BOUNDARY

INSTALLATION BOUNDARY

NOT TO SCALE

SOURCE:

INSTALLATION WIDE SITE ASSESSMENT FOR FORT RILEY, KANSAS (LBA,1992) [IWSA]

Burns & McDonnell

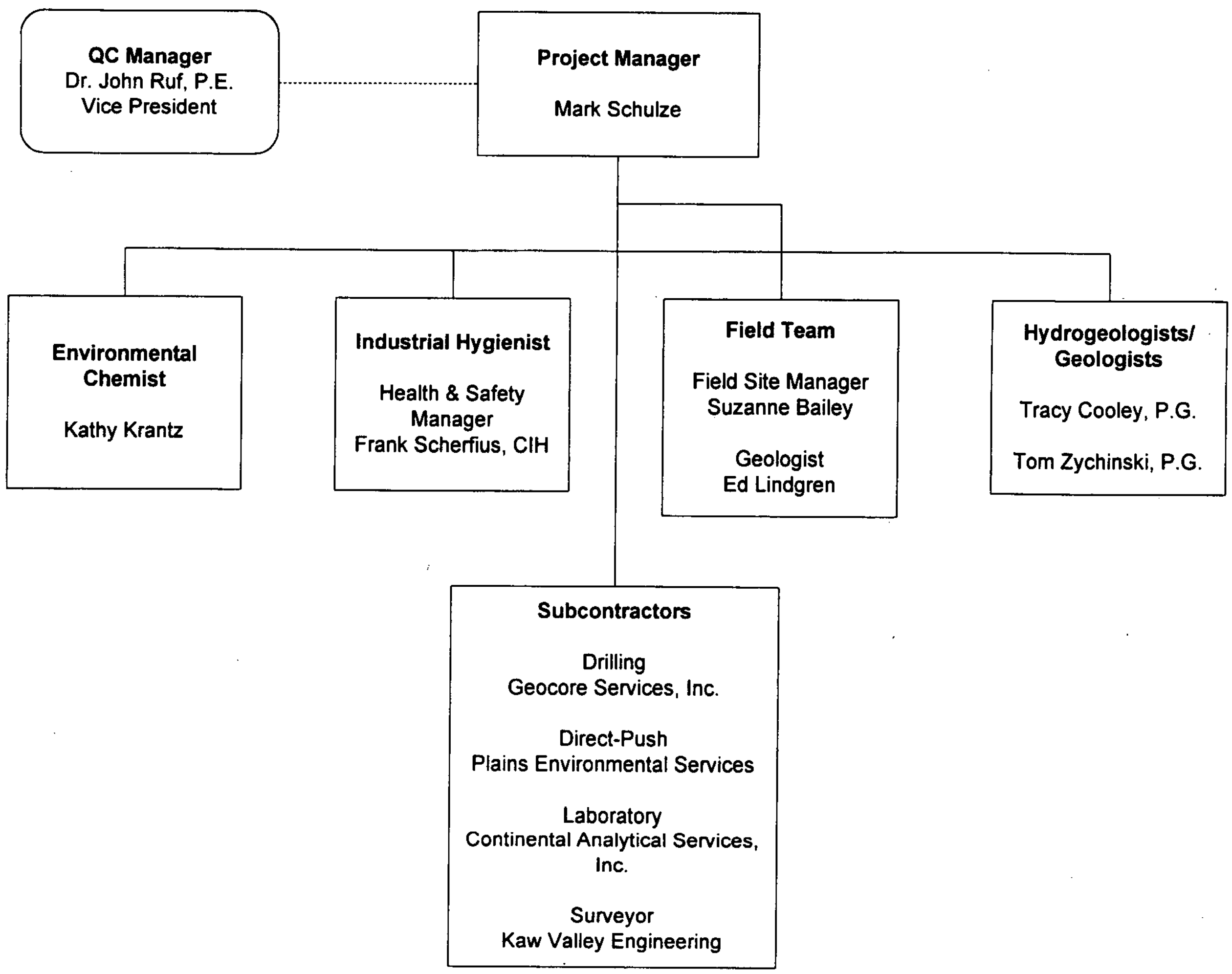
FIGURE 1-2

PROJECT LOCATION
MARSHALL ARMY AIRFIELD
FORT RILEY, KANSAS

MAAF-FFTA

FIG1-2.DWG 12-3-1997 16:00 MMW

Figure 2-1
Project Team
FFTA-MAAF



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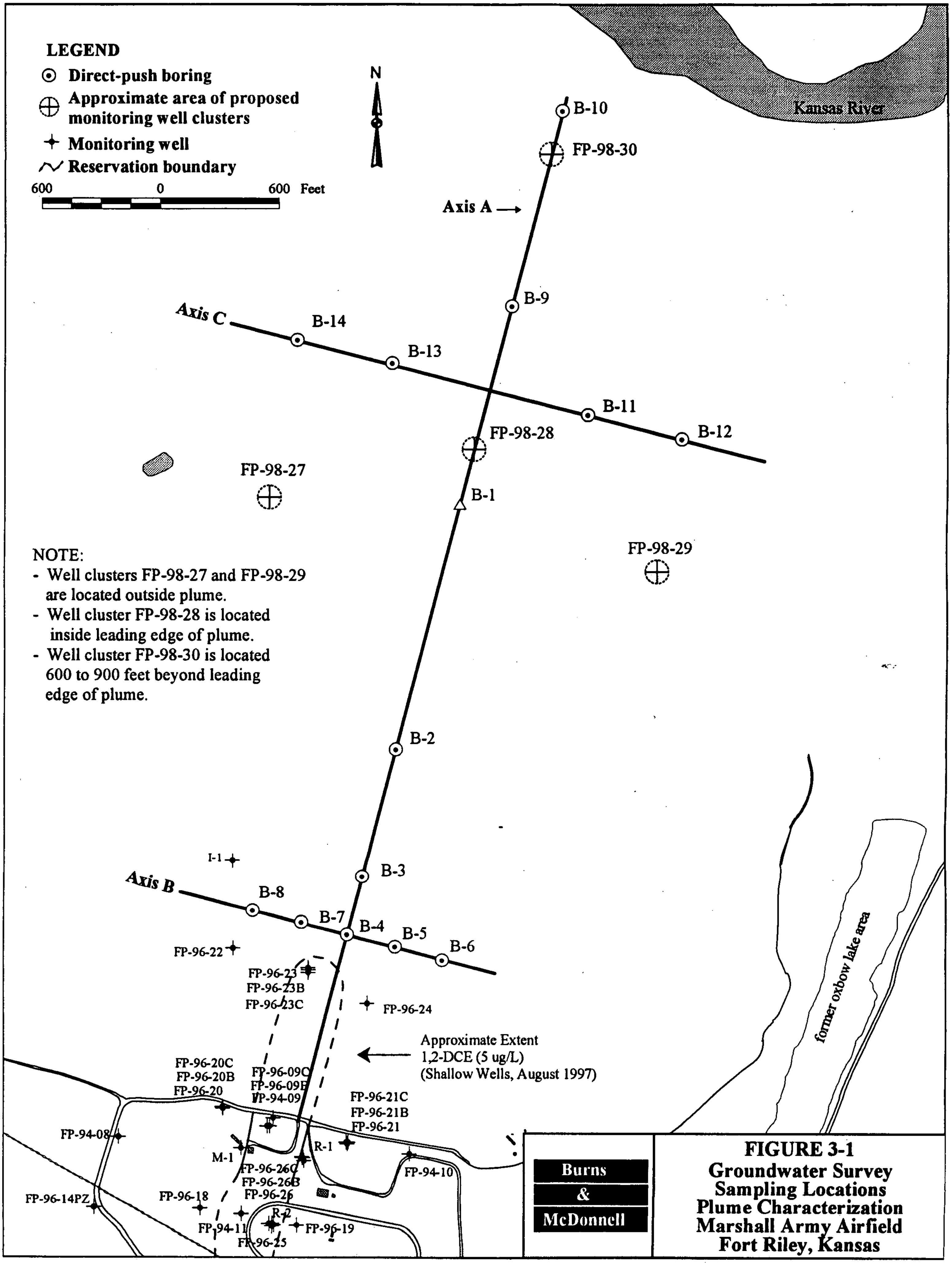


FIGURE 3-1
Groundwater Survey Sampling Locations Plume Characterization Marshall Army Airfield Fort Riley, Kansas

TABLES

Table 2-1
Logistics Summary
FFTA-MAAF

Task	Contact	Telephone No.	Time
Coordinate with Plains Environmental Services (Direct Push Contractor)	Lynn Newcomer	(785)827-4545	4 weeks*
Coordinate with Geocore Services, Inc. (Drilling Contractor)	Dale Robl	(785)826-1616	4 weeks*
Coordinate with KAW Valley Engineering (Survey Contractor)	Bill Delker	(785)762-5040	4 weeks*
Coordinate with DPW for equipment storage and staging area, and IDW staging area.	Kyle Kirchner	(785)239-8762	3 weeks**
Coordinate with DPW for source of non-chlorinated water.	Real Property	(785)239-3861	3 weeks**
Send draft copy of mobilization notification form that will be sent to KDHE and U.S. Environmental Protection Agency (EPA), to Fort Riley Department of Environmental Services (DES), and VSACE.	Kyle Kirchner Glen Shonkwiler	(785)239-8762 (816)983-3561	2½ weeks**
Send approved notification of mobilization to KDHE & EPA	KDHE EPA	(785)296-1500 (785)551-7000	2 weeks**
Coordinate with Continental Analytical Services, Inc. (Analytical Laboratory) to order bottles	Greg Groene	(785)827-1723 (785)823-7830 (fax)	2 weeks*
Request utility clearances from Kansas One Call.		800-DIG-SAFE	9 days**
Notify Fort Riley DES of scheduled field mobilization.	Kyle Kirchner	(785)239-8762	2 weeks**
Notify USACE of scheduled field mobilization.	Glen Shonkwiler	(816)983-3561	2 weeks**
Notify Fort Riley DES and USACE Resident Office of arrival on site.	Kyle Kirchner Mike Greene	(785)239-8762 (785)239-8636	Upon Arrival
Submit Draft Weekly Report to DES	Kyle Kirchner	(785)239-8762	Noon Thursday
Submit Final Weekly Report to DES.	Kyle Kirchner	(785-239- 8762	Close of Business Friday
Notify USACE Resident Office of Arrival and Departure.	Mike Greene	(785)239-8636	Daily
Notify Fort Riley DES and USACE Resident Office of Demobilization.	Kyle Kirchner Mike Greene	(785)239-8762 (785)239-8636	When Demobilizing

Notes: * = time prior to intrusive activities
** = time prior to initial mobilization

TABLE 3-1
SOIL SAMPLE ANALYSES
Plume Characterization
FFTA-MAAF

Monitoring Well Boring	TOC	CEC*	GEOTECHNICAL**		ARCHIVAL
			ASTM422	ASTM2216	
			ASTM854		
FP-98-27c	5 ft Intervals from 20 ft. to T.D.	5 ft. Intervals from 20 ft. to T.D.	5 ft. Intervals from 20 ft. to T.D.	5 ft. Intervals from G.L. to 20 ft.	5 ft. Intervals from G.L. to T.D.
FP-98-28c	5 ft. Intervals from 20 ft. to T.D.	5 ft. Intervals from 20 ft. to T.D.	5 ft. Intervals from 20 ft. to T.D.	5 ft. Intervals from G.L. to 20 ft.	5 ft. Intervals from G.L. to T.D.
FP-98-29c	None	None	None	None	5 ft. Intervals from G.L. to T.D.
FP-98-30c	None	None	None	None	5 ft. Intervals from G.L. to T.D.

NOTES:
G.L. = Ground Level
T.D. = Total Depth
TOC = Total Organic Carbon
*Cation Exchange Capacity (CEC) will be collected for clay soil only.
** Geotechnical Analyses include grain size (ASTM D422), specific gravity (ASTM D854), and moisture content (ASTM D2216)
Well Boring FP-98-27c is expected to be located outside the plume.
Well Boring FP-98-28c is expected to be located inside the plume.

Table 3-2
Sampling Requirements for FFTA-MAAF, Fort Riley, Kansas

		Field Measured				
	TCL Volatiles	GW Level	DO	ORP	Iron (II)	Temp, pH, & Turbidity
12 Wells						
FP-98-27	X	X	X	X	X	X
FP-98-27b	X	X	X	X	X	X
FP-98-27c	X	X	X	X	X	X
FP-98-28	X	X	X	X	X	X
FP-98-28b	X	X	X	X	X	X
FP-98-28c	X	X	X	X	X	X
FP-98-29	X	X	X	X	X	X
FP-98-29b	X	X	X	X	X	X
FP-98-29c	X	X	X	X	X	X
FP-98-30	X	X	X	X	X	X
FP-98-30b	X	X	X	X	X	X
FP-98-30c	X	X	X	X	X	X
Record	12	12	12	12	12	12

X - Planned Sample/Measurement
TCL Volatiles will be analyzed by Continental Analytical Services by SW-846 Method 8260A within 14 days of collection.
Dissolved Oxygen (DO), Oxidation Reduction Potential (ORP), Iron (II), Temp., pH, and Turbidity will be measured in the field.

APPENDIX A
PES STANDARD OPERATIONS & QUALITY ASSURANCE PROCEDURES

MOBILE LABORATORY SERVICES

STANDARD OPERATING AND QUALITY ASSURANCE PROCEDURES

FOR

SOIL VAPOR INVESTIGATIONS

SHALLOW GROUNDWATER SAMPLING AND ANALYSIS

AND SOIL SAMPLING AND ANALYSIS

PLAINS ENVIRONMENTAL SERVICES

SALINA, KANSAS

AUGUST 1997

TABLE OF CONTENTS

SECTION I. INTRODUCTION

Plains Environmental Services (PES) is an independent, small business offering cost effective mobile laboratory services. The sampling equipment and mobile laboratory instrumentation permits real-time data acquisition for soil vapor surveys, shallow groundwater and soil investigations for the detection of volatile organic compounds (VOCs). All equipment and instrumentation is state-of-the-art including laboratory quality gas chromatography and computerized data integration for archiving, retrieval, and review.

PES has extensive experience in the use of headspace analysis of groundwater and soil samples combined with soil gas analytical techniques for effectively delineating contamination sources and for tracking groundwater plumes for VOC contaminants. Our experience includes investigations at several hundred sites throughout a 24 state area using these sampling and mobile laboratory techniques.

The hydraulically driven sampling equipment has successfully been used to penetrate subsurface materials to depths greater than 120 feet. Consolidated materials such as concrete can be penetrated through thicknesses up to 12 inches. The analytical system provides high quality, high resolution results with the capability of parts per billion (ug/L) sensitivity for a wide range of volatile organic compounds.

All field personnel have been professionally trained in the operation of the mobile equipment and are current under OSHA 1910.120 for the 40-Hour Health and Safety Training requirements.

SECTION II. EQUIPMENT AND SAMPLING METHODS

EQUIPMENT. All sampling and analytical equipment are installed in Ford E-250 or E-350 Super-Vans for ease of mobility and efficient sample handling from sample collection to sample analysis.

PROBE UNIT. The probe unit consists of a Geoprobe Model 8-M which includes a hydraulically driven percussion hammer used for probe penetration. Steel probe rods are three feet in length and one inch o.d. Rod ends are threaded for easy connection and tight seals to provide a continuous probe and to prevent air leakage. The rods are hydraulically driven to depths of sampling interest. The steel rods with disposable driving points can withstand forces required to penetrate subsurface materials to depths of 120 feet. In addition to soil gas sampling, Plains Environmental Services is equipped to perform groundwater and soil sampling with the probe unit.

SOIL GAS SAMPLING. Probe rods are hydraulically driven to the sampling depth with the Geoprobe system. The probe unit is equipped with a retraction device which allows removal of the rods from the soil. Soil gas samples are collected by retracting the rods 1-2 inches to remove the driving point and to create a space for soil gas removal. A 1/4 inch o.d. polyethylene tube is inserted through the probe rods and threaded into the point holder forming a continuous gas sampling line. This sampling system assures a contamination free, leak-proof sampling train. Vacuum is applied to the head of the sampling tube for soil gas extraction. The sampling train is purged with 5 - 10 volumes of air to remove extraneous air before sampling. Soil gas samples are collected by use of 1-cc syringes and transferred to the gas chromatograph for analysis.

GROUNDWATER SAMPLING. Shallow groundwater samples are collected by probing to groundwater depths with the probe rods and then removing the probe rods. One-half inch PVC pipe is screened by cutting slots in the pipe and inserted into the one inch hole. After the "well" has charged with groundwater, polyethylene (3/8" o.d.) tubing is inserted through the opening of the PVC well casing for water sampling. A peristaltic pump is connected to the top of the polyethylene tubing for sample collection. Forty milliliter vials are filled with 20 mL of sample, capped, and heated to approximately 80 C. This effectively removes volatile organic compounds from the aqueous phase to the headspace which is then sampled and injected into the gas chromatograph.

Alternately, a small bailer can be used to sample water at depths of greater than 30 feet or when the concern for volatility may preclude the use of a peristaltic pump.

SOIL SAMPLING. Soil samples can be collected at discrete levels by the use of a special sampling tube attached to the end of the probe rod. Soil samples can be added to a 40-mL vial for headspace analysis or collected and sent to an off-site laboratory for analysis.

VACUUM/VOLUME SYSTEM. A vacuum/volume system consisting of a vacuum pump (capable of applying 24 inches of mercury), a storage tank, two vacuum gauges, and a line valve allows for a controlled purge and sampling rate which minimizes soil gas disturbance. The line gauge and valve provide an accurate measurement of purge volumes which reduces the disruption of soil gas equilibrium. Silicon tubing is used to connect the vacuum system to the probe head. Silicon has been shown to be inert to organics and does not readily adsorb organic compounds within a short contact time. After rod purging the rods are permitted to return to atmospheric pressure (line gauge reading of zero), an indication that the rods have been filled with soil gas. The volume of soil gas purged and the purge time are recorded on the Field Log Sheet. The vacuum/volume system provides information on soil permeability which is useful in determining the appropriateness of soil gas sampling.

SAMPLE COLLECTION AND TRANSFER. Soil gas samples are collected by inserting a 1-cc syringe through the silicon tubing at the rod head. The syringe is immediately taken to the gas chromatograph for direct injection of the sample. Smaller aliquots may be sampled for highly contaminated samples.

DECONTAMINATION. Probe point holders and post-run tubing (PRT) adapters are decontaminated by washing with an Alconox solution and rinsing with deionized water. They are air dried and randomly checked for contamination before reuse. Clean or new tubing is used for each sample point and a clean or new disposable syringe is used for each sample which minimizes the potential for cross contamination.

ANALYTICAL SYSTEM (GC). The analytical system includes a laboratory grade gas chromatograph (GC) and computerized data processing station for data acquisition, storage, and retrieval. A Shimadzu GC Model GC-14 equipped with flame ionization detector (FID), photoionization detector (PID), and an electron capture detector (ECD) provides a wide range of sensitivity for detecting petroleum hydrocarbons (especially aliphatics), aromatic compounds, and chlorinated organic solvents. The GC system uses a J&W Scientific, DB-624 megabore capillary column which effectively separates a wide range of volatile organic compounds. PID/FID and PID/ECD detectors can be connected in series for additional verification of analytes. The data station consists of a Shimadzu Data Processor Model C-R4A dual channel, dual disk processor which acquires, stores, calculates, and prints chromatogram results. Up to 10 chromatograms can be recalled on the CRT screen for fingerprinting which is extremely useful in determining sources of site contamination involving multiple component contaminants.

Overlaying chromatograms is particularly useful in distinguishing between gasoline, diesel, and fuel oil fuels. All data are stored on 3.5 inch disks and hard copied from the printer.

A detector configuration of the PID/ECD will provide results in the parts per billion by volume range. The FID configuration provides results in the parts per million by volume range.

ANALYTICAL SYSTEM (GC/MSD). The analytical system includes a laboratory grade gas chromatograph (GC) and computerized data processing station for data acquisition, storage, and retrieval. An HP5890A GC equipped with an HP5971A MSD (mass selective detector) provides ppmv sensitivity for identifying a wide range of volatile organic compounds (VOCs). A J&W Scientific DB-624 megabore capillary column (0.53mm x 30m) is used to effectively separate a wide range of VOCs. All data is captured, processed, and stored with the HP5971A MSD/DOS ChemStation System. The Wiley database of 130,000 MS spectra can be used to identify unknown compounds. The instrument is tuned daily using the auto tune function with PFTBA perfluorotributylamine). Instrument resolution is approximately 1 amu.

Semi-volatile compounds, i.e., PNAs, diesel fuel, engine oil, creosotes, PCBs, asphalt, and pesticides can be analyzed on-site using thin layer chromatography (TLC). TLC methods have been used effectively to determine "hot spots" and to track plumes in soil and groundwater. Detection limits of ppm levels restrict the use of this technique for determining gross contamination. Colorimetric field analytical techniques developed by 3-M have been used effectively to track groundwater plumes for herbicides at ppb levels.

Ion selective electrodes are used to determine inorganic contaminants (e.g. nitrates, chlorides) in groundwater samples.

SECTION III. QUALITY ASSURANCE/QUALITY CONTROL

QA/QC. Quality assurance procedures included in this proposal are intended to assure the quality and integrity of sample collection and sample analysis. Strict adherence to QC procedures and qualified field personnel who understand potential sources of sample contamination and analytical systems are crucial to successful on-site, turn-key operations. Laboratory quality data can be generated in the field providing that experienced personnel and state-of-the-art analytical equipment are available. PES conducts all field analysis under the direction of an experienced senior chemist using state-of-the-art equipment and technology. All sampling equipment and analytical equipment represents vendor top-of-the-line instrumentation. Operators have been factory trained in the operation of the equipment.

FIELD LOG SHEET. A field log will be maintained to assist in sample tracking and identification.

SAMPLE INTEGRITY. Sample integrity is maintained by the prevention of equipment contamination and by using disposable supplies when practical. All reused sampling equipment is decontaminated before sampling. Materials such as tubing and sample transfer or storage containers are disposable and not reused. Under normal operating conditions, samples are injected into the gas chromatograph within 30 seconds of sample collection which minimizes sample loss and potential for degradation or contamination. New syringes and new tubing are used at the rod head where samples are withdrawn.

FIELD BLANKS. The sample system is checked by analyzing field blanks on the complete system at the beginning and end of the day and after every 20 samples. Rods, tubing, syringes and vials are assured of being contaminant free by performing the field blanks. A syringe blank is analyzed daily to provide background information of ambient air conditions for possible sample contamination and also for health and safety purposes. When ambient air contamination exists, the Project Manager and Safety Officer are notified. If worker safety or data quality is endangered by continuing, work is suspended and appropriate corrective action taken to remedy the problem.

INSTRUMENT CALIBRATION. The GC is calibrated with standards for each analyte of interest. Commercially available gas standards such as trichloroethene and 1,1,1-trichloroethane for the electron capture detector (ECD) or benzene, toluene, and xylene for the flame ionization (FID) and photoionization detectors (PID) are also analyzed daily; at the beginning of each run, after every 10 field samples, and at the end of each day. PES can prepare vapor samples than are not readily available commercially.

Due to the expense and difficulty of purchasing gas standards, it is not always possible to use commercially prepared gas standards for the analytes being investigated. The use of a commercially available standard for monitoring detector sensitivity and response factor stability has shown to be satisfactory in monitoring the GC's performance.

In case gross contamination is detected and samples can not be diluted sufficiently for field analysis, a greater than result is reported.

DUPLICATES. One sample duplicate will be analyzed for every 20 field samples analyzed. Duplicate peak areas greater than 1000 counts should have a relative percent difference (RPD) of not greater than 25%[1] where:

$$RPD = \frac{X1 - X2}{(X1 + X2)/2} \times 100\%$$

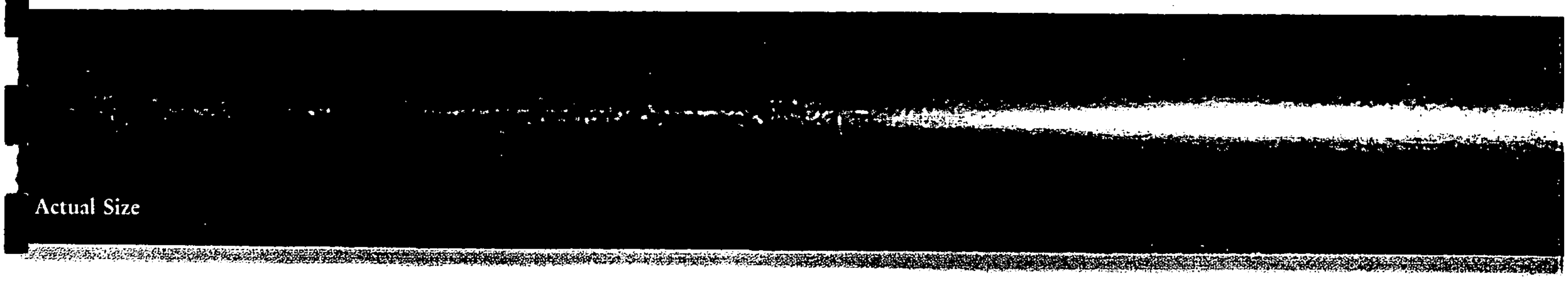
X1 = sample result
X2 = duplicate sample result

CONTINGENCIES. The analytical equipment is protected from the sampling equipment area by an insulated enclosure between the laboratory mid-section of the van and the back Geoprobe area. PES owns several sampling and analytical systems which can be made available on short notice as a backup in case of equipment failures.

1 This is an expected range. The actual range is determined from data generated from each project site.

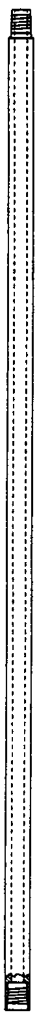
Geoprobe's 1.25 inch Probe

For use with standard Geoprobe® Soil and Groundwater


Actual Size

1.25 inch

probe rods and accessories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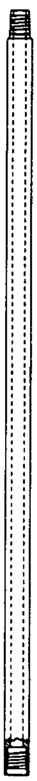
(AT-1248)


1m Probe Rod
(AT-1239)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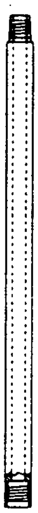
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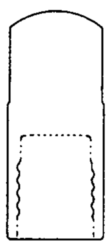
1 ft. Probe Rod
(AT-1212)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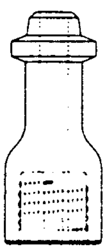
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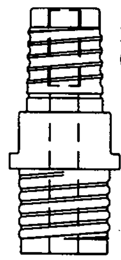
Soil Sampling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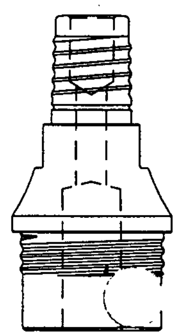
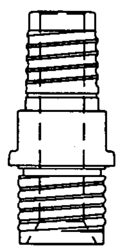

Macro-Core® Drive Head
(AT-8512)

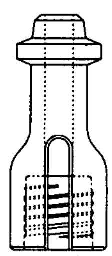
Both Large Bore and Macro-Core® soil sampling systems can be used with the 1.25-inch rod system by simply changing out the respective soil sampler drive head.

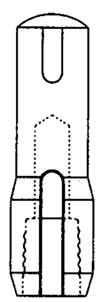
Groundwater Sampling


Screen Point 15 Drive Head
(GW-1512)

Existing Screen Point 15 groundwater samplers may be used with 1.25-inch rods by ordering the GW-1512 drive head. Sampler kits are available equipped with this drive head.

Soil Conductivity Logging

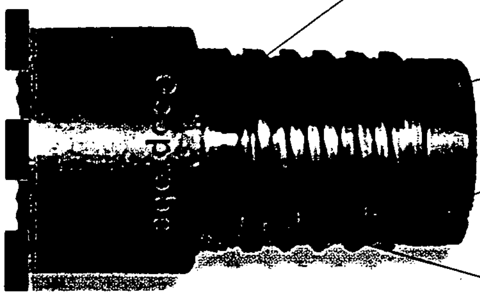

Slotted Pull Cap
(AT-1203)


Slotted Drive Cap
(AT-1202)

Used for direct push logging applications such as Soil Conductivity of the Membrane Interface Probe (MIP). Slot design allows the passage of the logging cable through the cap. Geoprobe® 1.25-inch probe rods offer excellent durablility for logging applications and have the advantage of requiring only 1-3/4 turns to fully make up the tool joint. These rods are standard for Geoprobe's MIP contaminant logging systems. This slotted drive cap will also accept the stop-pin for Large Bore applications.

Rod System

samplers.

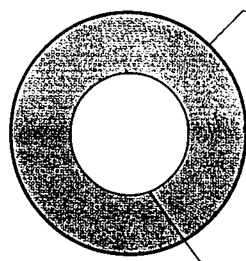


O-ring groove for a watertight seal at each joint.

Tapered end for easier joint make up.

Multi-lead design provides quick connections to standard Geoprobe® sampling and logging tools. Joint make-up is 1-3/4 turn!

Geoprobe® proprietary rounded thread system, hardened for maximum durability. Patent Pending

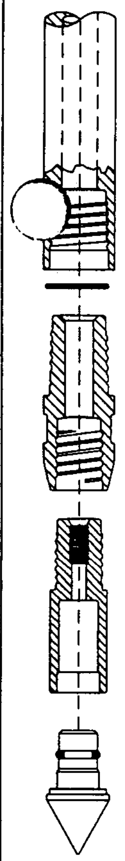


1.25-inch (31.8 mm) Outside Diameter

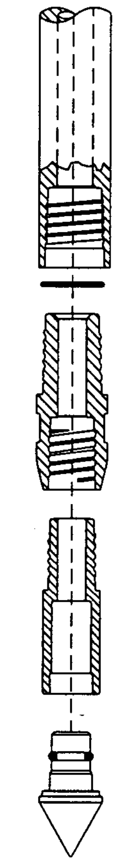
Actual Size

0.625-inch (15.9 mm) Inside Diameter

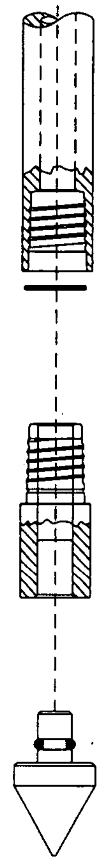
Expendable Point Systems: Soil Gas Sampling or Grouting



Using 1-inch PR-13B for Post-Run Tubing System

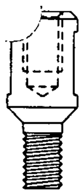


Using 1-inch AT-13B for through-the-rod soil gas sampling and grouting



Using 1.25-inch AT-1213 for through-the-rod soil gas sampling and grouting

Part No.	Description
AT-1200	Drive Cap
AT-1202	Slotted Drive Cap
AT-1203	Slotted Pull Cap
AT-1204	Pull Cap
AT-1212	Probe Rod (1.25 in. x 12 in.)
AT-1213	Expendable Point Holder
AT-1214	Steel Expendable Drive Point
AT-1214R	O-Ring (Pkt. of 25)
AT-1223	Adapter (1 in. Pin x 1.25 in. Box)
AT-1224	Probe Rod (1.25 in. x 24 in.)
AT-1225	Adapter (1.25 in. Pin x 1.375 in. Box)
AT-1226	Adapter (1.25 in. Pin x 1 in. Box)
AT-1227	Adapter (1.375 in. Pin x 1.25 in. Box)
AT-1228	Adapter (1.25 in. Pin x AW Pin)
AT-1236	Probe Rod (1.25 in. x 36 in.)
AT-1239	Probe Rod (1.25 in. x 1 m)
AT-1242	Pre-probe (2.5 in. diameter)
AT-1248	Probe Rod (1.25 in. x 48 in.)
AT-1250R	O-Ring (Pkt. of 25)
AT-13B	Expendable Point Holder
AT-14	Steel Expendable Drive Point
AT-2412	Probe Rod Extractor
AT-6612	LB Drive Head
AT-6712	Extension Rod Centering Device
AT-8512	MC Drive Head
GW-1512	Screen Point 15 Drive Head
PR-13B	PRT Expendable Point Holder



Extension Rod Centering Device (AT-6712)

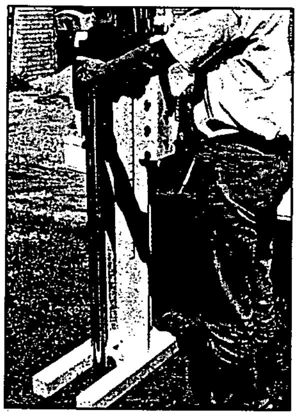
Use this end piece on Geoprobe® stainless steel extension rods to activate the stop pin on the Large Bore soil sampler.

Note: The inside diameter of Geoprobe® 1.25-inch probe rods will vary dependent upon the stock supplied to us by the mill and the effects of heat treatment. According to ASTM A-519, the internal diameter of material in this size may vary +/- .015 inch from 0.610 inch to 0.635 inch (15.49mm to 16.13mm). Although this is the allowable, the actual variation is typically much smaller than this.

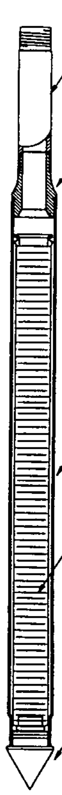
Geoprobe's NEW Screen Point Groundwater Sampler...

- Large 1.0-inch (25.4 mm) Outside Diameter Screen
- 41-inch (1041 mm) Exposed Screen Length
- Can be used to sample floating layers (LNAPLs) and sinking layers (DNAPLs)
- Assembled sampler contains only three parts
- Sampler is completely sealed during driving
- Sampler screens are available in stainless steel or PVC
- "Groutable" design allows abandonment grout to be pumped through sampler to meet ASTM Method D 5299-92 requirements

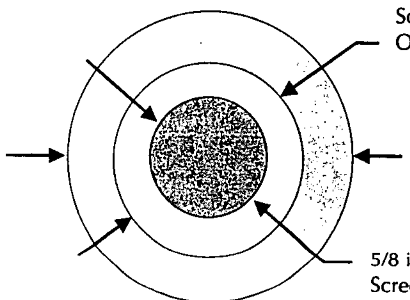
The **SCREEN POINT 15** is a hidden, screen-type, groundwater sampling device. The sampler is driven to the desired depth in the formation then exposed to obtain a groundwater sample. The **SCREEN POINT 15** design reflects Geoprobe® Systems' years of experience in designing groundwater samplers. This tool offers a number of important advantages to field users.



▲ **SEALED SCREEN**
The Screen is completely sealed inside the Sampler Sheath while the sampler is driven to depth.



▲ **DRIVING**
The SCREEN POINT 15 remains sealed while being driven from the surface. The sampler screen remains enclosed in the sampler body until it is deployed at the desired sampling depth.



TOOL SIZE DIAGRAM
Scale: 1:1

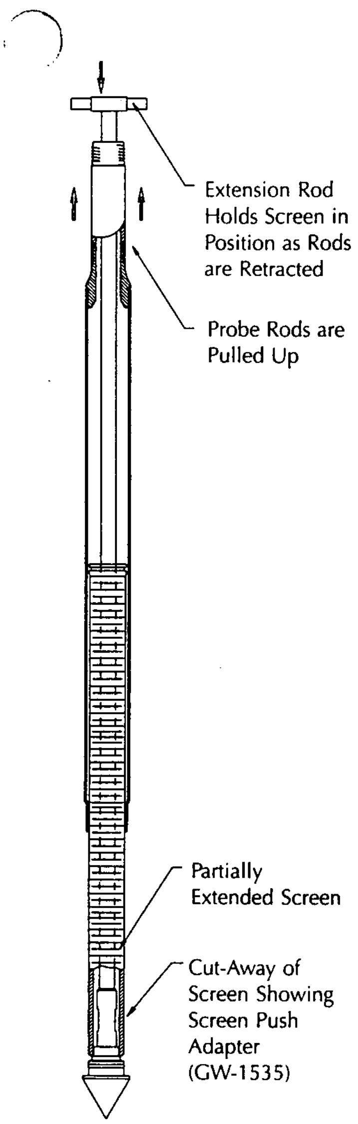
• SCREEN SIZE

The large screen diameter on the SCREEN POINT 15 allows the user to deploy either Geoprobe® Mini-Bailers or tubing with bottom check valves into the bore of the screen for sampling both dissolved compounds and non-aqueous phase liquids (NAPLs). The screen length is 41 inches (1041 mm) allowing for fast recharge from the formation.

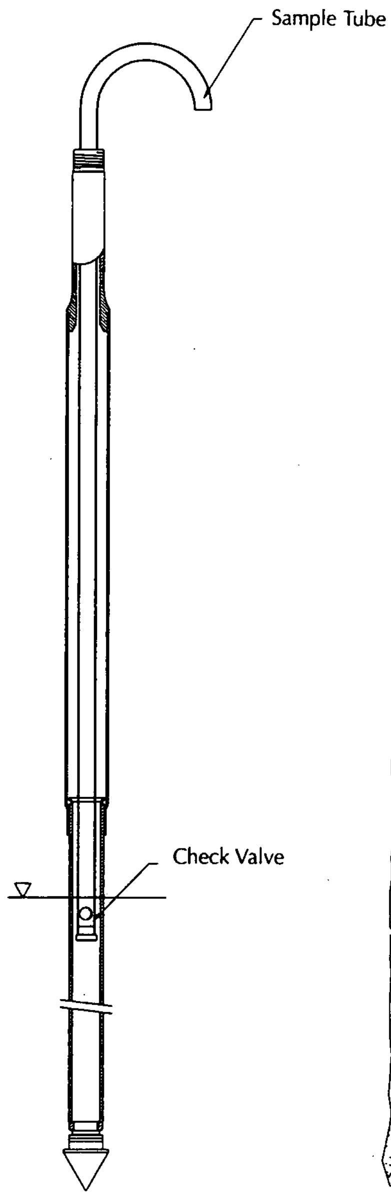
• MATERIAL CHOICES

Field users can choose from either wire-wound, stainless steel screens, or slotted PVC screens. Wire-wound, stainless steel screens provide large, open areas for maximum recharge rates. Due to its inert nature, stainless steel is the material of choice for many environmental sampling protocols. Slotted PVC screens are low cost and are acceptable for many sampling protocols.

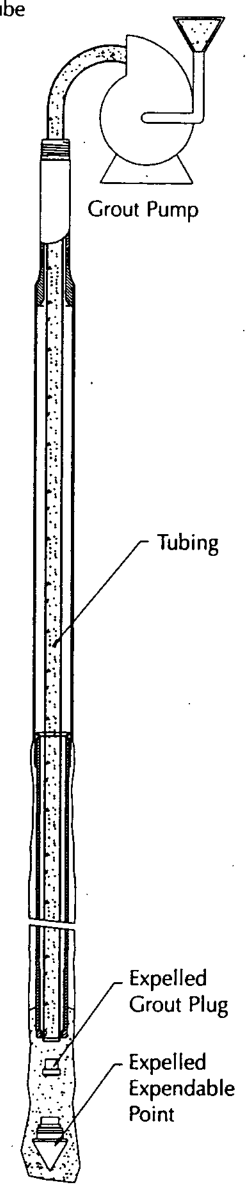
The Tools For Site Investigation



▲ DEPLOYMENT
The screen is held in position in the formation as the probe rods are retracted. Deployment of the Screen Point 15 is both positive and measureable.



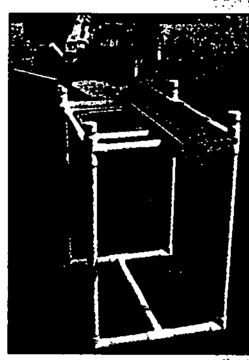
▲ SAMPLING
Tubing with bottom check valve or the Geoprobe® Mini-Bailer can be inserted into the bore of the screen, allowing for sampling of both dissolved and non-aqueous phase contaminants.



▲ GROUTING
Removal of the grout plug at the base of the sampler screen allows a grout tube to be inserted from the surface through the SCREEN POINT 15. Grout can then be pumped to fill the hole as the tool is removed from the ground.

▲ SAMPLING
Tubing and bailers fit into the 0.6 inch (15.2 mm) inside diameter screen bore.

▲ GROUTING
Pumping grout to seal the hole as the Screen Point 15 is retracted.



▲ DECONTAMINATION
The Screen Point 15 disassembles for easy decontamination.

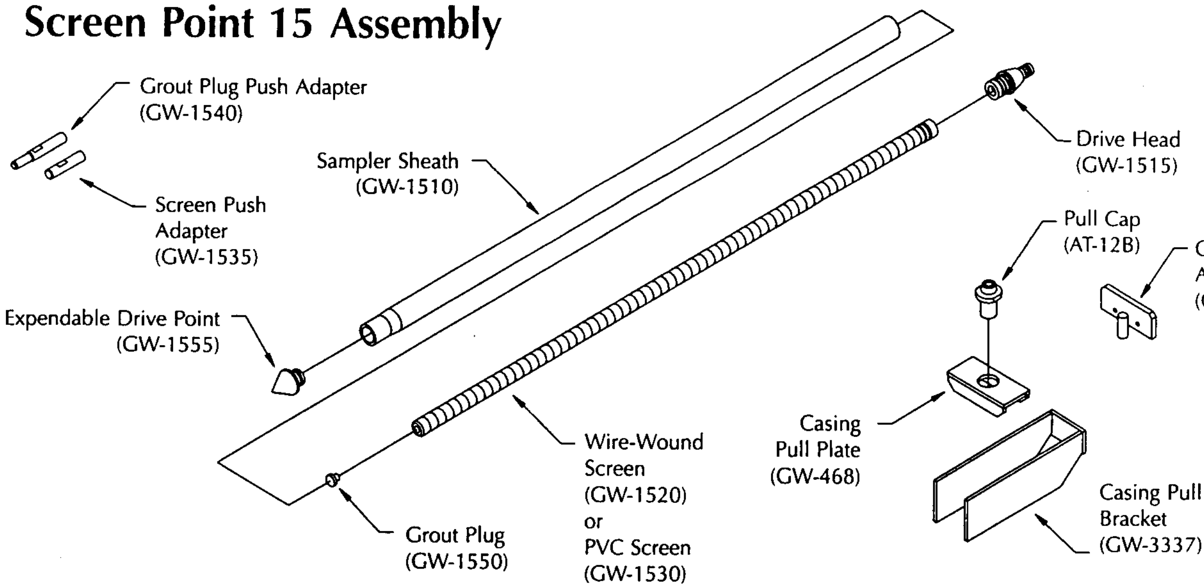
• SIMPLE AND RUGGED

The SCREEN POINT 15 is thick walled and built to take percussive driving. Not including O-rings, which are used as seals, the SCREEN POINT 15 contains only three parts. The alloy sampler body and drive head are both hardened and finished making them durable and corrosion resistant. Simplicity of design and ruggedness in construction translates into a lower operating cost for this tool. The SCREEN POINT 15 is easily disassembled for cleaning.

• DOWN-HOLE GROUTING

A knock-out grout plug is provided at the base of the screen to permit grouting of the probe hole from bottom to top as the tool is removed from the ground. In practice, the plug is removed and grout is pumped through a grout tube. A cement/bentonite grout is used to completely fill the hole as the SCREEN POINT 15 is retracted, meeting ASTM D 5299-92 requirements.

Screen Point 15 Assembly



SPECIFICATIONS

Assembled Length: .... 52 in. (1321 mm)
Maximum O.D.: .... 1.5 in. (38 mm)
Screen O.D.: .... 1.0 in. (25 mm)
Screen Bore (min.): .... 0.65 in. (16.5 mm)
Exposed Screen Length: .... 41 in. (1041 mm)
Screen Materials: .... Stainless Steel or PVC
Sampler Body Materials: .... Alloy Steel
Drive Point Material: .... Carbon Steel

SAMPLER KIT

GW-1500K Screen Point 15 Groundwater Sampler includes:	
GW-1504K	(1) O-Ring Service Kit, 400 (100 of each O-Ring required)
GW-1510	(1) Sampler Sheath
GW-1515	(1) Drive Head
GW-1520	(1) Wire-Wound Screen, 4-slot
GW-1535	(1) Screen Push Adapter
GW-1540	(1) Grout Plug Push Adapter
GW-1551	(1) Grout Plug, PVC
GW-1551K	(25) Grout Plugs, PVC
GW-1555K	(25) Expendable Drive Points

BASIC SAMPLER PARTS

Screen Point 15 Groundwater Sampler	
GW-1510	Sampler Sheath
GW-1515	Drive Head (fits 1-inch Probe Rod)
GW-1520	Wire-Wound Screen, 4-slot
GW-1530	PVC Screen, 10-slot
GW-1535	Screen Push Adapter
GW-1540	Grout Plug Push Adapter
GW-1550	Grout Plug, Teflon®
GW-1550K	Grout Plugs, Teflon®, Pkg. of 25
GW-1551	Grout Plug, PVC
GW-1551K	Grout Plugs, PVC, Pkg of 25
GW-1555	Expendable Drive Point
O-Rings	
GW-1515R	Drive Head, Top O-Rings, Pkg. of 25
GW-1516R	Drive Head, Bottom O-Rings, Pkg. of 25
GW-1520R	Screen Head O-Rings, Pkg. of 25
GW-1555R	Expendable Drive Point O-Rings, Pkg. of 25
Pulling Assembly, GH-40 Hammer	
GW-3286	Casing Pull Anchor
GW-3337	Casing Pull Bracket
GW-468	Casing Pull Plate
AT-12B	Pull Cap (with 1/2-in. bore)

Geoprobe® Systems
601 N. Broadway • Salina, KS 67401
913-825-1842 • Fax 913-825-2097

APPENDIX B
GROUNDWATER SURVEY (DIRECT-PUSH) SAMPLING LOCATION PROCEDURES

Groundwater Survey (Direct-Push) Sampling Location Procedures

1. Establish a longitudinal axis (Axis A) along the direction of groundwater flow in the approximate center of the contaminant plume near the FP-96-23 Monitoring Well cluster (Figure 3-1). The axis will be aligned by sighting (with survey equipment) from the center of the driveway entering the Well M-1 property, over a point (on a line between Wells FP-96-23 and FP-96-24) 200 feet west of Well FP-96-24.

2. Begin direct-push sampling and analyses at point B-1, located approximately 2,500 feet downgradient of the FP-96-23 Monitoring Well cluster, (Figure 3-1). If targeted compounds are not detected in groundwater samples collected at the shallow, intermediate, and deep zones of the aquifer, at this sample location, proceed to the procedures in the ***Longitudinal Approach for ND Results***. If target compounds are detected, proceed to the procedures in the ***Longitudinal Approach for Positive Results***.

Longitudinal Approach for ND Results

1. Move approximately 1,250 feet south (upgradient) along Axis A to point B-2 (located approximately half the distance from B-1 to the FP-96-23 Monitoring Well cluster). If targeted compounds are not detected from the three aquifer zones at point B-2, proceed to point B-3. Point B-3 is located approximately 600 feet from B-2 along Axis-A (Figure 3-1). If targeted compounds are detected see Note 1 at end of this section.

2. If targeted compounds are not detected at point B-3 proceed to point B-4, located approximately 300 feet south along Axis A.

3. If targeted compounds are detected at point B-4, then establish Axis-C at B-4 and proceed to ***Latitudinal Approach***. If targeted compounds are not detected at point B-4, one of the following assumptions can be made:

   - the edge of the plume is located between point B-4 and the FP-96-23 Monitoring Well cluster (defined to within 300 feet)

   - the plume apparently has not migrated along the assumed longitudinal Axis A but may have migrated along another offset axis

In either case, establish an axis (Axis B) perpendicular to Axis A at point B-4. Sampling and analyses of groundwater at points along Axis B (Figure 3-1) will either confirm the location of the edge of the plume or will indicate the direction to which the longitudinal axis of the plume is offset from Axis A. Collect groundwater samples and analyze for targeted compounds at 250 feet intervals along the Axis B with a minimum of two sample points in each direction (points B-5, B-6, B-7, and B-8). If targeted compounds are not detected at any points, assume the edge of the plume is located between point B-4 and the FP-96-23 Monitoring Well cluster. If targeted compounds are detected along the latitudinal axis, establish an offset longitudinal axis based on the positive analytical results. Follow the same procedures outlined for the longitudinal approach previously described in Step 1 of this section (see Note 2 regarding establishing an offset axis).

Note: 1. If any positive detections for target compounds are obtained during the sampling of points along the longitudinal axis (Axis A), move half the distance (north) between the last non-detect point and positive detection point unless the last non-detect was point B-3. Once the longitudinal non-detect edge of the plume is established proceed to the ***Latitudinal Approach*** procedures.

2. Reestablish an offset longitudinal axis by sighting (with survey equipment) as previously done to establish Axis A. The offset axis and Axis A are expected to be nearly parallel due to the north-northeast direction of groundwater flow. The starting point for sampling should be approximately 2,500 feet downgradient of the FP-96-23 Monitoring Well cluster (similar to point B-1).

Longitudinal Approach for Positive Results

1. Move approximately 1,000 feet north (downgradient) along Axis A to point B-9. Collect a groundwater sample from the three aquifer zones and analyze for targeted compounds.

2. If targeted compounds are detected at point B-9, move at least 1,000 feet north along Axis A to point B-10 located as near to the river as possible. If targeted compounds are detected at point B-10, proceed to ***Latitudinal Approach*** procedures.

Note: 1. If any non-detect analytical results are obtained during the sampling of points downgradient along the longitudinal axis (Axis A), move half the distance south (upgradient) along the longitudinal axis between last positive detection point and the non-detect point until a longitudinal non-detect extent of plume is established to plus or minus 250 feet (require up to 2 additional iterations).

2. Access to the proposed sampling points located on property where previous field activities have been conducted is not expected to be a problem. However, vehicle access to sample points past the extent of the irrigated property is uncertain. If proposed direct-push sampling locations are inaccessible, alternate locations will be identified to reflect actual field conditions. In these instances, on-site BMcD and USACE personnel will determine alternate locations for sampling, and the reason(s) for choosing the alternate location(s) will be recorded on the DQCR and in the weekly field report.

Latitudinal Approach

1. Set up a perpendicular latitudinal axis at first positive detection along the longitudinal axis south of the previously established non-detect point (see Figure 3-1, Axis C- note that this is an example location only). Establish at least two sample points east and west on either side of the latitudinal axis at 500 feet intervals (example points B-11, B-12, B-13, and B-14).

2. If targeted compounds are detected at the sampling points, move out 500 feet further to the next sampling point. If targeted compounds are not detected, move 250 feet back toward the previous positive detection sampling point to define the edge of the plume.

Additional Notes

If time allows, or determined to be necessary for analytical verification, confirmation sampling will be conducted by sampling within 25 feet downgradient of as many of the non-detect points which define the edge of the plume as possible.

From previous experience at the site, there may be points where the desired sampling depths (shallow - 20 to 30 feet bgs, intermediate - 40 to 50 feet bgs, or deep - 60 to 70 feet bgs [or bedrock surface]) cannot be attained with direct-push equipment. If this condition occurs after reasonable attempts have been made to attain the desired depth within the original probe hole, a sample should be collected if the sampling tool is within the specified target sampling depth. If the sampling tool is not within the target sampling depth, the first probe hole will be offset (by 25 to 50 feet) and another probe hole advanced to the desired sampling depth (up to two attempts should be made to obtain the desired depth with an offset probe hole). If the subsequent probe holes fail to achieve the desired sampling depth, the cluster location will be identified and temporarily abandoned. A groundwater sample will be collected from the failed probe hole location using cable tool methods. The cable tool drilling rig will be mobilized, and the missing groundwater screening sample collected as soon as possible after identification of the problem and consultation between Fort Riley, USACE, and BMcD. The intent is to collect the missing sample while direct-push activities continue at other probe hole locations at the site. All cable tool methods will be conducted in accordance to procedures described in the MWIP. Groundwater samples will be collected through the cable tool pipe by use of a disposable bailer.

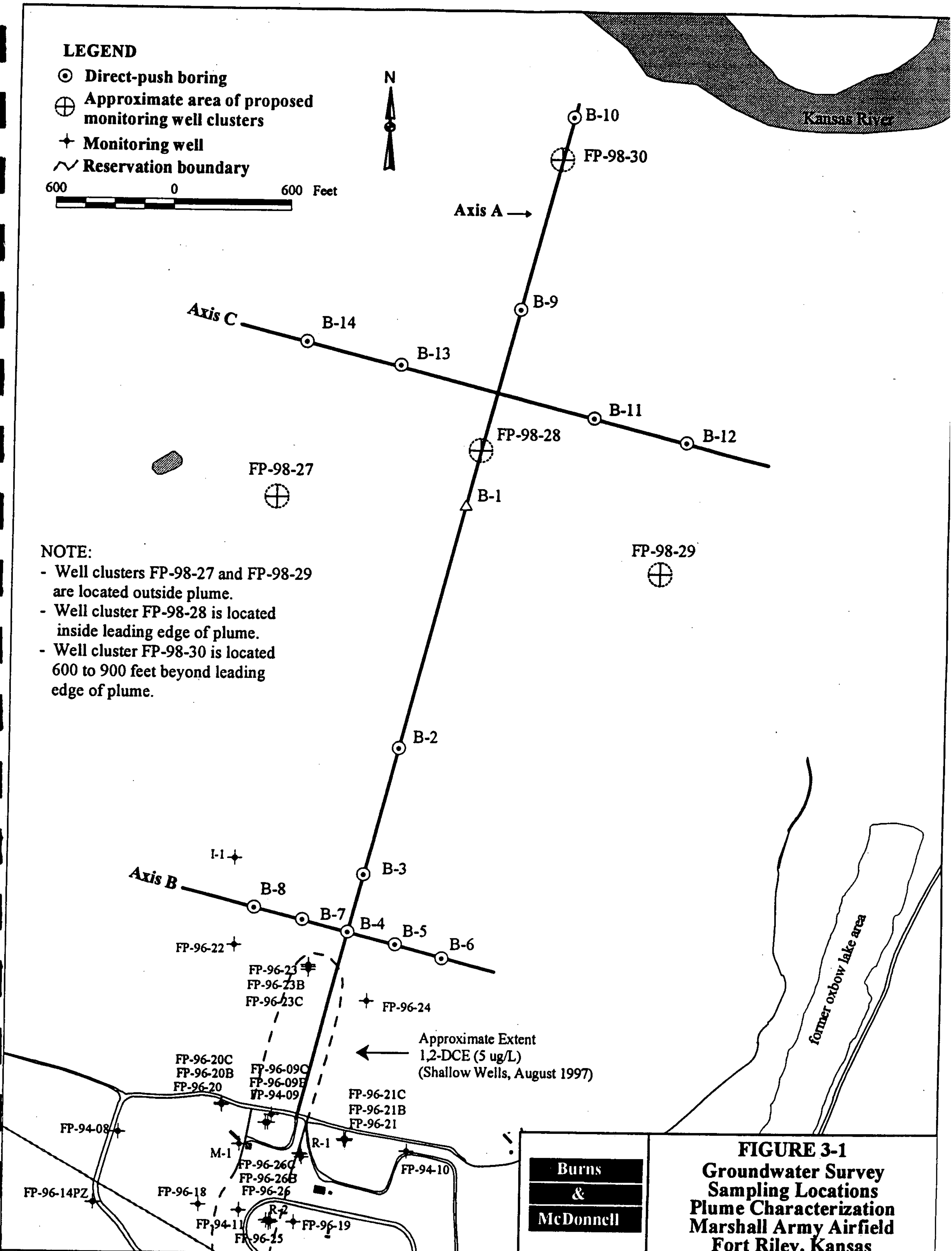


FIGURE 3-1
Groundwater Survey Sampling Locations Plume Characterization Marshall Army Airfield Fort Riley, Kansas

APPENDIX C
IDW CORRESPONDENCE

DEPARTMENT OF THE ARMY
HEADQUARTERS, FORT RILEY
FORT RILEY, KANSAS 66442-5000

REPLY TO
ATTENTION OF

August 6, 1996

Directorate of Environment
and Safety

Mr. Robert Koke
Environmental Protection Agency
726 Minnesota Avenue
Kansas City, KS 66101

Mr. William Dodd
Kansas Department of
Health and Environment
Forbes Field, Bldg. 740
Topeka, KS 66620-0001

Dear Mr. Koke and Mr. Dodd:

Ft. Riley requests the Environmental Protection Agency's (EPA) and Kansas Department of Health Environment's (KDHE) concurrence with Ft. Riley's proposed disposition of non-hazardous investigation derived waste (IDW) ground water to the ground surface at Marshall Army Airfield (MAAF) and placing non-hazardous IDW soil at the Construction Debris (CD) Landfill located in the Whitside area.

Approximately 3,100 gallons of non-hazardous ground-water IDW will be discharged to the ground surface in an area 100 feet east of the pilot study facilities. The water is currently contained in four separate temporary holding tanks at the pilot study area. Tank A, in the pilot study building, contains approximately 430 gallons of purged ground water from the August 1995 sampling event. Tank B, in the pilot study building, contains approximately 380 gallons of purged ground water from the December 1995 sampling event. Tank C, in the fenced pilot study area, contains approximately 1,800 gallons of purged ground water from the installation and development activities associated with Technical Memorandum (TM) #7. Tank D, in the fenced pilot study area, contains approximately 460 gallons of purged ground water from the May/June 1996 sampling event. The analytical results for target compounds associated with MAAF for the water in tanks A, B, C, D indicated the target compounds are below EPA Maximum Contaminant Levels (MCLs) established for drinking water.

Approximately 160 cubic yards of non-hazardous soil IDW will be taken to the CD Landfill located in the Whitside area to be used as surplus soil for the daily cover. The soil IDW generated during the installation of monitoring wells under TM#7 (approximately 50 cubic yards) was placed in a soil bin located within the fenced pilot study area. In addition, the 19 drums used to temporarily contain the soil IDW generated during the soil boring activities under TM#5/8 (approximately 110 cubic feet) was transferred to the soil bin. A composite sample consisting of soil collected from each corner and middle of the soil bin was collected for characterization of the soil. The analytical results indicted that the F-listed solvents were not detected above detection limits. Since the detection limits were rather high, we requested the laboratory to re-evaluate the chromatograph. The laboratory reports that no compounds outside the laboratory spike compounds were present in the soil sample.

Ft. Riley requests to proceed with the disposition of the non-hazardous soil and ground-water IDW during the week of August 8, 1996. We will contact you 48 hours in advance of the disposition date. The analytical data can be provided at your request. If you have any questions, call Kyle Kirchner at 913/239-8663.

Sincerely,

Janet L Wade

Janet L. Wade
Installation Restoration
Program Manager

CF:
AFZN-JA (Harry Hardy)
AFZN-ES-P (Dave Horn)
CEMRK-MD-H (Dennis Karns)
Louis Berger (Barry Millman)

State of Kansas

Bill Graves Governor

Department of Health and Environment

James J. O'C

FILE COPY

7 August 1996

Post-it® Fax Note 7671	Date 8-7	# of pages ▶ 1
To JANET WADE	From BILL DODD	
Co./Dept. FORT RILEY	Co. KDHE/BER	
Phone # 239-3343	Phone # 841-3143	
Fax # 913-239-8535	Fax #	

Ms. Janet Wade
Directorate of Environment and Safety
Planning Restoration Division
1970 2nd Street, Camp Funston
Fort Riley, KS 66442-6016

SUBJECT: Disposal of Investigation Derived Waste at Fort Riley

Dear Ms. Wade:

On 6 August 1996, the Kansas Department of Health and Environment (KDHE) received two facsimile communications from Fort Riley. The first facsimile requested concurrence from KDHE with a general plan for the disposal of investigation derived waste (IDW) at all Fort Riley sites. The second facsimile requested concurrence from KDHE with the implementation of this general plan for the disposal of IDW at the Marshall Army Airfield-Former Fire Training Area (MAAF-FFTA). The plan for the disposal of IDW included both purge water and soils.

KDHE concurs with Fort Riley's general plan for the disposal of purge water at Fort Riley sites and, specifically, with the disposal of purge water at the MAAF-FFTA. It is KDHE's understanding that, wherever implementing this plan, no water with contaminant concentrations above the U.S. Environmental Protection Agency's (EPA's) Maximum Contaminant Levels (MCLs) for drinking water will be discharged to the environment. If needed, groundwater will either: a) be treated on-site before being discharged to the environment or b) be taken to a treatment facility for disposal. KDHE also understands that Fort Riley will notify the EPA and the KDHE of any disposal of IDW at Fort Riley. Finally, KDHE understands that the water to be discharged in an area 100 feet east of the Pilot Studies area at the MAAF-FFTA will remain on-post.

KDHE also concurs with Fort Riley's general plan for the disposal of soils at Fort Riley sites and, specifically, with the disposal of soils at the MAAF-FFTA. With respect to the disposal of soils, Fort Riley should notify KDHE anytime IDW soils are to be deposited in a landfill. Also, note that soils with contaminant concentrations less than the detection limits may be left on-site.

Please call me if you have any questions. My telephone number is 913-291-3245.

Sincerely,

William R. Dodd

William R. Dodd
Environmental Geologist and Project Manager
Superfund Unit/Assessment and Restoration Section
Bureau of Environmental Remediation

c: Randall Carlson-->file Fort Riley Correspondence
Bob Koke, EPA Region VII