TECHNICAL MEMORANDA FOR OTHER SITES SITE INVESTIGATIONS

2 September 1994

Prepared for
United States Army Engineer District, Kansas City
CEMRK-ED-TP
601 East 12th Street
Kansas City, Missouri 64106-2896

Prepared by
Louis Berger & Associates, Inc.
295 Promenade Street
Providence, Rhode Island 02908

LIST OF TECHNICAL MEMORANDA
OTHER SITES
SITE INVESTIGATIONS

Technical Memorandum #1:	DRMO - Groundwater Wells
Technical Memorandum #2:	Whitside and Construction/Debris Landfills & Milford Lake - Natural Gamma Logging
Technical Memorandum #3:	Print and Publication Shop, Bldg. 263 - Phase II Soil Gas
Technical Memorandum #4:	Print and Publication Shop, Bldg. 263 - Soil Borings and Soil Sampling
Technical Memorandum #5:	Bldg. 319; Print and Publication Shop, Bldg. 263; and DRMO - Phase I Groundwater Screening Samples
Technical Memorandum #6:	Milford Lake Campground - Groundwater Monitor Wells
Technical Memorandum #7:	Whitside and Construction/Debris Landfills - Open Rock Wells
Technical Memorandum #8:	Milford Lake Campground - Closure and Abandonment of Open-Rock Groundwater Wells
Technical Memorandum #9:	Southeast Funston Landfill - Groundwater Monitor Wells
Technical Memorandum #10:	Main Post Landfill - Groundwater Monitor Wells
Technical Memorandum #11:	Former DS/GS Maintenance Area - Soil Sampling
Technical Memorandum #12:	DRMO Area 1 - No More Action
Technical Memorandum #13:	DRMO Area 2 - No More Action
Technical Memorandum #14:	Print and Publication Shop, Bldg. 263 - No More Action
Technical Memorandum #15:	Southeast Funston Landfill - Driven Well Points

TECHNICAL MEMORANDUM #1

Draft Technical Memorandum #1/Other Site SI Sampling and Analysis Plan Installation of Groundwater Monitor Wells at Current DRMO

1.0 Overview

A Site Inspection (SI) is currently being planned to be conducted under CERCLA at Fort Riley's DRMO facility. The SI field activities will be initiated during March 1994. The planned SI activities at DRMO are presented in the Draft Final Sampling and Analysis Plan (SAP) for Other Sites at Fort Riley, (9 January 1994). DRMO is located in the eastern portion of Camp Funston at the intersection of Fifth and L Streets. The current DRMO facility is identified as Area 1 in the SAP. [Areas 2 and 3 represent former DRMO locations.] The active DRMO facility includes Buildings 1952 and 1953, which are used for storage of hazardous waste. These buildings are located on M Street, south of Fifth Street.

The SI activities include soil gas and soil sampling around the site. Also, groundwater screening samples and monitor wells are proposed contingent upon the findings of the soil gas survey. This technical memorandum revises the SAP for DRMO Area 1 to include the installation and sampling of groundwater monitor wells regardless of the findings of the soil gas and/or groundwater screening samples. Phase 1, Area 1, of the DRMO SI will include installation of 6-groundwater monitoring wells. These wells will consist of 3-nested pairs; two downgradient (detection) monitoring well nests and one upgradient (background) monitoring well nest. These wells will be installed to assist in fulfilling long-term monitoring requirements under RCRA. The objective of installing these wells is to detect the possible release of contaminants into groundwater below the site. The RCRA Ground-Water Monitoring: Draft Technical Guidance, (EPA, 1992) was used for the monitoring well location recommendations presented in this memo.

2.0 Background

Buildings 1953 and 1952 are identified in Fort Riley's Part B permit application under RCRA for storage of hazardous waste. The DRMO is the primary distribution and receiving facility for materials used at Fort Riley. A wide range of chemicals used at Fort Riley and stored at the hazardous waste storage area includes ignitable, corrosive, reactive, and toxic chemicals. These include toxic metals, batteries, solvents, fuels, paints, oils, lubricants, pesticides, adhesives, and

other hazardous materials and wastes. Although the DRMO has never officially handled PCB fluids or transformers, there is the possibility that PCB contaminated items were handled by the facility during the 1950's and 1960's, before the electrical industry identified PCBs as a concern.

Buildings 1952 and 1953 were constructed in 1983 and placed into operation August 1984. An outside paved and curbed area was constructed in 1991 and placed into operation in 1992. Buildings 1952 and 1953 consists of two 16' by 18' prefabricated metal structures situated approximately 30 feet east of "M" Street at opposite ends of an 80' by 80' concrete paved lot. Building 1953 is located at the northern end of the lot, and Building 1952 is located at the southern end. Each building consists of an eight-foot high prefabricated building constructed on a reinforced concrete slab that slopes downward toward the back of each structure and contains three, separate pallet size, leak containment basins. Both buildings are open on the side facing the paved lot. This opening is covered by a locked metal roll-up door. Both buildings are serviced by electricity, and the lot between the buildings is lighted. Neither building is heated but both have internal ventilation. The only building serviced by water is Building 1953, which has an emergency eye wash and shower located inside. There are no other utilities at the site. The lot between the buildings is paved with concrete and has a chemical resistant coating. The general area of DRMO is shown in Figure 1; the construction details of buildings 1952 and 1953 are shown on Figure 2.

Because of activities occurring at the DRMO it is a RCRA treatment, storage, and disposal (TSD) facility and must comply with implementation of groundwater monitoring regulations for regulated units contained in 40 CFR Part 264 Subpart K. Consistent with RCRA Ground-Water Monitoring: Draft Technical Guidance, (EPA, 1992), groundwater wells at the DRMO are proposed.

The primary criteria for determining the number and location of monitoring wells at a site is to allow for the detection of contamination (i.e., detection monitoring) when hazardous waste or hazardous constituents have migrated from the waste management area to the uppermost aquifer. There is no required minimum number of wells at permitted facilities; the owner/operator is simply required to install a "sufficient" number of wells to allow for determination of background water quality and the water quality at the point of compliance, the facility boundary. In order to detect releases to groundwater as soon as possible, the facility boundary for purposes of installing a groundwater monitoring system is considered the edge of the containment area around buildings 1952 and 1953.

3.0 Proposed Action

Six wells will be installed at the current DRMO facility as follows (see Figure 1):

- Two sets of nested (detection) wells immediately downgradient of Buildings 1952 & 1953
- One set of nested (background) wells upgradient of the DRMO

It is recommended that the downgradient well nests be placed as close as physically possible to the edge of hazardous waste management units. Downgradient wells should be placed on the east side of these buildings since the groundwater gradient is east toward the Kansas River.a Temporary groundwater gradient reversals during periods of high flow in the Kansas River may occur but will not impact the ability of the downgradient wells to serve as an effective network for detecting releases to groundwater. The actual placement of these wells may vary from that shown on Figure 1 due to site conditions such as utilities, drill access, and railroad right-of-way. In particular, there is a variety of non-hazardous material storage in the areas outside and adjacent to buildings 1952 and 1953. If necessary, the downgradient nested wells will be moved further to the east due to this surface storage. These sets of nested downgradient wells will provide detection monitoring of both hazardous waste storage buildings due to the close proximity of the buildings.

Nested wells are recommended for several reasons. Firstly, potential contaminants occurring at the site could either be dense, non-aqueous phase liquids (DNAPLs) (e.g., trichloroethylene -- TCE) or light, non-aqueous phase liquids (LNAPLs) (e.g., petroleum-based hydrocarbons). DNAPLs tend to sink in the aquifer while LNAPLs tend to float. Secondly, the unconsolidated materials in which the uppermost aquifer is found is likely to have a high vertical gradient. Well clusters are recommended in the EPA Guidance to establish vertical hydraulic gradient and the vertical distribution of contaminants.

We recommend that an upgradient well nest be installed to assess the quality of groundwater entering the site (i.e., background) in the upper and lower zones of the aquifer. It is proposed that this well nest be placed in the field west of the DRMO facility (see Figure 2).

Geologic conditions at the site are based on previous investigations in the Camp Funston area, including the Remedial Investigation/Feasibility Study of the Southwest Funston Landfill. Unconsolidated materials at the site are expected to consist predominantly of sands and gravels with

some silts and clays. These unconsolidated materials represent the uppermost water-bearing zone beneath Buildings 1952 and 1953. The groundwater table at the site is anticipated to be from 15 to 20 feet beneath the surface, within unconsolidated materials. These groundwater elevations are expected to be elevated by approximately 4 to 8 feet as a result of regional flooding in July 1993. The bottom of the uppermost water-bearing zone is presumed to be at the top of bedrock, which in this area is estimated to be approximately 40 to 70 feet (Figure 3). Therefore, the shallow monitoring wells will be approximately 25 feet deep, and the deep monitoring wells will be approximately 70 feet deep. Wells will be constructed of two inch polyvinylchloride (PVC) casing and screen and will be installed in accordance with the Groundwater Monitor Well Installation Plan developed for environmental investigations at Fort Riley.

While there is no maximum sampling frequency and duration that is required by the EPA guidance, the minimum frequency for sampling is at least semi-annual for a duration greater than two years. Proposed sampling frequencies should be submitted by the owner/operator as a part of the (RCRA) TSD facility permit application. One round of groundwater sampling will be performed as part of this SI.

Table 1 is a list of hazardous waste stored at the DRMO and Table 2 is a waste stream analysis from the DRMO RCRA Part B Application. Based on the contents of these lists, the proposed groundwater chemical analyses for the proposed monitoring wells are: EPA method 6010 and 7000 Series for priority pollutant metals, EPA method 8240 for volatile organic compounds, EPA method 8270 for semi-volatile organic compounds, and EPA method 8080 for pesticides.

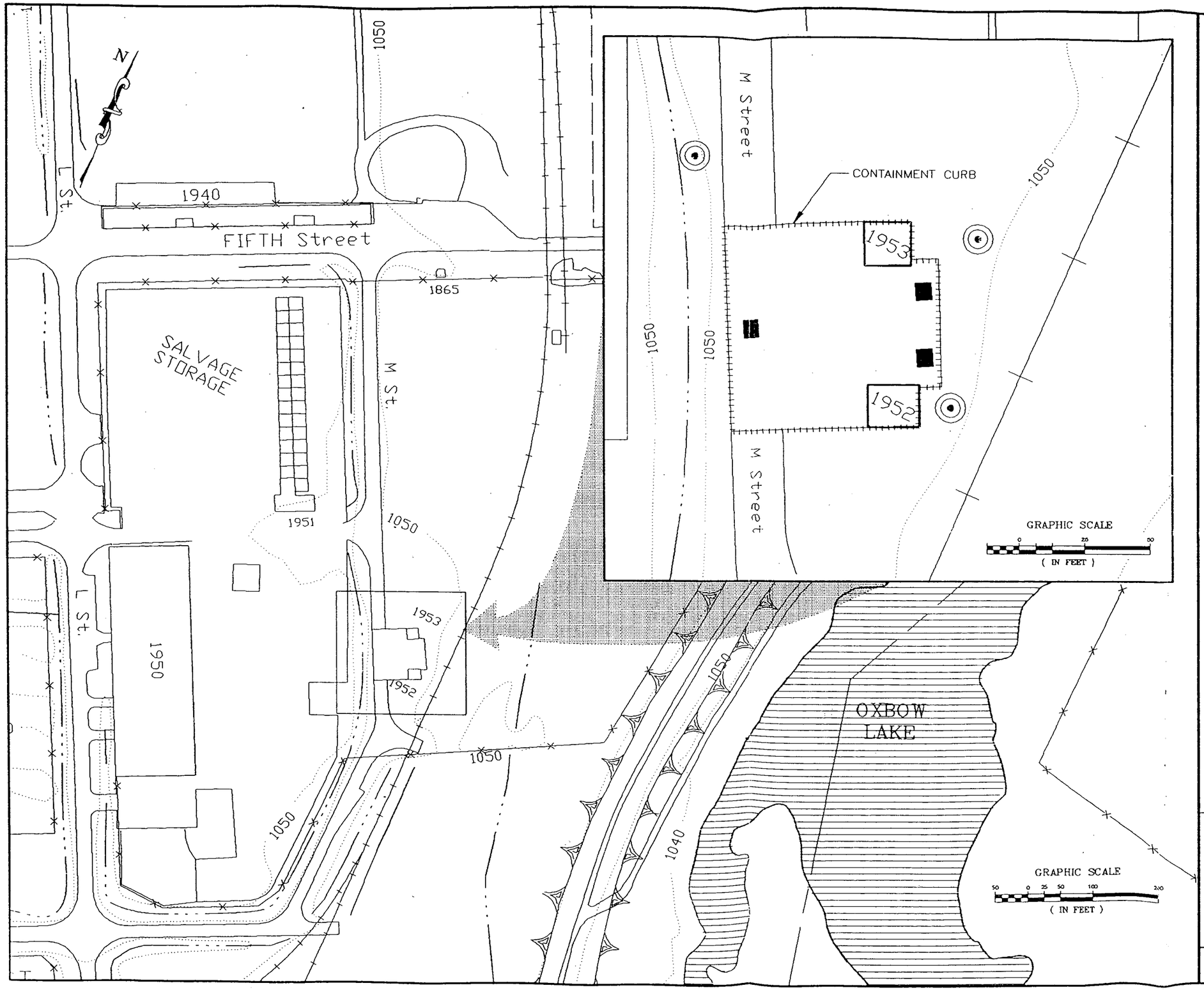
(40 CFR 261 Listing)
List of Hazardous Waste Stored
Source: DRMO RCRA Part B Application

General Description	Hazardous Characteristic	Basis
Any D001 Waste	Ignitable	D001
Any D002 Waste	Corrosive	D002
Any D003 Waste	Reactive	D003
Any D004 Waste	Toxic, Heavy Metal; Arsenic	D004
Any D005 Waste	Toxic, Heavy Metal; Barium	D005
Any D006 Waste	Toxic, Heavy Metal; Cadmium	D006
Any D007 Waste	Toxic, Heavy Metal; Chromium	D007
Any D008 Waste	Toxic, Heavy Metal; Lead	D008
Any D009 Waste	Toxic, Heavy Metal; Mercury	D009
Any D010 Waste	Toxic, Heavy Metal; Selenium	D010
Any D011 Waste	Toxic, Heavy Metal; Silver	D011
Any D013 Waste	Toxic, Lindane	D013
Any D022 Waste	Toxic, Chloroform	D022
Any D035 Waste	Toxic, Methyl ethyl ketone	D035
		U159
Any D039 Waste	Toxic, Tetrachloroethylene	D039
Any D040 Waste	Toxic, Trichloroethylene	D040
Acetone	Ignitable	U002
Calcium Chromate	Toxic	U032
Diethyl Phthalate	Toxic	U088
Formaldehyde	Toxic	U122
Methanol	Ignitable	U154
Methyl Ethyl Ketone	Ignitable	U159
Toluene	Toxic	U220
1,1,1-Trichloroethane	Toxic	U226
Xylene	Ignitable	U239
Warfarin	Toxic	U248
Any F001	Toxic	Listed Waste
Any F002	Toxic	Listed Waste
Any F003	Ignitable	Listed Waste
Any F005	Ignitable, Toxic	Listed Waste

Table 2.

Waste Stream Analysis from the DRMO RCRA Part B Application

WASTE	APPROXIMATE RATE/YEAR	BLDG #	ACTIVITY	WASTE CODE	PARAMETERS	RATIONALE	TEST METHOD	FREQUENCY
Lead Battery Solution	7200 Gal/Yr	8100	DOL	D002	pH	Corrosive	pH-electrometric EPA-SW 846 Methods	
				D004-D011	TCLP Metals	Toxic	for TCLP Metals	Biennally
Dry Honer Particles	1.5 Gal/Yr	8100	DOL, Auto Shop	D001	Flash point	Ignitable	ASTM STD D-93-79 or D-93-80	Yearly
				D004-D011	TCLP Metals	Toxic	EPA SW 846 Methods for TCLP Metals	
		7753	DPCA, Auto Craft	D035	MEK	Toxic	EPA SW 846 Methods 8015 & 8240	
				D039	Tetrachloroethyl	Toxic	EPA SW 846 Methods 8010 & 8240	
				D040	Trichloroethane	Toxic	EPA SW 846 Methods 8010 & 8240	
Spray Paint Air Filters	600 Gal/Yr	8100	DOL Fuel/Elec Shop	D001	Flash point	Ignitable	ASTM Std D-93-79 or D-93-80	Yearly
		8100	DOL, Comp Shop	D004-D011	TCLP Metals	Toxic	EPA SW 846 Methods for TCLP Metals	
		8100	DOL, Auto Body Shop	D035	MEK	Toxic	EPA SW 846 Methods 8015 & 8240	
		8100	DOL, Furniture Shop	D039	Tetrachlorethyl	Toxic	EPA SW 846 Methods 8010 & 8240	
		7753	DPCA, Auto Craft	D040	Trichloroethane	Toxic	EPA SW 846 Methods 8010 & 8240	
		727	DOL, Aircraft Maintenance					
		1460	KSARNG, MATES		Flash Point			
Trichloroethane & Tetrachloroethylene (Mixed)	12 Gal/Yr	8100	DOL, Oil Lab	D004-D011	TCLP Metals	Toxic	EPA SW 846 Methods for TCLP Metals	
				D039	Tetrachloroethyl	Toxic	EPA SW 846 Methods 8010/8240	Biennally
				D040	Trichloroethylene	Toxic		
Fuel Filters	300 Gal/Yr	8314	DEH, POL Facility	D001	Flash point	Ignitable	ASTM STD D-93-79 or D-93-80	Biennally
		700	DEH, POL Facility	D004-D011	TCLP Metals	Toxic	EPA SW 846 Methods for TCLP Metals	
Nickel-Cadmium Bat Fld	24 Gal/Yr	727	DOL, Avn Maint Shop	D002	pH	Corrosive	Electrometric	Biennially
				D004-D011	TCLP Metals	Toxic	EPA SW 846 Methods for TCLP Metals	
De-Silvered Photo Fixer	1200 Gal/Yr	600	Dental X-Ray	D011	Silver	Toxic	EPA SW 846 Methods 7760/7761	Yearly
		1950	DRMO					
		6914	AAFES 1 hr photo (PX)					
Mixed Aromatic Solvents	20 Gal/Yr	600	IACH	D001	Flash point	Ignitable	ASTM STD D-93-79 or D-93-80	Biennally
				F003	Xylene	Toxic	EPA SW 846 Methods 8010/8240	
				F005	Toluene	Toxic	EPA SW 846 Methods 8020/8240	
Paint and Paint Related Materials		343	DEH, Carpentry Shop	F005-D039 D040	Flash point	Ignitable	ASTM D-93-85 or D-93-80	Yearly
		8100	DOL, Furniture Shop	D035-D001	Volatile Organics	Toxic	EPA SW 846 Methods 8240	
		8100	DOL, Auto Body Shop	D035-D001	Volatile Organics	Toxic	EPA SW 846 Methods 8240	
		7753	DPCA, Auto Craft Shop	D035-D001	Volatile Organics	Toxic	EPA SW 846 Methods 8240	
		1460	KSARNG, Mates Shop	D035-D001	Volatile Organics	Toxic	EPA SW 846 Methods 8240	
		2259	DPTM, TSC Sign Shop	D035-D001	Volatile Organics	Toxic	EPA SW 846 Methods 8240	
		1301	USACA Arts & Craft	D035-D001	Volatile Organics	Toxic	EPA SW 846 Methods 8240	
		216	Confinement Facility	D035-D001	Volatile Organics	Toxic	EPA SW 846 Methods 8240	
		727	DOL, Avn Main Shop	D035-D001	Volatile Organics	Toxic	EPA SW 846 Methods 8240	
Radiator Caustic	Varies	8100	DOL, Radiator Shop	D004-D011 D002	TCLP Metals, pH	Toxic/Corr	EPA SW 846 Methods for TCLP Metals	Ev Batch
		7753	DPCA, Auto Craft Shop	D004-D011 D002	TCLP Metals, pH	Toxic/Corr	EPA SW 846 Methods for TCLP Metals	
Radiator Work Tank Water	Varies	8100	DOL, Radiator Shop	D004-D011	TCLP Metals, pH	Toxic/Corr	Electrometric	Biennally
		7753	DPCA, Auto Craft Shop	D004-D011 D002	TCLP Metals, pH	Toxic/Corr	Electrometric	
Engine Cleaner	50 Gal/Yr	8100	DOL, Radiator Shop	D004-D011 D002	TCLP Metals, pH	Toxic/Corr	Electrometric	Ev Batch
	50 Gal/Yr	7753	DPCA, Auto Craft Shop	D004-D011	TCLP Metals, pH	Toxic/Corr	Electrometric	
Sulfuric Acid COO Sol	2 Gal/Yr	8130	Sewage Treatment Lab Custer Hill	D002 D004-D011	TCLP Metals, pH	Toxic/Corr	Electrometric	Biennally
Parts Washer Sludge	Varies	8100	DOL	D004-D011	TCLP Metals, pH	Toxic	EPA SW-846 Methods for TCLP Metals	Yearly



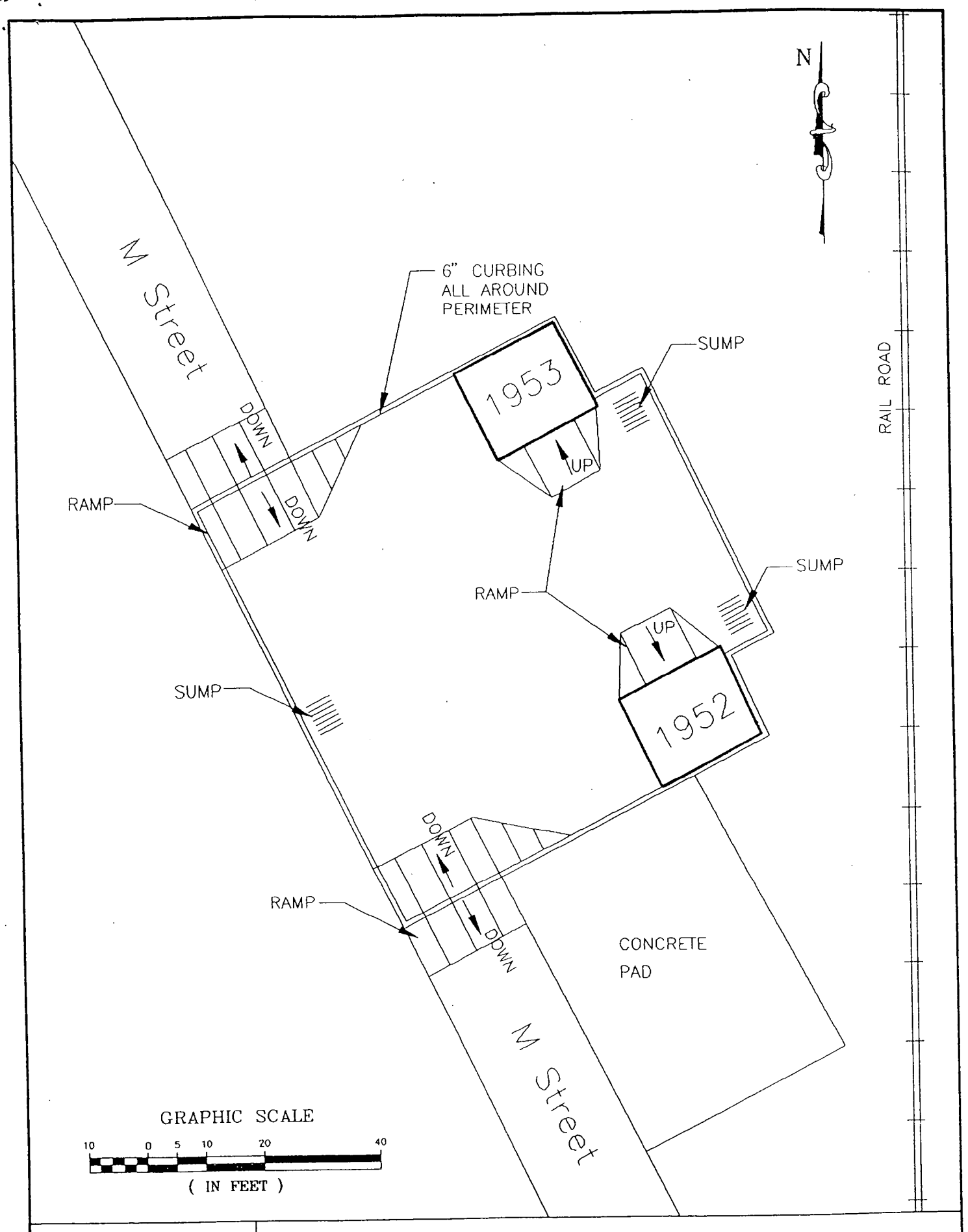
LEGEND

- PROPOSED MONITORING WELL NEST
- SUMP
- ELEVATION CONTOUR
- DRAINAGE
- BUILDINGS
- ROAD
- RAIL LINES
- FENCE LINES
- LEVEE

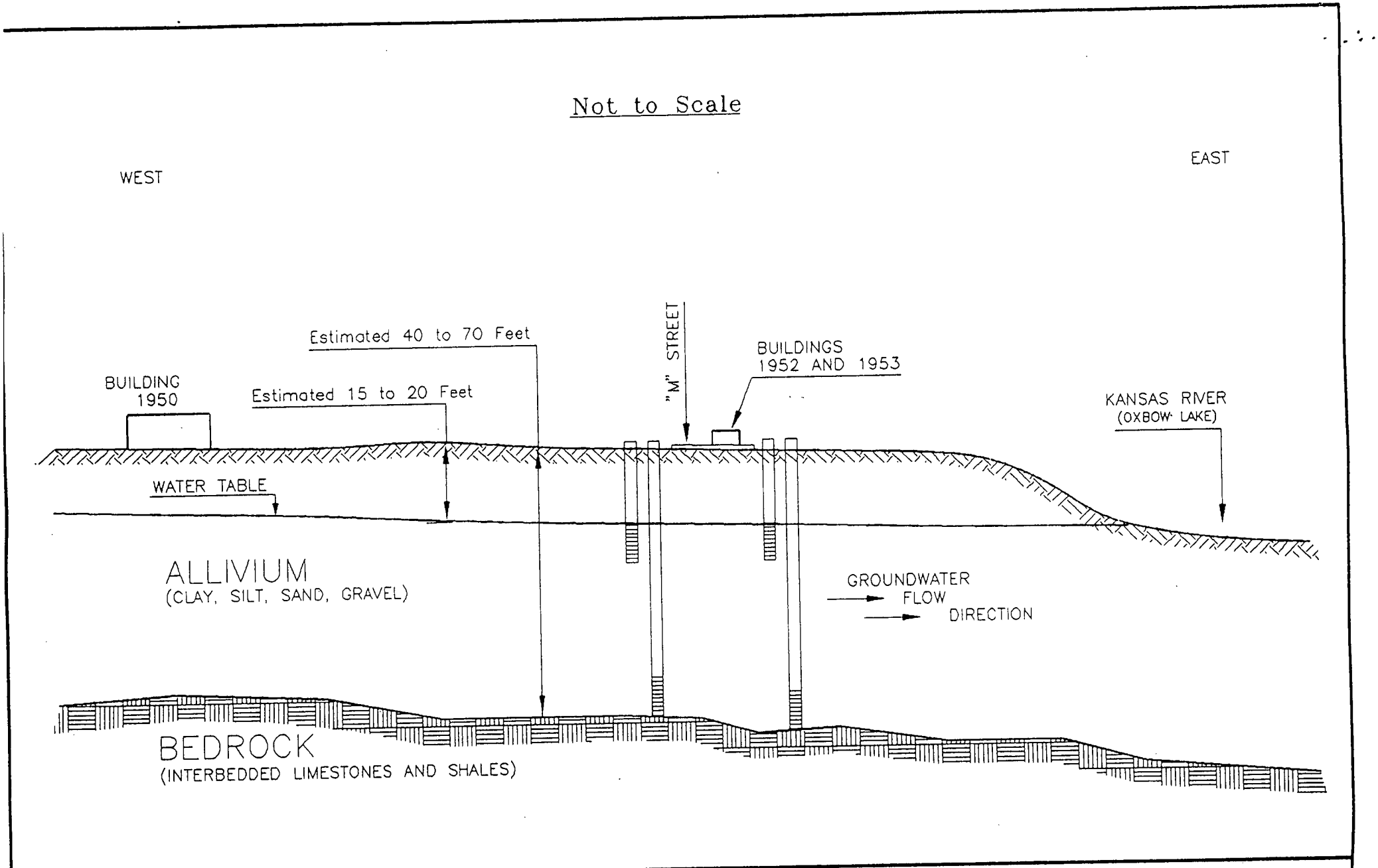
NOTE: BUILDINGS 1953 & 1952 ARE HAZARDOUS WASTE STORAGE FACILITY

Figure 1: Site Location and Proposed Monitoring Well Nest Locations

February, 1994



File: fig2.dwg	Figure 2: DRMO Hazardous Waste Storage Facility Buildings 1952 and 1953
February, 1994	



File: fig3.dwg

January, 1994

Figure 3: Schematic Geologic Cross Section–
DRMO Hazardous Waste Storage Facilty (Buildings 1952 and 1953)
Showing Proposed Groundwater Monitoring Well Nest Configuration

TECHNICAL MEMORANDUM #2

Draft Technical Memorandum #2/Other Sites SI

Natural Gamma Logging

15 March 1994

1.0 Overview

The installation of groundwater monitor wells around a site requires sufficient geologic information to correlate subsurface geologic strata between monitoring well locations in order to provide appropriate interpretation of groundwater analytical data. When installing wells in bedrock, the proposed drilling technique -- dual tube reverse air rotary -- produces cuttings from the geologic materials that are very fine (e.g., powdery), making it difficult to distinguish between geologic units. Therefore, to assist in correlation of bedrock formations, monitor wells will be logged using an instrument that measures natural gamma radiation. Natural gamma logging is one type of geophysical logging widely used in the petroleum industry to identify subsurface geologic formations, including depths and thicknesses. Natural gamma logging has been in use since the 1930's, and its effectiveness and usefulness is well-established.

2.0 Issue

The necessary geologic information can be obtained at each monitor well location by coring bedrock and retrieving a physical sample of the geologic strata. The costs of coring are relatively high when compared with the costs of natural gamma logging. Therefore, it is more cost-effective to use natural gamma logging to assist in the characterization of geologic strata with depth at each monitor well installed in bedrock. In order to interpret natural gamma logs, some bedrock coring will still be necessary. However, by using natural gamma logs, the number of monitor well locations requiring coring can be reduced.

3.0 Proposed Action

Wells being installed in bedrock as part of the Other Sites SI include the seven wells around the Whitside and Construction/Debris landfills and the two wells at the Milford Lake Campground and Recreation Area. This procedure is applicable to other wells installed in bedrock, if necessary.

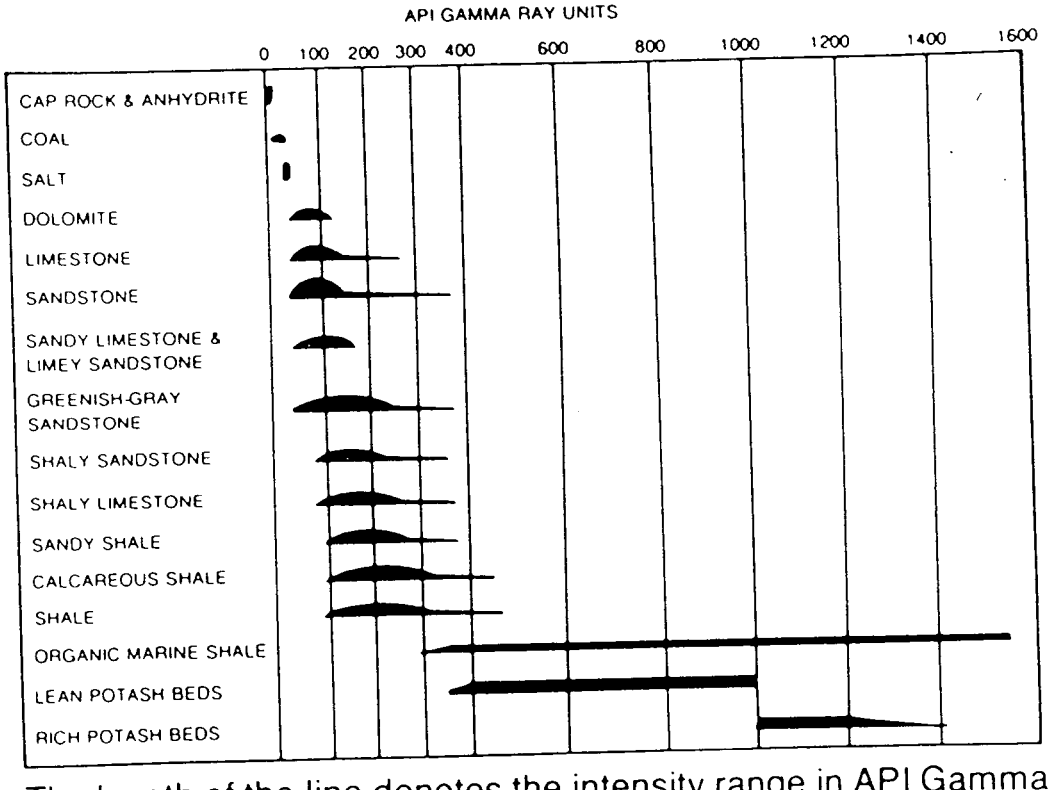
All nine of the wells installed in bedrock will be logged with a natural gamma detector. The bedrock formations in the Fort Riley area consist of interbedded shales and limestones. In general, clay minerals have higher levels of natural radiation than sands or carbonates (e.g., limestones), and natural gamma logging is effective in distinguishing between shales and adjacent limestone formations. (See Figure 1). As an example, Figure 2 depicts the results of natural gamma logging performed at well IZ-93-10 installed as part of the Impact Area investigation. To support interpretation of the logging data, one well at Milford Lake will be cored. Similarly, two to four wells around the Whitside and C/D landfills will be cored. [The exact number of wells to be cored has not yet been determined and will be based on geologic findings during monitor well installation.]

The wells will be logged following construction; casing materials such as steel and PVC do not impede the ability of the natural gamma logging to identify subsurface geologic strata. The wells will be logged with a Mount Sopris Model MGX logger used in conjunction with a HLP-2375/S natural gamma tool. An IBM compatible computer will be used to record the data. Information on this equipment is attached. The procedures to be used are as follows:

- The logging probe and related equipment entering the monitoring well will be decontaminated on-site prior to use.
- Setup and connect all equipment.
- Set tool detector to begin data collection at 3.5 feet below ground.
- Turn on PC and initiate natural gamma logging.
- Turn on all logging equipment.
- Initialize data acquisition program for going downhole.
- Start down monitoring well with logging tool at a rate of approximately 15 feet per minute.
- At bottom of hole, end data acquisition and print log.
- Reset data acquisition program to log up the boring.
- Start logging up the monitoring well at a rate of approximately 10 feet per minute.
- At a depth of 3.5 feet, end data acquisition.
- Print log and copy digital data from hard drive to diskette.
- If logging results appear abnormal, repeat the logging of the well; otherwise, move to the next location.

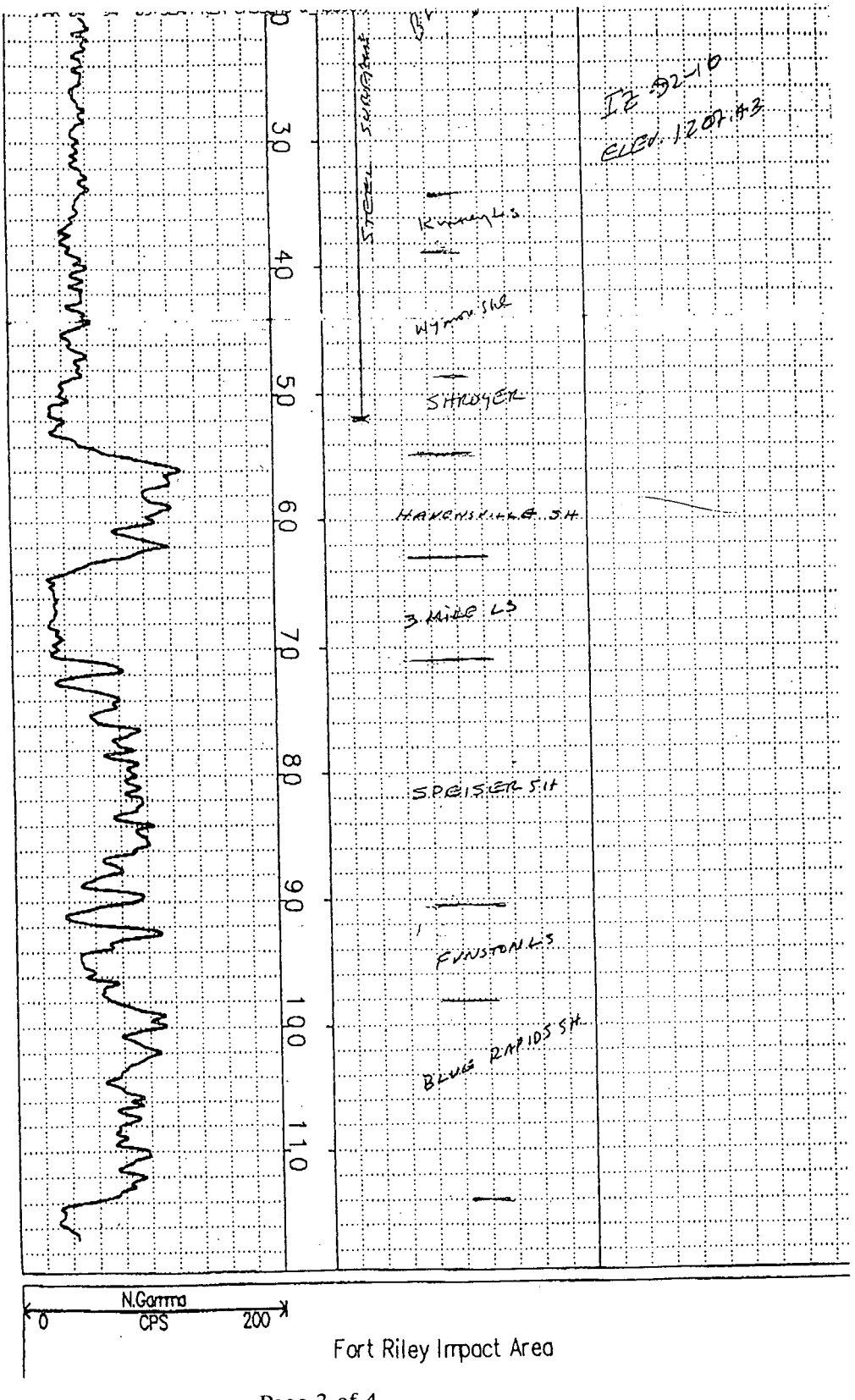
The interpretation of the natural gamma logs will be made based on data generated by coring and will be presented with the data reports for the Other Site SI.

Figure 1 - Natural Gamma Log Response for Sedimentary Rocks
(from: Gamma Ray Log, Dresser Atlas, Dresser Industries, Inc., 1981)



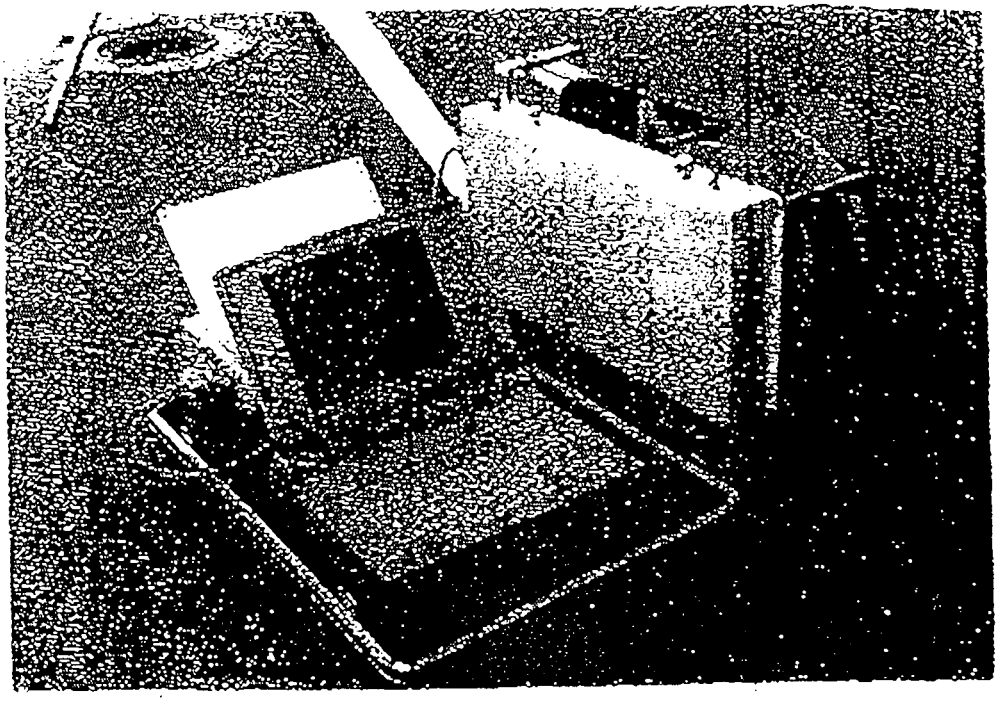
The length of the line denotes the intensity range in API Gamma Ray Units. The vertical width of the line increases with the frequency of occurrence.

Figure 2 - Results and Interpretation of Natural Gamma Log at IZ-93-10, Impact Area, Fort Riley, Kansas



MGX PORTABLE DIGITAL LOGGER

Now you can log with your own PC!



Console/Winch: Console mounted directly on winch side plate. Controls all probe functions.
Outputs data in serial format directly to PC
Small footprint (19" L X 11.4" H X 9.5" W)(485 mm X 290 mm X 242 mm)
Single conductor for ease of maintenance. Motor drive with speed control
110/220 VAC power (12 VDC invertor option)
Cable capacity-1000' (305 m) of 0.10", 660' (200 m) of .0125" diameter.
Total weight 69 lbs (31 kg) including heavy duty polypropylene transit case.

Software: *LOGSHELL* menu-driven acquisition and processing software with pull-down HELP. Provides full onscreen *waterfall* display while logging, direct hardcopy output to dot-matrix, ink jet or thermal printer. Includes PRNPLOT, SCRNPLOT, INTERP, and PRNHEAD functions for enhanced custom data presentation. Requires 386SX MSDOS compatible portable PC with hard drive and VGA graphics. **(PC\Printer may be supplied by customer or ordered through MSI).**

Accessories: System comes complete with standard Gamma/SP/Single Point Resistance probe, sturdy anodized aluminum tripod with removable pulley for rig operations, cable line wiper, consumables, and rugged probe/tripod transit case.

MOUNT SOPRIS
Instrument Company, Inc.

TECHNICAL MEMORANDUM #3

Draft Technical Memorandum #3/Other Sites SI

Phase II Soil Gas Survey

18 March 1994

1.0 Overview

The SAP for the SI of the Print and Publication Shop (Building 263) required a soil gas survey (Phase I) around the building and the sewer line to the south of the building. Additional investigations were contingent upon the Phase I soil gas results. The Phase I soil gas results identified trichloroethene (TCE) and tetrachloroethene (PCE) at locations to the south of the building and along the sewer line. The highest detected concentration for TCE or PCE was 6.7 micrograms per liter (parts per billion). Also, petroleum hydrocarbons were detected at one location at the rear (north end) of the building -- detected concentrations were 60 ug/L for Total FID. A summary of the positive detections for Phase I are provided below; the sample locations are provided on the attached site sketch.

Phase I Soil Gas Results
(All results in ug/L)

Sample ID (PPS-SG1-)	Depth (feet)	Methylene chloride	Trichloro-ethylene	Tetrachloroe thylene	Toluene	Xylenes	Total FID
2	4	-	-	1.2	-	-	-
3	4	1.1	5.2	5.1	-	-	-
6	4	-	-	-	-	1.1	-
8	4	1.0	-	-	-	-	-
10	4	-	-	-	-	2.6	60
14	4	-	-	-	-	2.0	-
16	4	-	6.7	4.9	-	-	-
17	12	-	4.0	4.8	-	-	-
18	4	-	-	-	1.0	-	-
20	4	-	-	-	3.5	-	-

2.0 Issue

The SAP states that a Phase II soil gas survey will be conducted at the site if soil gas samples exceed action levels in the SAP. At the Print and Publication Shop, total chlorinated solvents reached concentrations of 11.6 ug/L, which exceeds the action level of 10 ug/L. Also, the maximum Total FID concentrations were 60 ug/l, which exceeds the action level of 20 ug/L. The SAP does not provide Phase II soil gas sampling locations since the locations are contingent upon Phase I results. Therefore, this memo provides the Phase II soil gas sampling locations.

3.0 Proposed Action

The positive detections in the Phase I soil gas survey occur primarily along the sewer line running to the south of the Print and Publication Shop. Therefore, Phase II soil gas points are located as follows:

- one on each of the three sewer lines feeding into the line south of the Print and Publication Shop, with the samples located upflow of the junction;
- three locations at and around the junctions of the sewer lines south of the building;
- one location on the downflow end of the sewer line leaving the Print and Publication Shop; and
- four locations on the downgradient side (to the south) of the area with the positive detections.

In addition, petroleum hydrocarbons were detected at one location in the rear of the building. Two Phase II locations are located on either side of this Phase I location. As outlined in the SAP, the Phase II sample locations will include soil gas samples at both the 4 foot and 12 foot depths. The locations of the Phase II samples are shown on the attached site sketch. These sample locations were approved by the parties to the IAG based on a facsimile transmission of relevant information on 7 March 1994. The Phase II survey was conducted on 8 and 9 March, and the Phase II results were reported in the weekly report dated 11 March 1994.

-- End Technical Discussion --

(Two site sketches attached.)

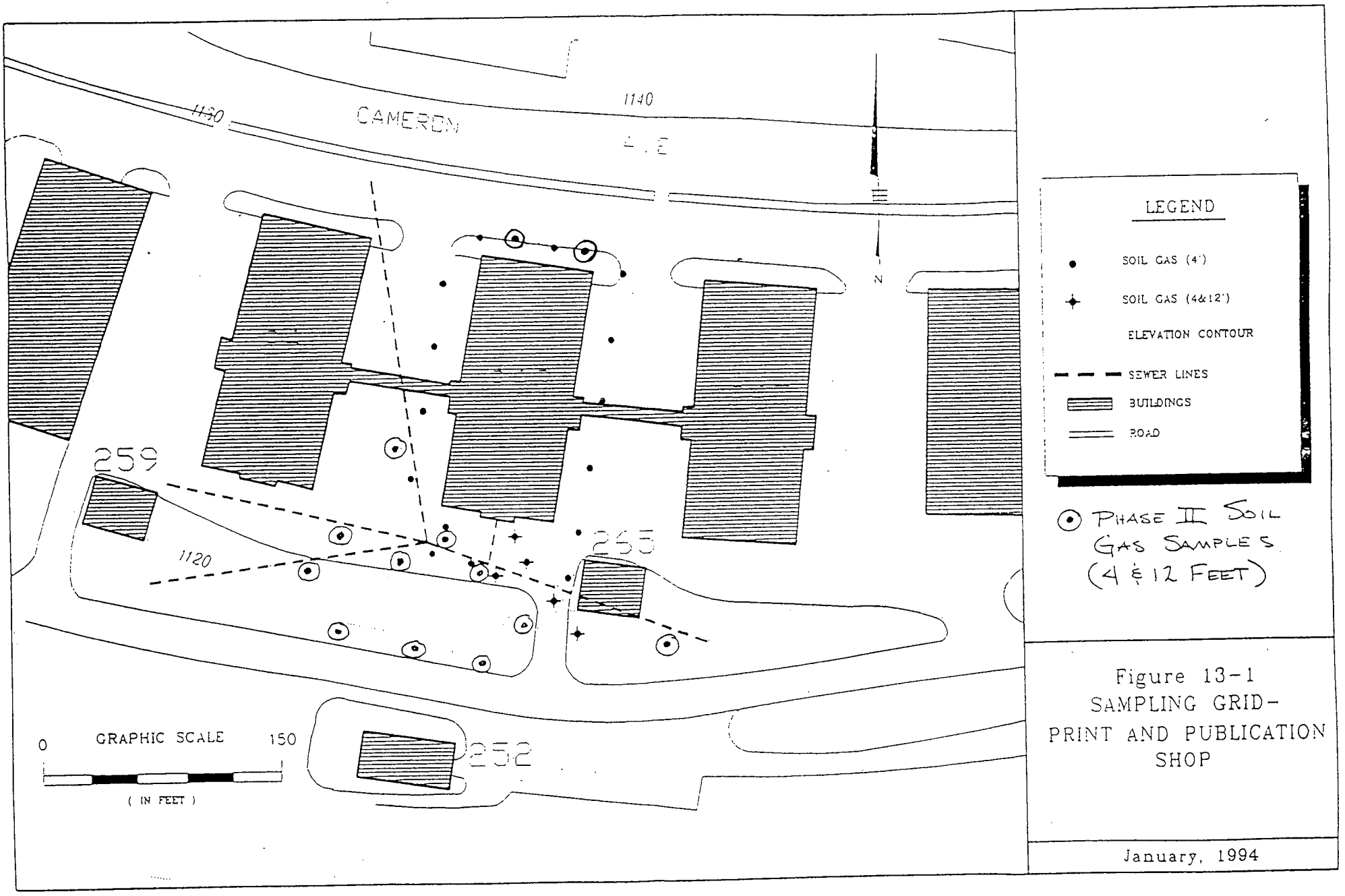
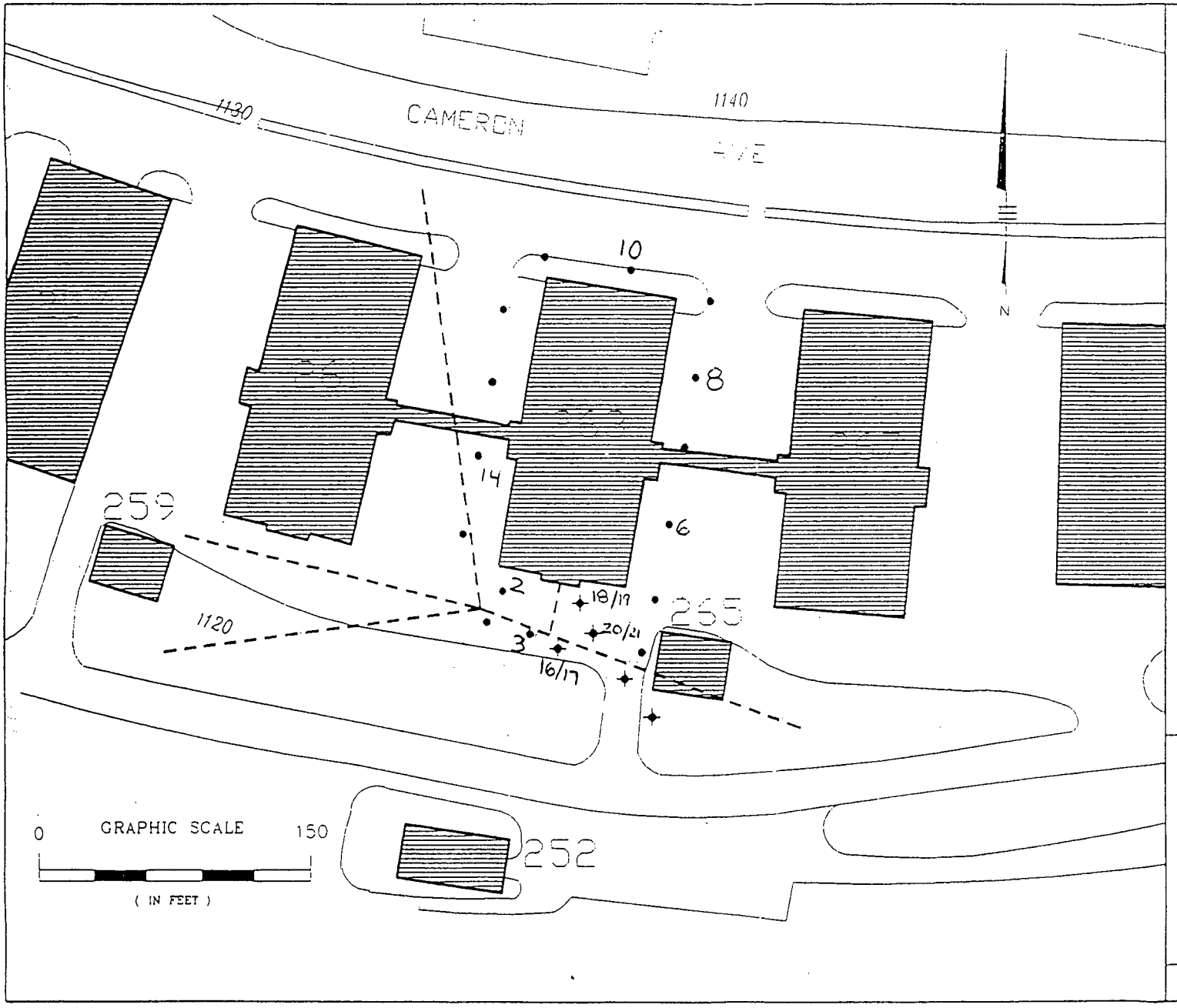


Figure 13-1
SAMPLING GRID-
PRINT AND PUBLICATION SHOP

January, 1994



LEGEND

- SOIL GAS (4')
- SOIL GAS (4&12')
- ELEVATION CONTOUR
- SEWER LINES
- BUILDINGS
- ROAD

Figure 13-1
SAMPLING GRID-
PRINT AND PUBLICATION
SHOP

January, 1994

TECHNICAL MEMORANDUM #4

Draft Technical Memorandum #4/Other Sites SI

Soil Borings and Soil Sampling - Print and Publication Shop

18 March 1994

1.0 Overview

The SAP for SI of the Print and Publication Shop (Building 263) required a soil gas survey (Phase I) around the building and the sewer line to the south of the building. Additional investigations were contingent upon the Phase I soil gas results. As reported in the Weekly Field Report of 11 March 1994, the Phase I soil gas results identified trichloroethene (TCE) and tetrachloroethene (PCE) at locations to the south of the building and along the sewer line. The highest detected concentration for TCE or PCE was 6.7 micrograms per liter (parts per billion). Also, petroleum hydrocarbons were detected at one location at the rear (north end) of the building -- detected concentrations were 60 ug/L for Total FID.

Based on the Phase I findings and in accordance with the SAP, a Phase II soil gas survey was conducted (Refer to Technical Memorandum #3). The results of the Phase II survey were also reported in the 11 March weekly report. A summary of the positive detections from the Phase I and Phase II soil gas results is attached. During the Phase II survey, it was determined that depth to bedrock beneath the site was 20 feet at the southern end of the building. A PVC pipe was placed in the ground from the surface to the top of bedrock and was left overnight. No groundwater was present in the materials overlying bedrock.

The principle contaminants of concern at the site are volatile organic compounds associated with the cleaners (e.g., PCE) that were used at the site. Some cleaners were discharged to the sanitary sewer lines which are located to the south of the building. The depth of the sewer line running past the building has been estimated by Ground Penetrating Radar to be 7 to 10 feet. (Measurements from manholes along the sewer line both up and down flow of the building confirmed the GPR measurements.) The sewer line running past Building 263 flows to the south and receives wastes from approximately six other buildings located to the immediate west of Building 263. [The sewer line is not connected to the sewer line leaving the Drycleaning Facility.]

2.0 Issue

The SAP states that a Phase III groundwater screening investigation will be conducted at the site if soil gas samples exceed action levels in the SAP. At the Print and Publication Shop, total chlorinated solvents reached concentrations of 21.1 ug/L, which exceeds the action level of 10 ug/L. Also, the maximum Total FID concentrations were 60 ug/L, which exceeds the action level of 20 ug/L. Then, depending on the results of the groundwater screening samples, Phase IV of the investigation may be conducted which is the installation and sampling of groundwater monitor wells. Based on data collected during the Phase II survey, collection of groundwater screening samples will not be possible at the site because groundwater does not occur in the materials overlying bedrock. Further, the site topography drops substantially to the south, towards the road. This drop continues from the road to the railroad tracks to

the south. The overall change in elevation from the site to the railroad tracks is approximately 18 meters or 59 feet. Along this slope, there is no evidence of seaps, springs or groundwater discharge. Thus, the bedrock formations underlying the Print and Publication Shop are not expected to be water bearing.

3.0 Proposed Action

The data collected in Phases I and II indicate that volatile organic compounds are present in the subsurface environment at low concentrations. Also, at locations with both four foot and twelve foot soil gas samples, concentration were consistently higher at the shallower sample. Thus, because groundwater screening samples cannot be collected and groundwater is deeper than 20 feet, the installation of soil borings and collection soil samples for laboratory analysis will be conducted. At six locations, samples will be collected and used to determine whether the investigations at the site will proceed to Phase IV.

Six soil borings will be installed with soil samples collected from each boring. The locations of the soil borings and the samples will be as follows (see attached site sketch):

- One soil boring at location SG1-10 at the north end of Building 263. Samples will be collected at depths of 4 to 5, 9 to 10 and 15 to 16 feet. These samples will be analyzed for Total Petroleum Hydrocarbons using EPA Method 8015 modified and volatile organic compounds using EPA Method 8240.

- Two soil borings adjacent to and north of the sewer line: location SG2-9/10 west of the feed from the Print and Publication Shop; and a new location east of the feed from the Print and Publication Shop. Samples from each boring will be collected at depths of 4 to 5, 9 to 10 and 14 to 15 feet and from the materials directly overlying bedrock. Each of the samples will be analyzed for volatile organic compounds using EPA Method 8240.

- Three soil borings adjacent to and south of the sewer line: location SG1-2 at the junction of the sewer line lines off the southwest corner of the building; location SG-19/20 at the junction of the feed from the Print and Publication Shop to the sewer line; and a new location south of SG1-20. Samples from each boring will be collected at depths of 4 to 5, 9 to 10 and 14 to 15 feet and from the materials directly overlying bedrock. Each of the samples will be analyzed for volatile organic compounds using EPA Method 8240.

The soil borings located above were selected because they are located in areas of detected contamination. Sampling depths were selected as follows:

- 4 to 5 feet: depth of shallow soil gas detections and above depth of sewer line; assesses releases at the surface;

- 9 to 10 feet: depth at or just below the sewer line; assesses releases from sewer line;

- 14 to 15 feet: assesses downward migration of contaminants from surface and/or sewer line; and

- Top of Bedrock: assesses whether downward migration has occurred to the top of the alluvial/bedrock interface.

The sampling will include collection of one duplicate, one matrix spike, one matrix spike duplicate, one field blank, one trip blank, and one duplicate for the Missouri River Division, Corps of Engineers. In addition, at each sampling depth, a container will be filled for metals analyses and held as an archive at the laboratory. In the event that volatile organic compounds are detected (which are the principal contaminant at the site), select samples may be analyzed for metals following discussions with the parties to the IAG.

-- End Technical Discussion --

(Three pages attached.)

Print and Publication Shop. The Phase I soil gas survey has been completed. The positive detections are summarized below, the sample locations are shown on the attached site sketch.

All results in ug/L

Sample ID (PPS-SG1-)	Depth (feet)	Methylene chloride	Trichloro-ethylene	Tetrachloroet hylene	Toluene	Xylenes	Total FID
2	4	-	-	1.2	-	-	-
3	4	1.1	5.2	5.1	-	-	-
6	4	-	-	-	-	1.1	-
8	4	1.0	-	-	-	-	-
10	4	-	-	-	-	2.6	60
14	4	-	-	-	-	2.0	-
16	4	-	6.7	4.9	-	-	-
17	12	-	4.0	4.8	-	-	-
18	4	-	-	-	1.0	-	-
20	4	-	-	-	3.5	-	-
PPS-SG2-				Phase II Sample Results			
7	4	-	-	-	6.1	-	-
8	12	-	-	2.1	-	-	-
9	4	-	-	2.1	-	1.5	43
19	4	-	11.5	9.6	-	-	-
20	12	-	5.3	6.3	-	-	-

Results for three of the Phase II locations are not yet available, but all the locations along the road were non-detect for VOCs, indicating that contamination does not extend to the south, the downgradient direction. During the Phase II sampling, a probe was inserted to the top of bedrock, approximately 20 feet. A 1-inch PVC pipe with screen was inserted into the hole and left overnight. No groundwater was present in the pipe after 24 hours. Therefore, collection of groundwater screening samples at this location is not possible.

PHASE III SOIL SAMPLING

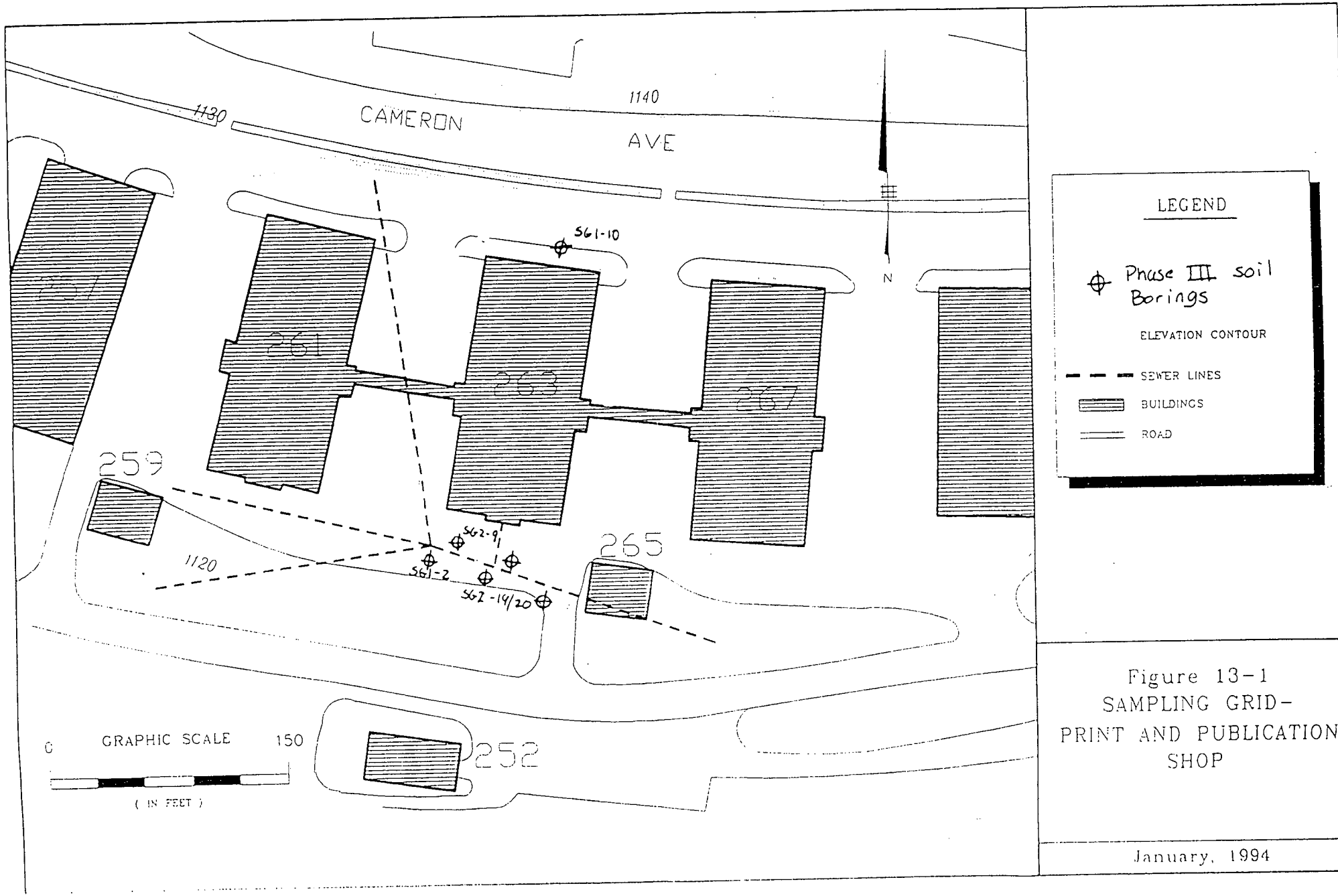


Figure 13-1
SAMPLING GRID-
PRINT AND PUBLICATION SHOP

January, 1994

PHASE I AND PHASE II SOIL GAS LOCATIONS

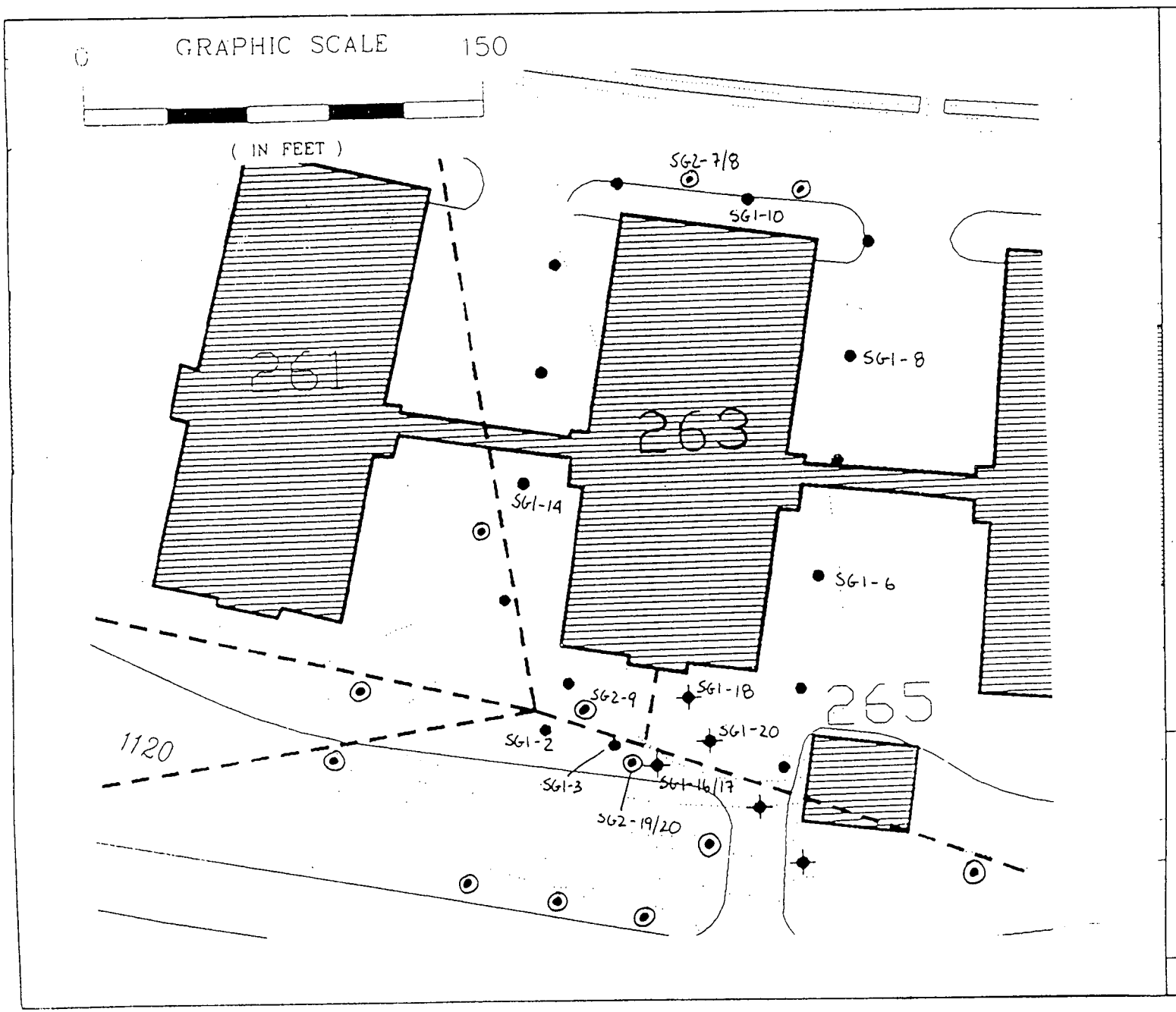


Figure 13-1
SAMPLING GRID-
PRINT AND PUBLICATION
SHOP

January, 1994

TECHNICAL MEMORANDUM #5

Draft Technical Memorandum #5/Other Sites SI

Phase I Groundwater Screening Samples

18 March 1994

1.0 Overview

Informal dispute resolution was conducted on the Other Sites SI SAP between the parties to the IAG. Discussions were conducted via teleconference on 25 February 1994. One topic addressed was the collection of groundwater screening samples at certain sites during Phase I. The resolution discussed included the collection of groundwater screening samples at three sites even if the Phase I soil gas results are below action levels specified in the SAP. These sites include Building 319, the Print and Publications Shop (Building 263) and the DRMO Areas (1 through 3). At each site, three groundwater screening samples would be collected and analyzed in the field with one sample collected in duplicate for off-site laboratory analyses. In addition, EPA and KDHE indicated that additional groundwater screening samples were favorable over soil gas samples around the Main Post landfill.

The results of the informal dispute resolution as they relate to groundwater screening samples were presented to the parties to the IAG via facsimile on 7 March 1994. Both EPA and KDHE subsequently approved the proposed changes. This memorandum outlines the changes made to the SAP.

2.0 Issue

Increasing the number of groundwater screening samples collected as part of Phase I was performed without increasing the overall costs of the SI. The additional costs and effort for the Phase I groundwater screening were covered by cost savings that results from by reducing the scope of the SI at other sites. In particular, the parties to the IAG agreed that groundwater screening samples would only be analyzed for volatiles (currently the groundwater screening samples for Main Post landfill, Southeast Funston landfill and the Camp Forsyth landfill areas are to be analyzed for metals as well as volatiles). Also, EPA and KDHE stated that number of soil gas samples around the Main Post landfill could be reduced, and that, in general, more groundwater screening samples at the Main Post landfill would be preferrable. Each of these sites is discussed below. Regarding costs, the Phase I groundwater screening samples at Building 319, Print and Publication Shop and DRMO Areas 1 through 3 are the same cost as the savings generated by not analyzing groundwater screening samples for metals at the landfill sites. Next, for the Main Post landfill, the costs for the additional groundwater screening samples is the same as the soil gas samples deleted. Therefore, there is no net change in costs.

3.0 Proposed Action

The Phase I groundwater screening samples for each of the sites discussed during informal dispute resolution are presented below.

Building 319. As of 7 March, all the Phase I soil gas samples had non-detected concentrations of the target analytes. The attached site sketch shows the proposed groundwater screening samples. One is by the door to the building (potentially used for transfer of materials) and two are along the sewer -- one at the point of discharge from the building and one in the downflow direction.

Print and Publication Shop. As reported in the weekly report dated 11 March and in Technical Memorandum #4, depth to bedrock beneath the site is 20 feet. No groundwater was present in the unconsolidated materials overlying bedrock. Therefore, groundwater screening samples cannot be collected.

DRMO. Phase I groundwater screening samples are proposed in each of the three areas. As shown on the attached site sketches, at each area, two groundwater screening samples are placed along the downgradient boundaries of the investigation while one is placed in the interior area.

Main Post landfill. Along three sides of the landfill (north, east and south), a double row of soil gas sampling points was planned. Ten of the soil gas samples were deleted while maintaining a ring of samples around the entire area. In place of these ten soil gas sample locations, five additional groundwater screening samples were placed along the southern and eastern boundaries. These samples were analyzed on-site. [Note: the other five groundwater screening samples collected as part of Phase I were transmitted to the off-site laboratory for chemical analyses, providing adequate verification of field data.]

-- End Technical Discussion --

(Six site sketches attached.)

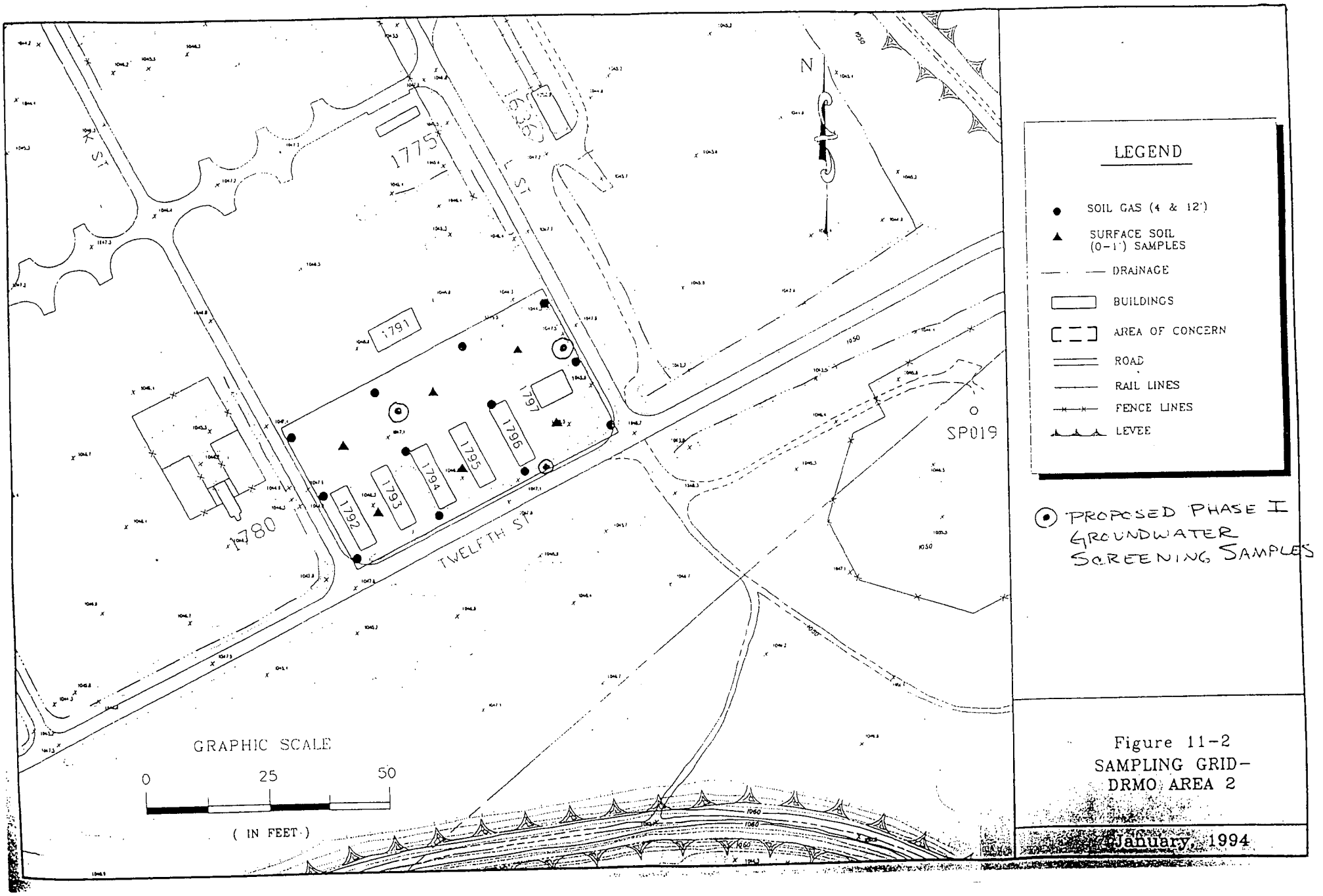


Figure 11-2
SAMPLING GRID-
DRMO AREA 2

January, 1994

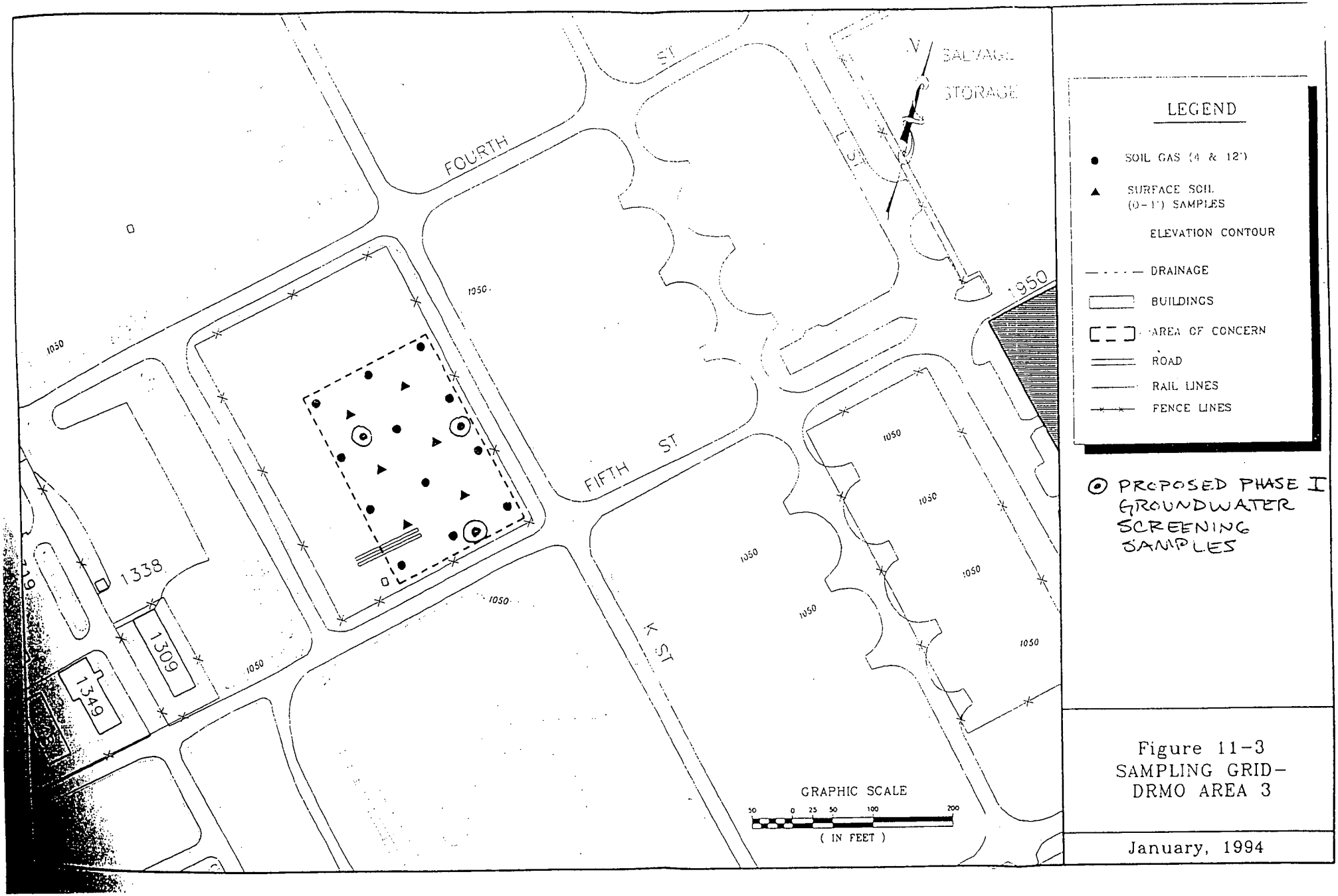


Figure 11-3
SAMPLING GRID-
DRMO AREA 3

January, 1994

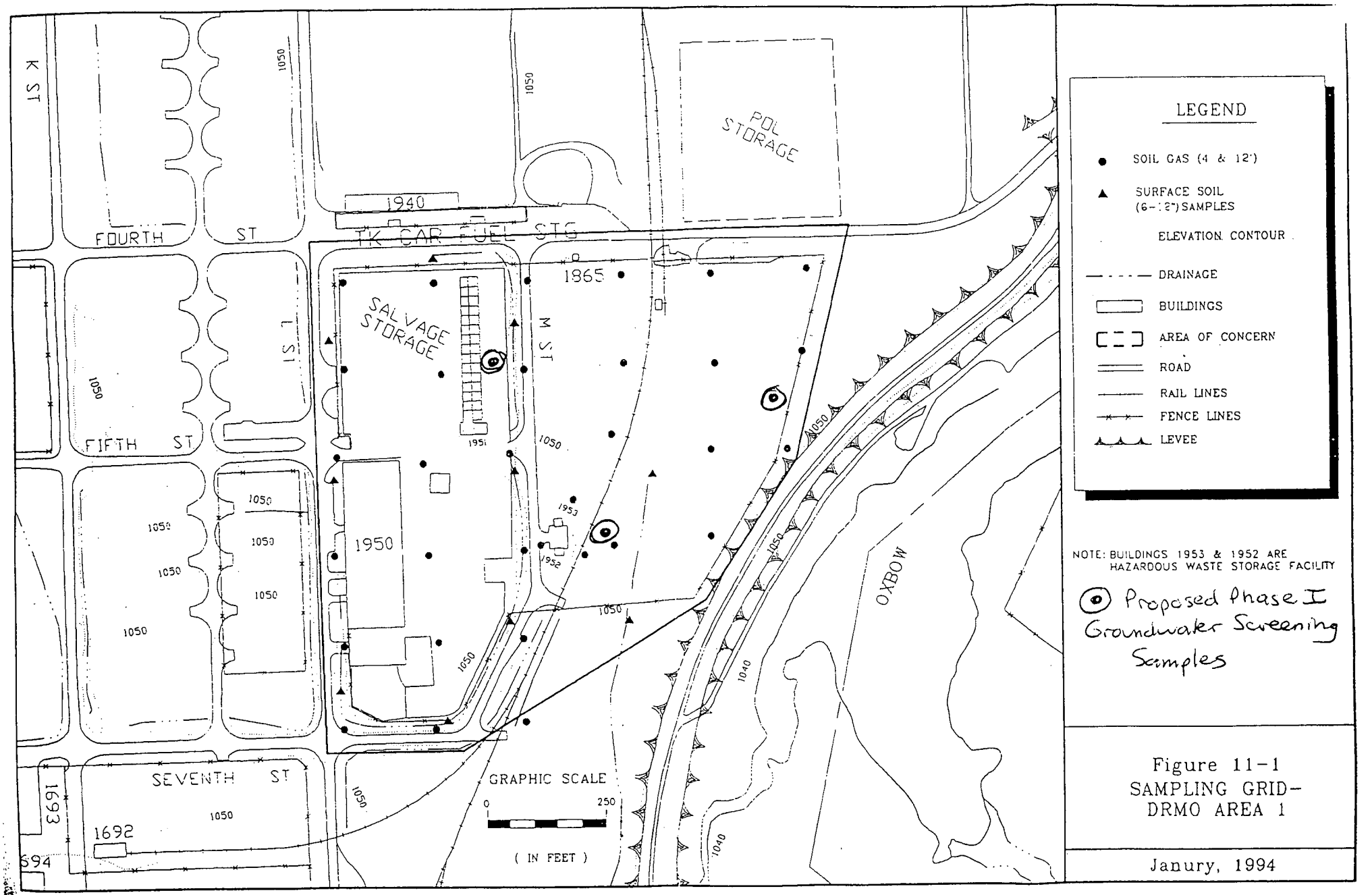


Figure 11-1
SAMPLING GRID-
DRMO AREA 1

Janury, 1994

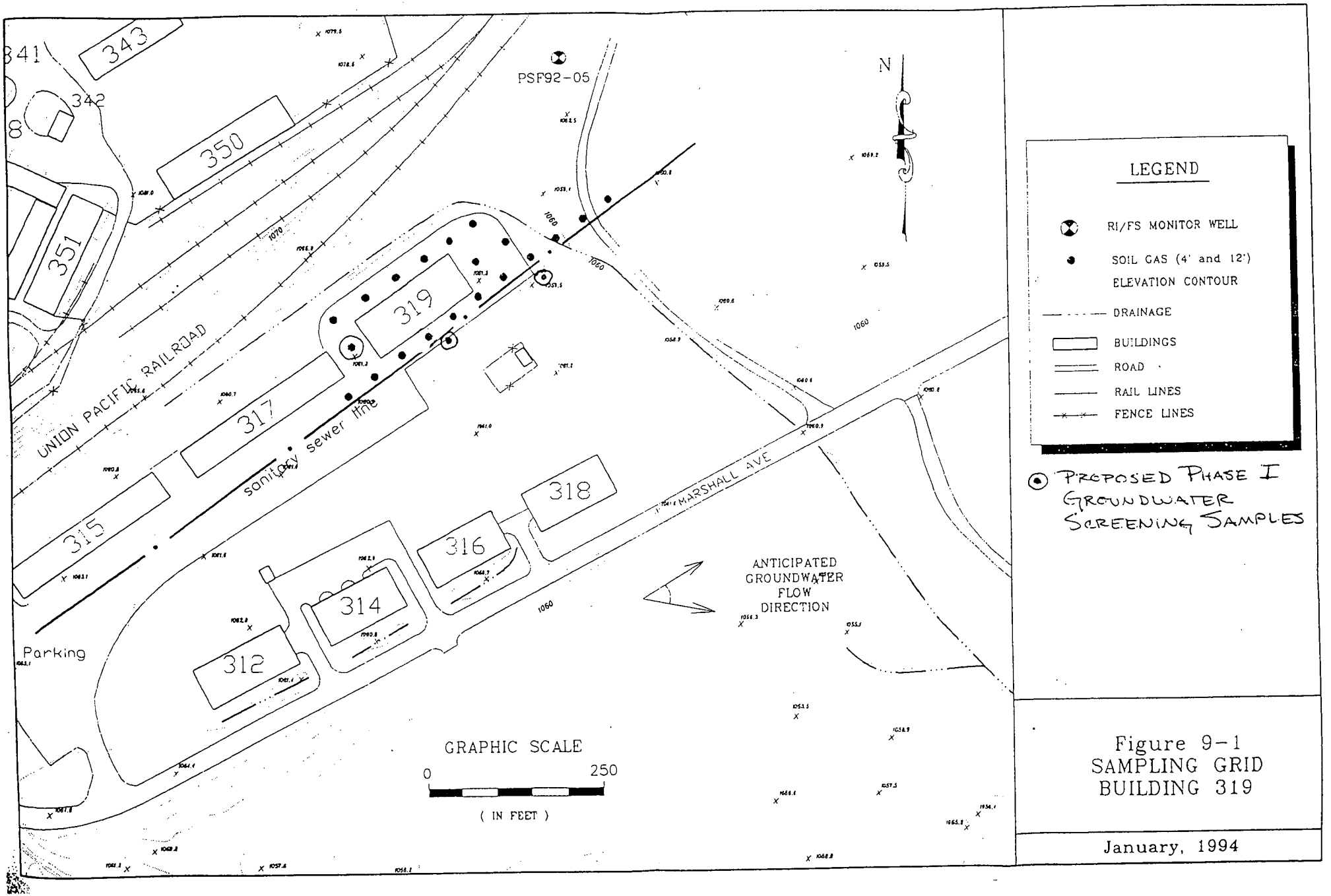
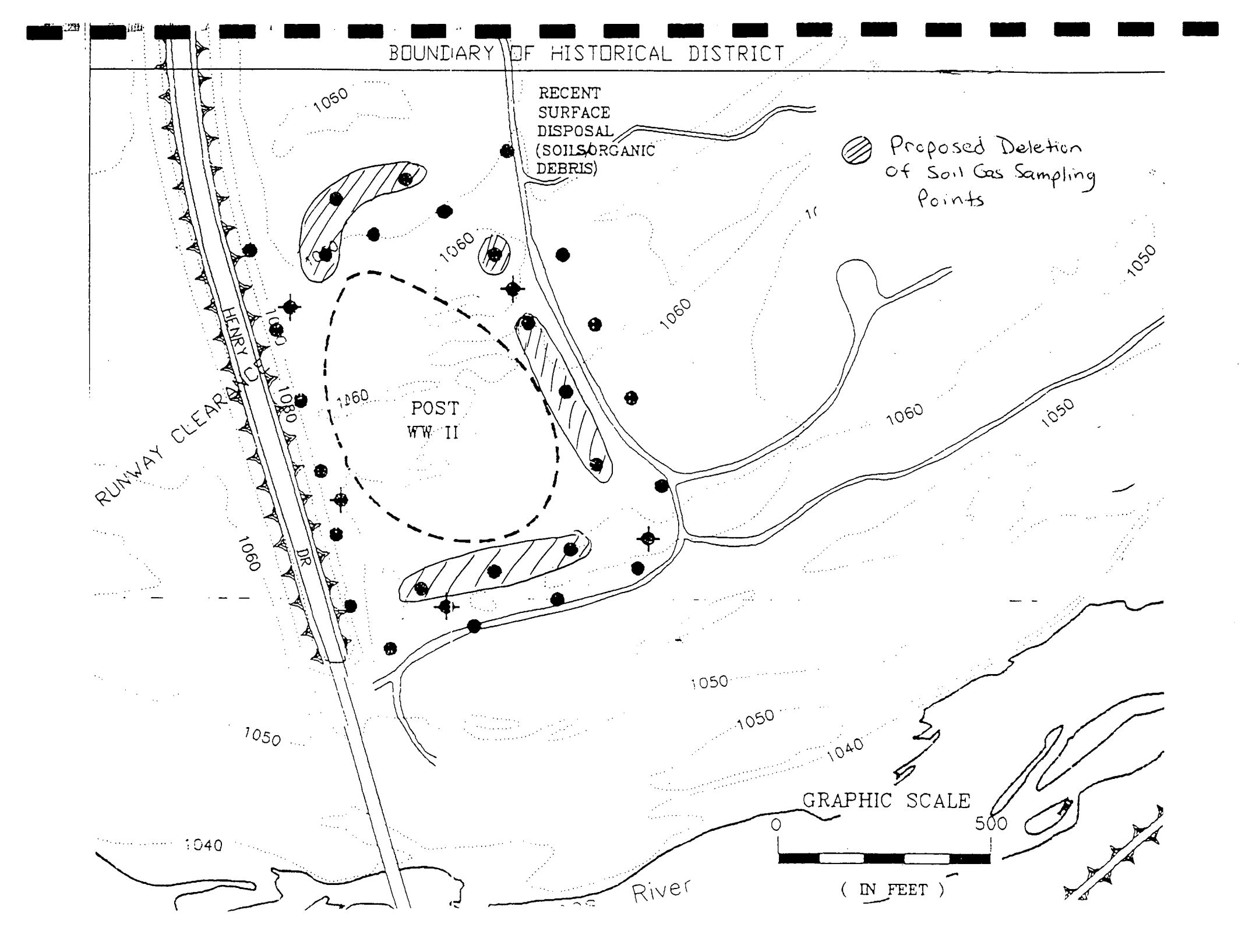


Figure 9-1
SAMPLING GRID
BUILDING 319

January, 1994


BOUNDARY OF HISTORICAL DISTRICT
RECENT SURFACE DISPOSAL (SOILS, ORGANIC DEBRIS)
Proposed Deletion of Soil Gas Sampling Points
POST WW II
HENRY C
RUNWAY CLEARA
DR
1050
1060
1040
GRAPHIC SCALE
0
500
(IN FEET)
River

TECHNICAL MEMORANDUM #6

Draft Technical Memorandum #6/Other Sites SI

Groundwater Monitor Wells at Milford Lake Campground

25 March 1994

1.0 Overview

The Installation Wide Site Assessment and the Other Sites SAP identified that one prior well at the former Milford Lake Campground had been sampled and tested positive for lindane. The well with the positive detection for lindane was identified as former well 9441. Three wells were located at this site; all have been closed in accordance with State of Kansas requirements.,

2.0 Issue

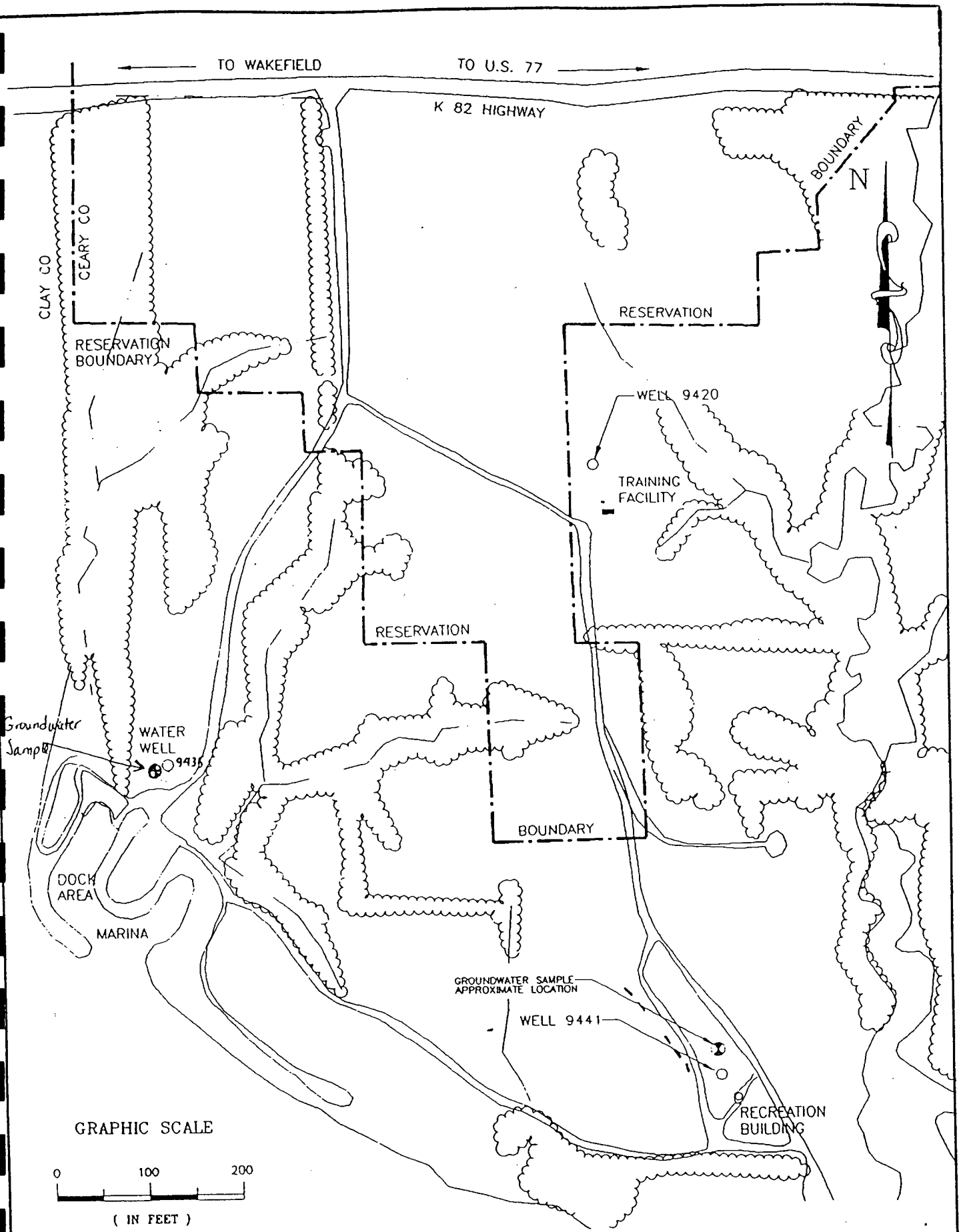
As noted in the IWSA and the Other Sites SAP, there is a hand-written note in the Fort Riley DEH files indicating that the samples from wells 9441 and 9435 may have been switched. Therefore, it is not clear whether the detection of lindane was in former well 9441 or 9435.

3.0 Proposed Action

The SAP included the installation of one well at the Milford Lake Campground near former well 9441. In addition to this well, a second well has been installed (22 March) near former well 9435. Construction, sampling and analyses of this second well will be the same as that used for the first well. This proposed action represents the opinion of the parties to the IAG following discussions on this matter.

-- End Technical Discussion --

(One site sketch attached.)



January, 1994

Figure 15-1 SAMPLE LOCATION-
MILFORD AREA CAMPGROUND WELL

TECHNICAL MEMORANDUM #7

Draft Technical Memorandum #7/Other Sites SI

Installation of Open Rock Wells at the Whitside and C/D Landfills

25 March 1994

1.0 Overview

Seven groundwater monitor wells are identified in the SAP to be installed around the Whitside and C/D landfills. The wells were to be installed using the standard groundwater monitor well construction procedures outlined in the Comprehensive Basic Documents for Fort Riley environmental investigations. Specifically, the wells were to be completed with 2-inch PVC well screen and casing in zones providing sustainable quantities of water (defined in the SAP as approximately 1.0 gallon per minute or greater).

2.0 Issue

Wells at all seven locations around the Whitside and C/D landfills have been installed into bedrock. The bedrock formations consist of interbedded shales and limestones. During installation of the monitor wells at the landfills, it was determined that the water-bearing limestones yield low volumes of groundwater. For example, where static water was encountered (sometimes at depths exceeding 100 feet for wells at higher elevations), groundwater was bailed or pumped from the boring to evaluate yield. Some borings were evaluated over a period of several days. At most locations, well yields were estimated at 0.1 to 0.2 gallons per minute. Although this volume was well below the criteria in the SAP of 1.0 gallon per minute, the volume is sufficient to collect groundwater samples for laboratory analyses. Therefore, borings were completed at the shallowest depths where groundwater would recover in the borehole to generate sampling volumes of three to five gallons on a daily basis. However, due to the low groundwater flow in these wells, they would be difficult to develop if constructed using a sand filter pack around a PVC well screen. Poor well development would potentially result in degraded quality of the groundwater samples.

3.0 Proposed Action

The wells around the Whitside and C/D landfills have been constructed as open rock wells. Open rock wells had already been used at the Milford Lake Recreation area. The parties to the IAG were consulted via telephone prior to modification of the well construction procedures and concurred with this proposed action.

The bedrock formations at the Whitside and C/D landfills are sufficiently competent to maintain an open borehole in the area of the water bearing zone without a well screen. The wells are constructed as follows:

- the borehole nominal diameter is 6 inches;
- 4-inch schedule 80, flush-jointed PVC casing is installed into the borehole to a depth of approximately 7 feet above static water;
- one to three flex packers are placed at the bottom of the 4-inch casing prior to installation;
- bentonite pellets or slurry is placed in the annular space on top of the flex packers;
- cement grout is placed in the annular space from the top of the flex packers (and bentonite) to the surface.

The wells are then completed with a locking cap, cement pad and protective posts. Because the wells do not have a filter pack and well screen, well development will not be hindered. Well development will consist of pumping water from the open rock well from different elevations in the well until clear water (less than 30 NTU) is consistently produced.

This proposed action is consistent with the objectives of the SI which include monitoring the first encountered groundwater which will produce sufficient volume to sample. This uppermost groundwater will provide the earliest indicator of releases of contaminants from the landfills to the environment.

-- End Technical Discussion --

TECHNICAL MEMORANDUM #8

Draft Technical Memorandum #8/Other Sites SI

Closure and Abandonment of Open-Rock Groundwater Wells at Milford Lake Campground

18 April 1994

1.0 Overview

As outlined in Section 15.0 of the SAP for "Other Sites" and Technical Memoranda 6 and 7, two borings were installed into the first water-bearing zones at the former locations of wells 9441 and 9435. These borings were terminated in shallow bedrock, and the borings were completed as open rock wells. The purpose of these open rock wells is to collect groundwater samples to evaluate whether lindane is present in groundwater, as reported in a groundwater sample collected in September 1988 from one of the former wells at the campground. The groundwater samples were collected from the open-rock wells during the week of 4 to 8 April and transmitted to the laboratory for pesticide analyses.

2.0 Issue

Based on results of the Installation Wide Site Assessment, Fort Riley recommended that the Milford Lake Campground required no further action. During informal dispute resolution, the parties to the IAG agreed to redrill some temporary wells at the site to recollect groundwater data to compare against the September 1988 findings. [Note: although the wells are considered temporary, they meet State of Kansas requirements for monitor well installation.] There are no plans for ongoing monitoring at the site if the SI test results are negative for lindane.

3.0 Proposed Action

The analytical results for the groundwater samples collected from the open-rock wells at Milford Lake Campground will be reviewed when they become available. If lindane is not present in either groundwater sample, then the wells will be closed and abandoned in accordance with State of Kansas requirements, which include permanently grouting the open-rock wells from the top of groundwater to the surface.

Although not identified in the SAP, coring of bedrock was planned for one of the open-rock well locations at the campground. Also, natural gamma logging was planned for both open-rock wells. The coring and logging was planned to collect data on the bedrock stratigraphy at the site to assist in the interpretation of any positive findings. This coring and logging is currently scheduled for 20 through 22 April. If the analytical data for the groundwater samples collected from the open-rock wells is available and shows non-detectable concentrations of lindane, then the coring and natural gamma logging will not be performed for any of the borings at the site.

-- End Technical Discussion --

TECHNICAL MEMORANDUM #9

Draft Technical Memorandum #9/Other Sites SI

Groundwater Monitor Wells at Southeast Funston Landfill

2 May 1994

1.0 Overview

The Other Sites SI SAP for the Southeast Funston Landfill required Phase I XRF surface soil samples (75), soil gas samples (22), and groundwater screening samples (11). The field analysis for soil gas and groundwater screening samples had no detections. Preliminary laboratory results for the groundwater screening samples indicate that locations 5 and 7 are above the MCLs for vinyl chloride; locations SEFLGS1-6 and SEFLGS1-7 are above the KNL for benzene; and location SEFLGS1-7 is above the KNL for DCE. A number of soil sample locations had high detections of metals and lead in and around the former incinerator.

A summary of the positive detections for Phase I based on samples sent to the laboratory is provided below; the sample locations are provided on the attached site sketch.

2.0 Issue

Groundwater screening samples were above the MCL's for vinyl chloride and above the KNL (but below the KAL and MCL) for DCE and benzene. The Other Sites SAP includes a Phase II for groundwater wells if groundwater screening samples exceed regulatory standards. Therefore, Phase II is warranted for Southeast Funston Landfill.

3.0 Proposed Action

Three groundwater monitoring wells are to be installed at Southeast Funston Landfill. The recommended locations of these wells are as follows: at locations SEFLGS1-7, SEFLGS1-10 and SEFLGS1-11. Confirmation of the locations will be based upon the delineated landfill boundaries, as determined by the EM survey. If the EM survey provides a clear demarcation of the landfill boundary, the wells will be placed outside the landfill boundary, if possible. Otherwise, the wells will be placed as close to the river as possible. Existing Well AEHA 6 will be used as a background. However, before any wells are installed, access for equipment needs to be determined due to brush. UXO clearance is also necessary. The locations are identified on the attached site sketch. The samples taken from the wells will be analyzed for Volatile Organic Compounds and Priority Pollutant Metals.

Lead was detected in soils in the immediate vicinity of the former incinerator at concentrations above EPA guidelines for cleanup (i.e., 1,000 mg/kg). There is no use of this area. Further, excavation of the soils may not be economically feasible due to the potential for UXO at the site. The

groundwater wells being installed and sampled will provide data to indicate whether elevated levels of metals are being released to groundwater. No other soil sampling is planned at this time.

-- End Technical Discussion --

(Two data tables attached.)
(One site sketch attached.)

DRAFT

SOUTHEAST FUNSTON LANDFILL
GROUNDWATER SCREEING SAMPLES
PRELIMINARY DATA (ORGANIC COMPOUNDS)

Analyte (μg/l)	Sample ID							Regulatory Comparison Values		
	SEFLG S1-5	SEFLG S1-23	SEFLG S1-6	SEFLG S1-7	SEFLG S1-8	SEFLG S1-10	SEFLG S1-11	KAL	KNL	MCL
1,2-Dichloroethylene (Total)	{1.7}	{ND}	{ND}	{9.7}	{ND}	{2.0}	{7.8}	70	7	5
1,4-Dichlorobenzene	{2.3}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	--	--	75
Chlorobenzene	{3.9}	{2.1}	{3.0}	{0.8}	{ND}	{ND}	{ND}	60	6	--
Vinyl Chloride	{5.7}	{ND}	{ND}	{3.6}	{ND}	{ND}	{ND}	2	0.2	2
Toluene	{ND}	{2.0}	{ND}	{0.9}	{1.2}	{1.8}	{3.5}	2000	200	1000
Benzene	{ND}	{ND}	{1.0}	{0.7}	{ND}	{ND}	{ND}	5	0.5	5
Ethylbenzene	{ND}	{ND}	{ND}	{ND}	{0.8}	{ND}	{ND}	680	68	700
M- &/or P-Xylene	{ND}	{ND}	{ND}	{ND}	{2.7}	{ND}	{ND}	440	44	10,000
O-Xylene	{ND}	{ND}	{ND}	{ND}	{1.4}	{ND}	{ND}	440	44	10,000

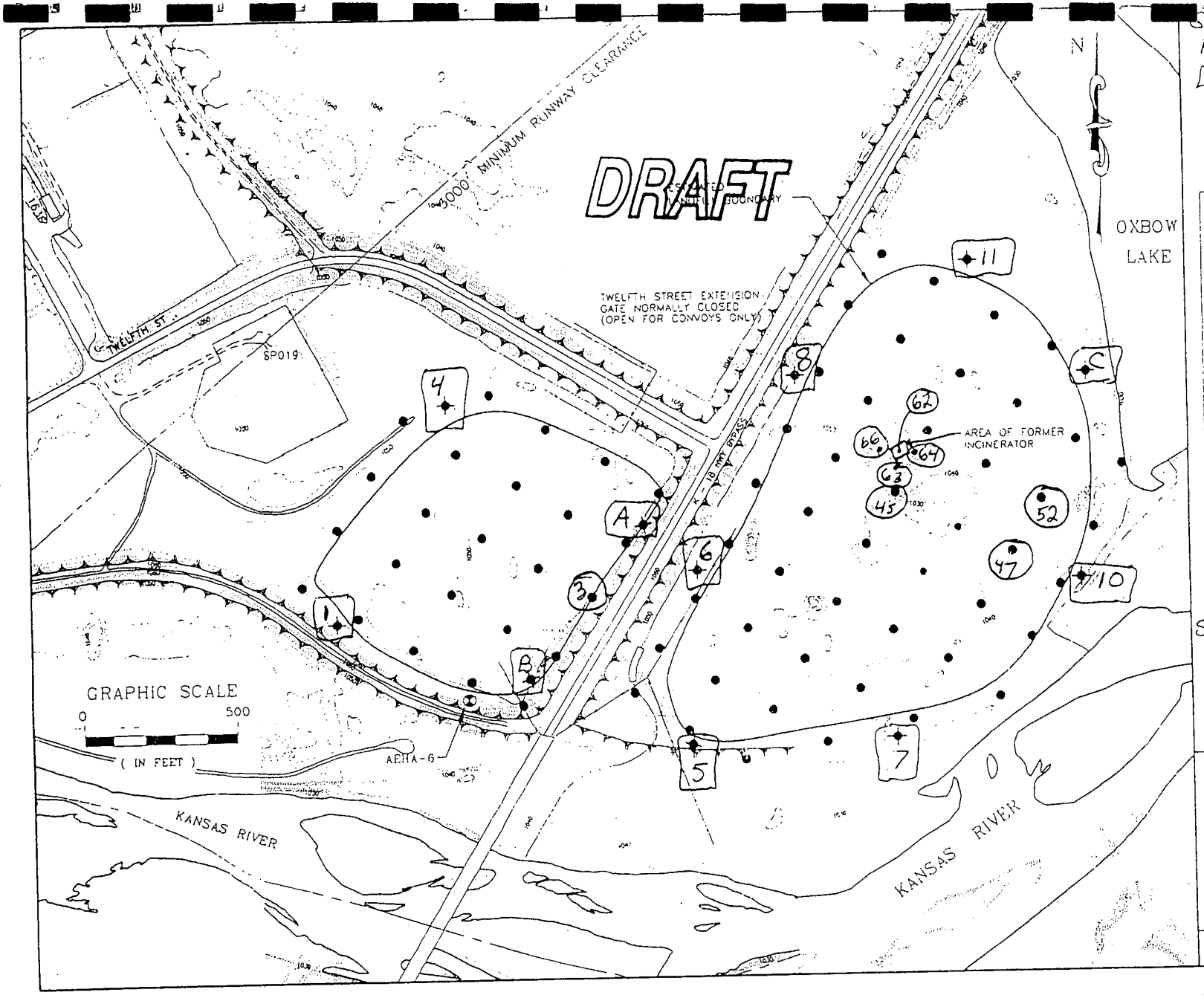
{}: Indicate that the data is preliminary and has not been verified by QA. --: Standard Not Available
ND: Not Detected
KAL: Kansas Action Level. From: Final 880607 Graoundwater Contaminant Cleanup Target Concentrations.
KNL: Kansas Notification Level. From: Final 880607 Graoundwater Contaminant Cleanup Target Concentrations.
MCL: Federal Maximum Contaminant Level. From: Drinking Water Regulations and Health Advisories, Office of Water, United States Environmental Protection Agency, December 1993.

Shaded areas represent those concentrations exceeding either the MCL or the KAL.

DRAFT

SOUTHEAST FUNSTON LANDFILL
SOIL SAMPLES
PRELIMINARY DATA (METALS)

Analyte (mg/kg, dry wt.) (total)	Sample ID								
	SEFLSB-3	SEFLSB-62	SEFLSB-63	SEFLSB-64	SEFLSB-66	SEFLSB-45	SEFLSB-47	SEFLSM-52	SEFLSB-79
Sb	{ND}	{15}	{60}	{ND}	{ND}	{164}	{ND}	{ND}	{47}
As	{5}	{14}	{24}	{30}	{31}	{41}	{2}	{2}	{22}
Be	{ND}	{ND}	{1.7}	{1.7}	{4.7}	{0.7}	{ND}	{ND}	{1.3}
Cd	{0.7}	{9.5}	{7.3}	{7.6}	{4.0}	{13.0}	{ND}	{ND}	{6.9}
Cr	{11}	{60}	{73}	{19}	{16}	{94}	{4}	{5}	{70}
Cu	{11}	{120}	{470}	{85}	{41}	{1800}	{3}	{4}	{300}
Pb	{114}	{3800}	{4900}	{71}	{58}	{14000}	{14}	{600}	{3000}
Hg	{ND}	{0.2}	{0.1}	{ND}	{ND}	{0.8}	{ND}	{ND}	{0.2}
Ni	{11}	{32}	{45}	{44}	{59}	{94}	{ND}	{5}	{41}
Ag	{ND}	{5}	{7}	{ND}	{ND}	{28}	{ND}	{ND}	{6}
Zn	{77}	{3100}	{4900}	{920}	{330}	{6400}	{18}	{34}	{6500}



GROUNDWATER SCREENING:
PREFIX = SEFLGS1 - #
[NO SAMPLES @ A, B, C]
ON MAP AS (11)

LEGEND

- GROUNDWATER MONITOR WELL
- XRF SURFACE SOIL SAMPLES
- SOIL GAS AND GROUNDWATER SCREENING SAMPLES (4&12')
- ELEVATION CONTOUR
- DRAINAGE
- AREA OF CONCERN
- ROAD
- FENCE LINES
- LEVEE

SOIL SAMPLES: PREFIX = SEFLSB-#
ON MAP AS: (3)

Figure 5-1
SAMPLING GRID
SOUTHEAST FUNSTON
LANDFILL AND FORMER
INCINERATOR

January, 1994

GROUNDWATER SCREENING:
23 = duplicate of 5

SOIL
79 is duplicate of 63

DRAFT

TECHNICAL MEMORANDUM #10

Draft Technical Memorandum #10/Other Sites SI

Groundwater Monitor Wells at Main Post Landfill

2 May 1994

1.0 Overview

The Other Sites SI SAP for the Main Post Landfill, as modified by Technical Memo #5, required Phase I soil gas samples (54), and groundwater screening samples (10). The field analysis for soil gas and groundwater screening samples had no detections. Preliminary laboratory results for the groundwater screening samples indicate that there were no detections at 9 of 10 locations. However, location MPLGS1-5 was above the KNL for 1,4-Dichlorobenzene, but it was not above the KAL and MCL. A summary of the positive detections for Phase I is provided on the attached site sketch.

2.0 Issue

One groundwater screening sample was above the KNL for 1,4-Dichlorobenzene. The Other Sites SAP includes a Phase III for groundwater wells if groundwater screening samples exceed regulatory standards. Therefore, Phase III is warranted for Main Post Landfill.

3.0 Proposed Action

Three groundwater monitoring wells are to be installed at Main Post Landfill. The recommended locations of these wells are as follows: at location MPLGS1-5, off the southeast corner of the landfill, and to the northwest as background. Confirmation of the locations will be based upon the delineated landfill boundaries, as determined by the EM survey. The wells will be placed outside the boundaries of the landfill. However, before any wells are installed, UXO clearance may be necessary. The locations are identified on the attached site sketch. The samples taken from the wells will be analyzed for Volatile Organic Compounds and Priority Pollutant Metals.

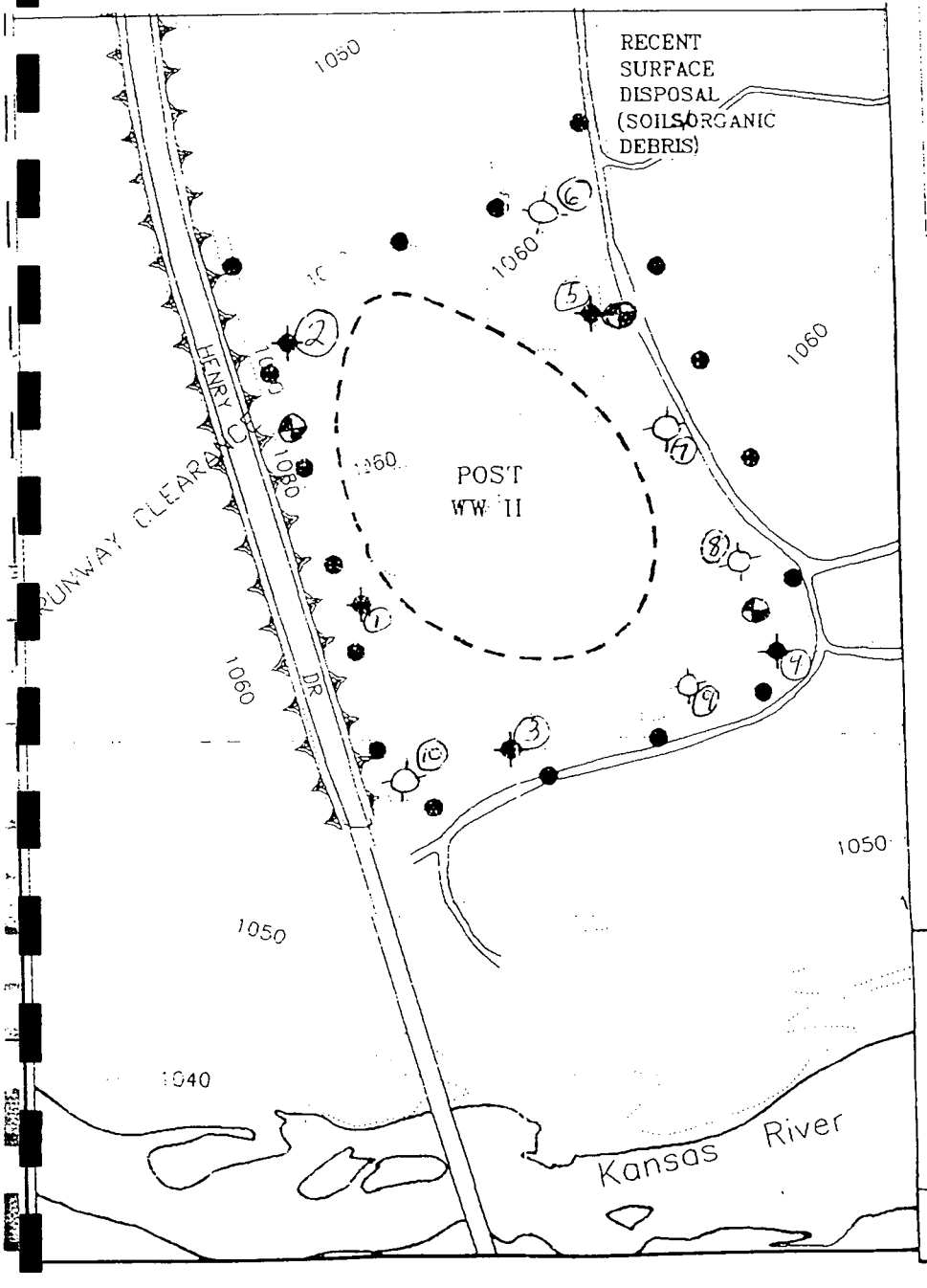
-- End Technical Discussion --

(One site sketch attached.)

GROUNDWATER SCREENING SAMPLES
PRELIMINARY DATA (ORGANIC COMPOUNDS)

Analyte (µg/l)	Sample ID	Regulatory Comparison Values		
	MPLGS1-5	KAL	KNL	MCL
1,4-Dichlorobenzene	{23}	--	--	75
Chlorobenzene	{0.7}	60	6	--

{}: Indicate that the data is preliminary and has not been verified by QA.
--: Standard Not Available
KAL: Kansas Action Level. From: Final 880607 Groundwater Contaminant Cleanup Target Concentrations.
KNL: Kansas Notification Level. From: Final 880607 Groundwater Contaminant Cleanup Target Concentrations.
MCL: Federal Maximum Contaminant Level. From: Drinking Water Regulations and Health Advisories, Office of Water, United States Environmental Protection Agency, December 1993.



LEGEND

- ON-SITE ANALYSIS → GROUNDWATER SCREENING SAMPLES
- SOIL GAS SAMPLING LOCATIONS
- [ON-SITE / OFF-SITE ANALYSIS] GROUNDWATER SCREENING LOCATIONS [MPLGS1-#] [1P]
- ELEVATION CONTOUR
- DRAINAGE
- BUILDINGS
- AREA OF CONCERN
- ROAD
- RAIL LINES
- FENCE LINES
- LEVEE

16 = DUPLICATE OF 1

PROPOSED WELL LOCATIONS

N

GRAPHIC SCALE
0 500
(IN FEET)

SAMPLING GRID–
FORMER MAIN POST LANDFIL

January, 1994

TECHNICAL MEMORANDUM #11

Draft Technical Memorandum #11/Other Sites SI

Soil Sampling at Former DS/GS Maintenance Area

31 May 1994

1.0 Overview

The Other Sites SI SAP for the Former DS/GS Maintenance Area required Phase I soil gas samples (50), and soil samples (10). The field analysis for soil gas samples had no detections. Preliminary laboratory results for the soil samples indicate a number of locations had detections of TPH. There were no elevated levels of metals or other non-petroleum contaminants detected where TPH was detected. The only detections of concern involved the center of the former paint pit in Building 1693, sample DSGSSS1-50. Only one of the two pits was sampled, due to access. A summary of the positive detections for Phase I are provided below; the sample locations are provided on the attached site sketch.

2.0 Issue

The center of the former paint pit in Building 1693 had elevated concentrations of VOCs and metals in soils. Phase III of the SAP indicates that groundwater screening at DS/GS would be next, with the groundwater screening samples analyzed for VOCs and metals. As discussed previously with the parties to the IAG, groundwater screening samples will not be analyzed for metals. Therefore, an expanded grid of soil sampling will be undertaken within the immediate vicinity of the pits. In addition, locations for Phase III groundwater screening samples to be analyzed for VOCs are illustrated.

not correct. it is six locations, 10 samples

3.0 Proposed Action

Soil sampling, including collection of samples at both pits, along the sides and underneath the pit at Building 1693, will occur. The pits are 5 X 5 feet across and five feet in depth. No sampling will be done at the pits by going through the pit if there are liquids in or beneath the drain into the pit. Six soil samples will be taken. Sample locations 1, 2, 3, and 4 will consist of two samples each. One will be at one foot below the bottom of the pit, and the other sample will be five feet below bottom. For sample locations 5 and 6, the sampling will be done through the pit, if possible (note exception stated previously). Otherwise, the holes will be bored at a 45° angle, with a sample taken at eight feet below the surface. Additionally, a duplicate will be taken at one location. The soil samples will be analyzed for VOCs, TPH and Pollutant Priority Metals. The locations are identified on the attached site sketch.

The soil samples outside of Building 1693 with detections of TPH are considered petroleum detections, a non-CERCLA issue. The data will be turned over to the Fort Riley POL program, as deemed appropriate.

Three groundwater screening samples will be collected in the area of the pits. As shown on the attached site sketch, one groundwater screening sample will be collected adjacent to the southeast corner of each pit (for a total of two samples). Also, a third sample will be collected outside the building, downgradient of the pits. One duplicate groundwater screening sample will be collected. The samples will be transmitted to an off-site laboratory for VOC analysis.

-- End Technical Discussion --

(Two data tables attached.)
(Two site sketches attached.)

DRAFT

DS/GS FACILITY
SOIL SAMPLES
PRELIMINARY DATA (METALS)

Analyte (mg/kg, dry wt.) (total)	Sample ID All prefixes are DSGSSS1-#											
	1	2	3	4	5	6	7	8	9	10	11	50 (Dry Wt).
As	{7}	{5}	{3}	{2}	{3}	{3}	{4}	{3}	{2}	{2}	{3}	{4}
Ba	{80}	{130}	{95}	{110}	{170}	{47}	{61}	{84}	{110}	{120}	{100}	{14000}
Cd	{ND}	{1.4}	{4.2}	{1.7}	{0.9}	{1.0}	{1.7}	{0.7}	{ND}	{ND}	{1.1}.	{41}
Cr	{3}	{24}	{59}	{19}	{16}	{13}	{24}	{16}	{9}	{10}	{16}	{8500}
Pb	{22}	{86}	{280}	{110}	{58}	{47}	{150}	{44}	{3}	{8}	{89}	{44000}
Hg	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{0.4 }
Se	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{4.5}

{ }: denote preliminary analytical data results prior to completion of QA/QC data reviews.

DRAFT

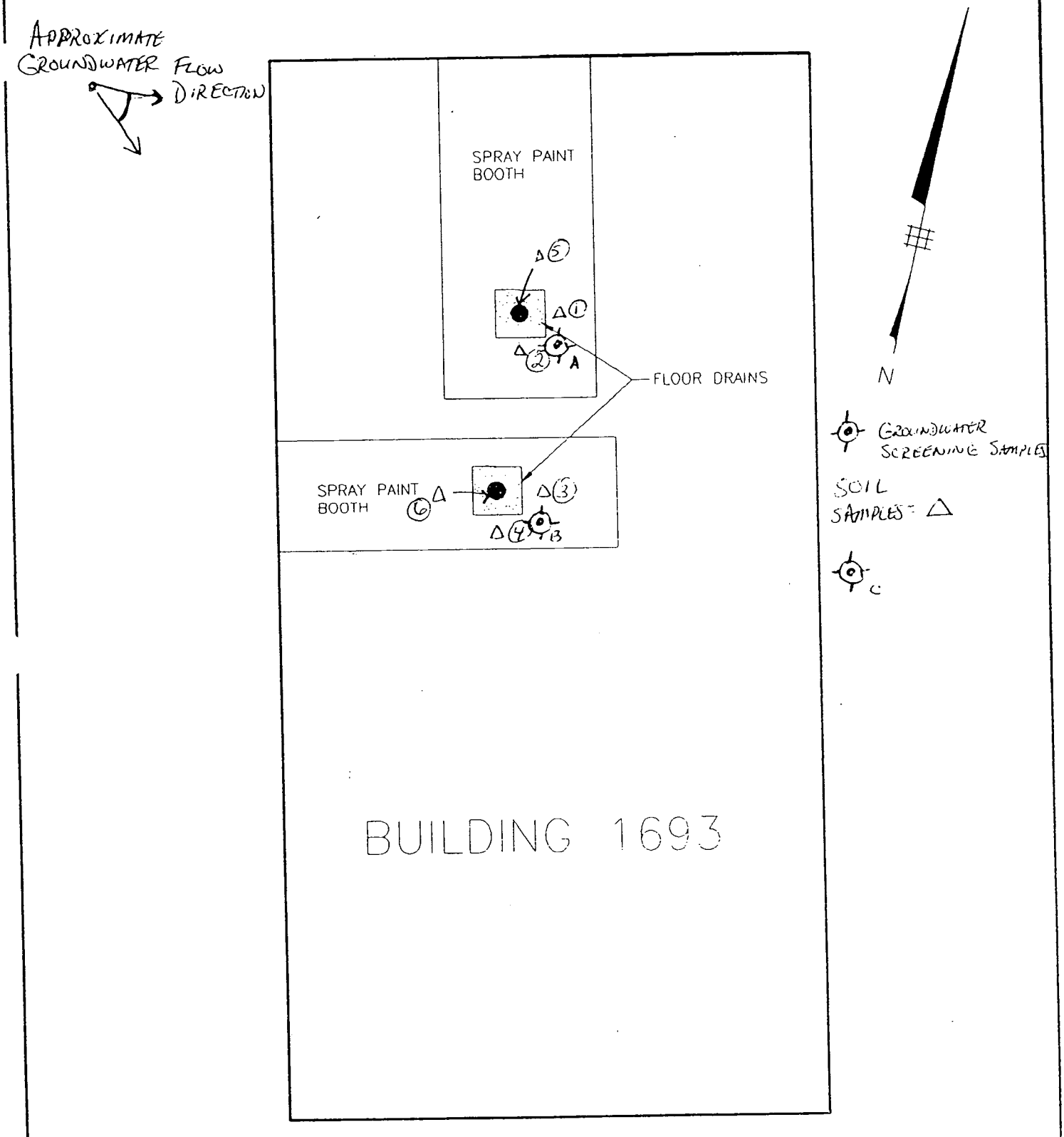
DS/GS AREA

SOIL SAMPLES

PRELIMINARY DATA (ORGANIC COMPOUNDS)

Analyte	Sample ID. All have prefix DSGSSS1-#										
(Dry Weight)	1	2	3	4	5	6	7	8	10	11	50
Semivolatile Pet. Hydrocarbon	{130} mg/kg	{42} mg/kg	{1200} mg/kg	{84} mg/kg	{770} mg/kg	{140} mg/kg	{77} mg/kg	{30} mg/kg	{10} mg/kg	{110} mg/kg	{ND}
Total Purgeable Hydrocarbons	{ND}	{200} µg/kg	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}
Ethylbenzene	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{5500} µg/kg
Meta &/or Para-Xylene	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{19000} µg/kg
Ortho-Xylene	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{3400} µg/kg

{ }: denote preliminary analytical data results prior to completion of QA/QC data reviews.



Floor Drain Note: floor drain pads are 7x7'. Below the drains are 5x5x5' pits. These pits are filled with sand. The drains are 4" perforated pipe extended 4' into the sand fill.

January, 1994	Figure 10-1 LAYOUT OF BUILDING 1693

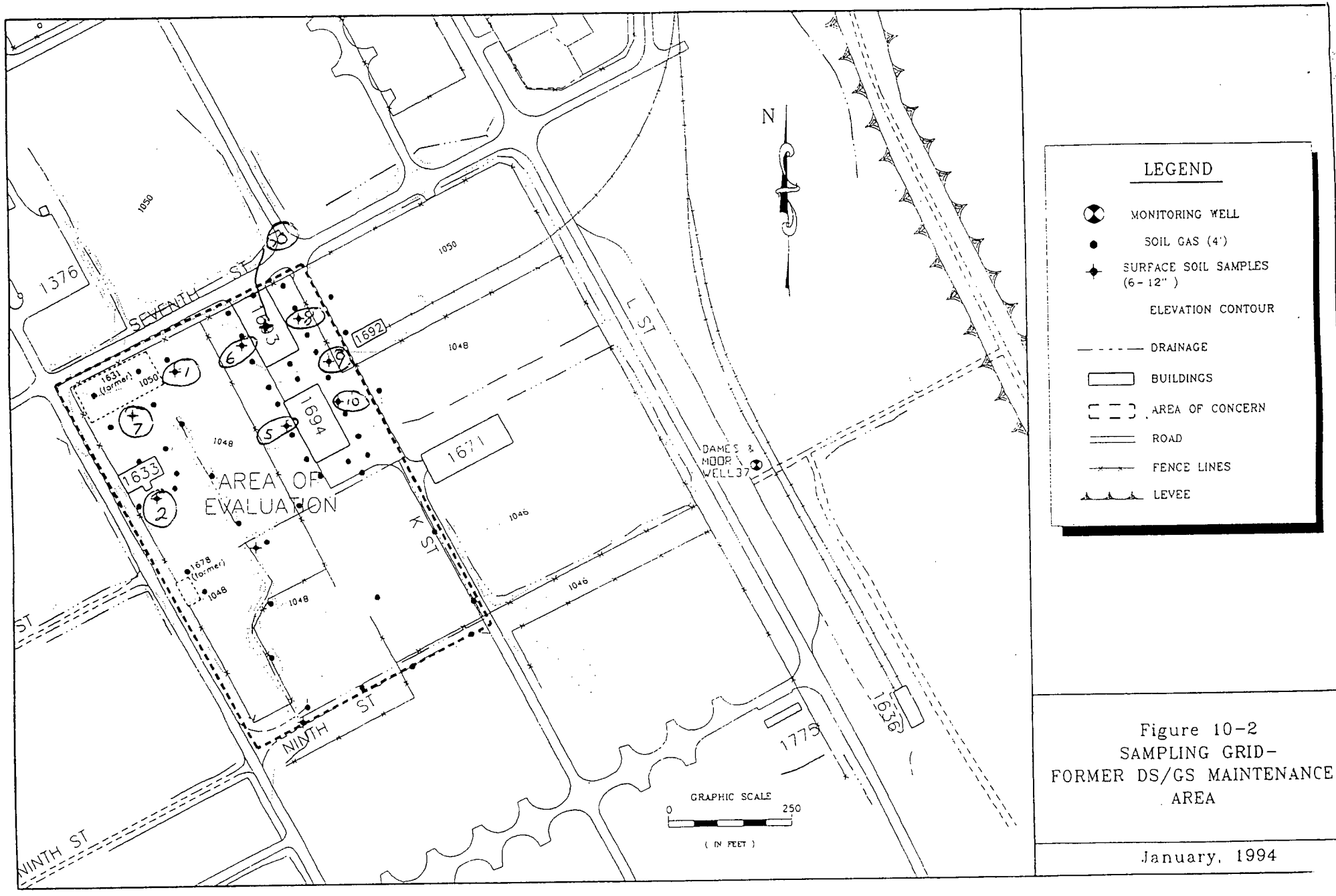


Figure 10-2
SAMPLING GRID-
FORMER DS/GS MAINTENANCE
AREA

January, 1994

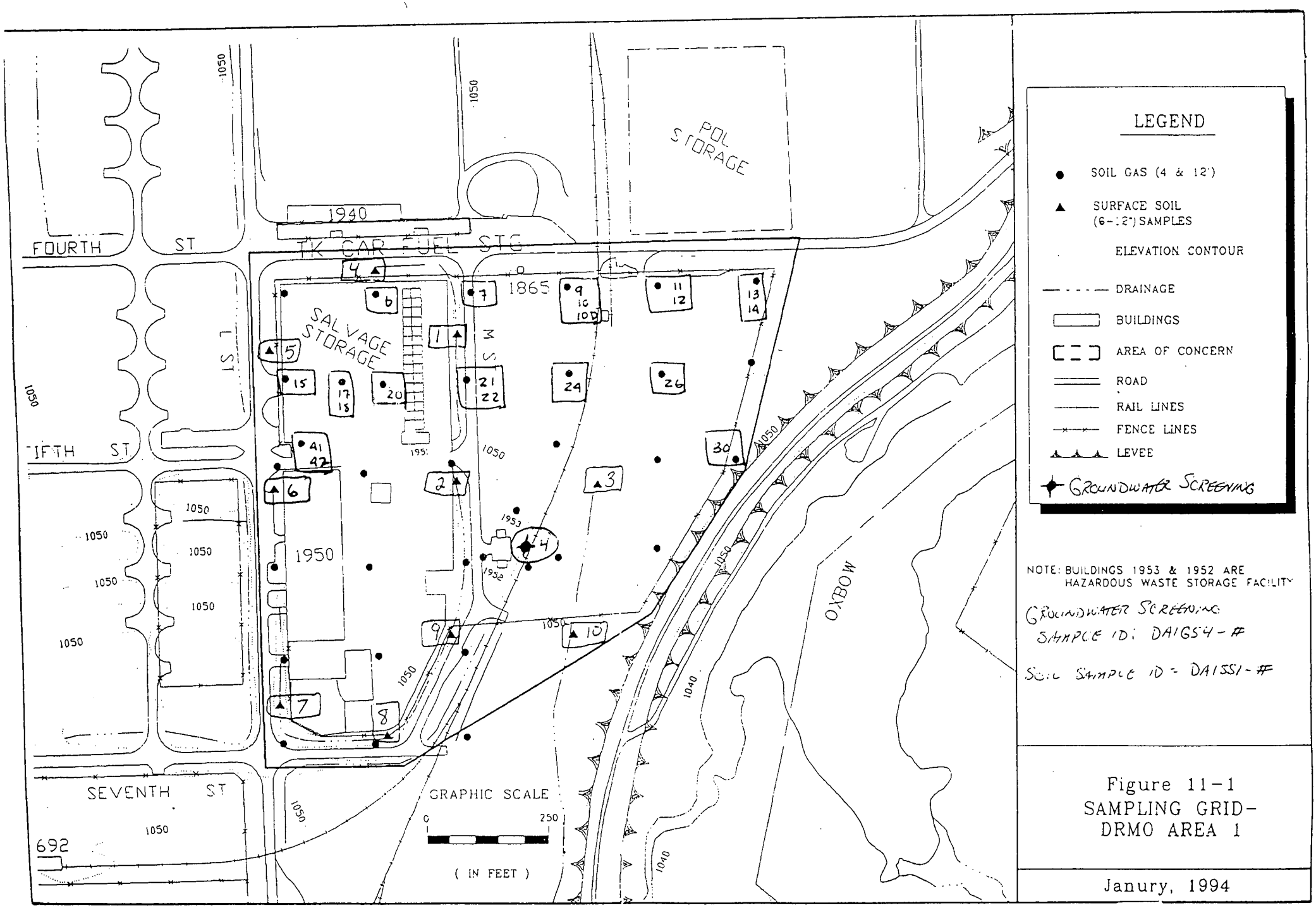


Figure 11-1
SAMPLING GRID-
DRMO AREA 1

Janury, 1994

TECHNICAL MEMORANDUM #12

Draft Technical Memorandum #12/Other Sites SI

DRMO Area 1

4 May 1994

1.0 Overview

The Other Sites SI SAP for the DRMO Area 1 (as modified by Technical Memorandum) requires Phase I soil gas samples (64), soil samples (10), and groundwater screening samples (3). The soil gas samples had petroleum detections along the northern boundary of the site. The soil samples had low level detections of metals, and two locations had detections of PCB-1260 and fluoranthene. One groundwater screening location had a detection of toluene. A summary of the positive detections for Phase I soil gas, groundwater screening and soil samples are provided with the sample locations on the attached site sketch.

2.0 Issue

A POL storage facility is located immediately north of DRMO Area 1. Petroleum releases have previously been identified at the POL storage facility and are currently under investigation within Fort Riley's POL program. The soil gas samples along the northern boundary of DRMO Area 1 are considered petroleum hits. The soil sample detection for PCB-1260 (4,700 μg/kg) was above the EPA Region III and Region IX industrial risk-based levels (370 and 740 μg/kg, respectively) and the EPA Region X residential risk-based level (80 ug/kg), but well below the level of 50,000 μg/kg for TSCA. Both the fluoranthene and the toluene detections were below the risk-based concentrations.

3.0 Proposed Action

No further investigation is planned at this time. The soil gas detections, which normally would initiate Phase II, will instead be referred to the Fort Riley POL program, which is currently conducting an investigation of petroleum releases in the area.

-- End Technical Discussion --

(Three data tables attached.)
(One site sketch attached.)

FIELD ANALYSIS
DRMO AREA 1 -- Soil Gas Samples

Analyte (µg/l)	Sample ID All ID's have prefix DA1SG1-#									
	6 (12 ft.)	7 (4 ft.)	9 (4 ft.)	10 (10 ft.)	10D* (10 ft.)	11 (4 ft.)	12 (12 ft.)	13 (4 ft.)	14 (12 ft.)	15 (4 ft.)
Benzene	{ND}	{ND}	{44}	{1170}	{835}	{47}	{248}	{8}	{4}	{5}
Toluene	{ND}	{ND}	{ND}	{450}	{400}	{19}	{234}	{9}	{5}	{6}
EB†	{ND}	{ND}	{ND}	{157}	{150}	{<.1}	{26}	{ND}	{ND}	{ND}
Xylenes	{ND}	{ND}	{ND}	{257}	{257}	{ND}	{83}	{ND}	{ND}	{ND}
CHCl3	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}
1,1,1-TCA	{>.1}	{>.1}	{<.2}	{ND}	{ND}	{ND}	{.2}	{ND}	{ND}	{ND}
PCE	{0.2}	{ND}	{<.3}	{ND}	{ND}	{ND}	{ND}	{.3}	{<.4}	{>.4}

Soil Gas Samples (continued)

Analyte (µg/l)	Sample ID All ID's have prefix DA1SG1-#									
	17 (4 ft.)	18 (12 ft.)	20 (12 ft.)	21 (4 ft.)	22 (12 ft.)	24 (12 ft.)	26 (12 ft.)	30 (12 ft.)	41 (4 ft.)	42 (12 ft.)
Benzene	{ND}	{ND}	{ND}	{ND}	{ND}	{65}	{79}	{ND}	{ND}	{ND}
Toluene	{ND}	{ND}	{ND}	{ND}	{ND}	{2}	{ND}	{ND}	{ND}	{ND}
EB†	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}
Xylenes	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}
CHCl3	{ND}	{ND}	{ND}	{ND}	{<5}	{ND}	{5}	{ND}	{>2}	{<5}
1,1,1-TCA	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{<.1}	{ND}
PCE	{>.4}	{>.4}	{<.3}	{>.1}	{<3}	{<.2}	{<.2}	{<.3}	{.3}	{>.1}

*: Duplicate of DA1SG1-10 †: Ethylbenzene { }: denote preliminary analytical data results prior to completion of QA/QC data reviews.

DRAFT

PRELIMINARY LABORATORY DATA
DRMO AREA 1

Soil Samples

Analyte (mg/kg) un (dry wt.)	Sample ID All prefixes are DA1SS1-#										
	1	2	3	4	5	6	7	8	9	10	11
Arsenic	{3}	{3}	{2}	{2}	{3}	{3}	{4}	{2}	{3}	{3}	{3}
Barium	{120}	{110}	{77}	{110}	{72}	{52}	{84}	{140}	{120}	{88}	{98}
Cadmium	{0.7}	{ND}	{ND}	{ND}	{ND}	{ND}	{1.3}	{ND}	{ND}	2.1}	{ND}
Chromium	{12}	{10}	{7}	{15}	{11}	{9}	{17}	{10}	{10}	{16}	{10}
Lead	{70}	{13}	{8}	{40}	{72}	{91}	{130}	{10}	{17}	{88}	{46}
Silver	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{3}	{ND}
Fluoranthene	{ND}	{ND}	{ND}	{ND}	{ND}	{1100}	{ND}	{ND}	{ND}	{ND}	{ND}
PCB-1260	{4700}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}	{ND}

Groundwater Screening Samples

Analyte (μg/l, organics)	Sample ID	Regulatory Comparison Values		
	DA1GS4-4	KAL	KNL	MCL
Toluene	{2.9}	2000	200	1000

KAL: Kansas Action Level. From: Final 880607 Groundwater Contaminant Cleanup Target Concentrations.
KNL: Kansas Notification Level. From: Final 880607 Groundwater Contaminant Cleanup Target Concentrations.
MCL: Federal Maximum Contaminant Level. From: Drinking Water Regulations and Health Advisories, Office of Water, United States Environmental Protection Agency, December 1993.
{ }: denote preliminary analytical data results prior to completion of QA/QC data reviews.

TECHNICAL MEMORANDUM #13

Draft Technical Memorandum #13/Other Sites SI

DRMO Area 2

4 May 1994

1.0 Overview

The Other Sites SI SAP for the DRMO Area 2 required Phase I soil gas samples (24), soil samples (6), and groundwater screening samples (3). The soil gas and soil samples had no detections. One groundwater screening location had a detection of tetrachloroethylene (PCE). A summary of the positive detections for Phase I are provided with the sample locations on the attached site sketch.

2.0 Issue

The groundwater screening sample detection has a concentration of 6.2 μg/L, above the MCL (5 μg/L) and the KNL (0.7 μg/L). The other two compounds detected (xylenes and benzene) are below the MCLs. Based upon this data, monitoring wells should be installed in accordance with the SAP.

3.0 Proposed Action

Because there were no detections in the soil gas or soil samples, the groundwater screening sample may not be indicative of site contamination. Therefore, installation of groundwater monitor wells for DRMO Area 2 will not be performed at this time. Instead, additional data on other wells in Camp Funston will be collected (i.e. the Dames & Moore wells and AEHA #5) and, as necessary, additional wells will be installed to evaluate Camp Funston as a whole. The PCE detection at DRMO Area 2 will be examined within the context of the Camp Funston evaluation, allowing for possible identification of point sources (DRMO Area 2 is not a point source) and the migration pathway between Funston and Ogden.

-- End Technical Discussion --

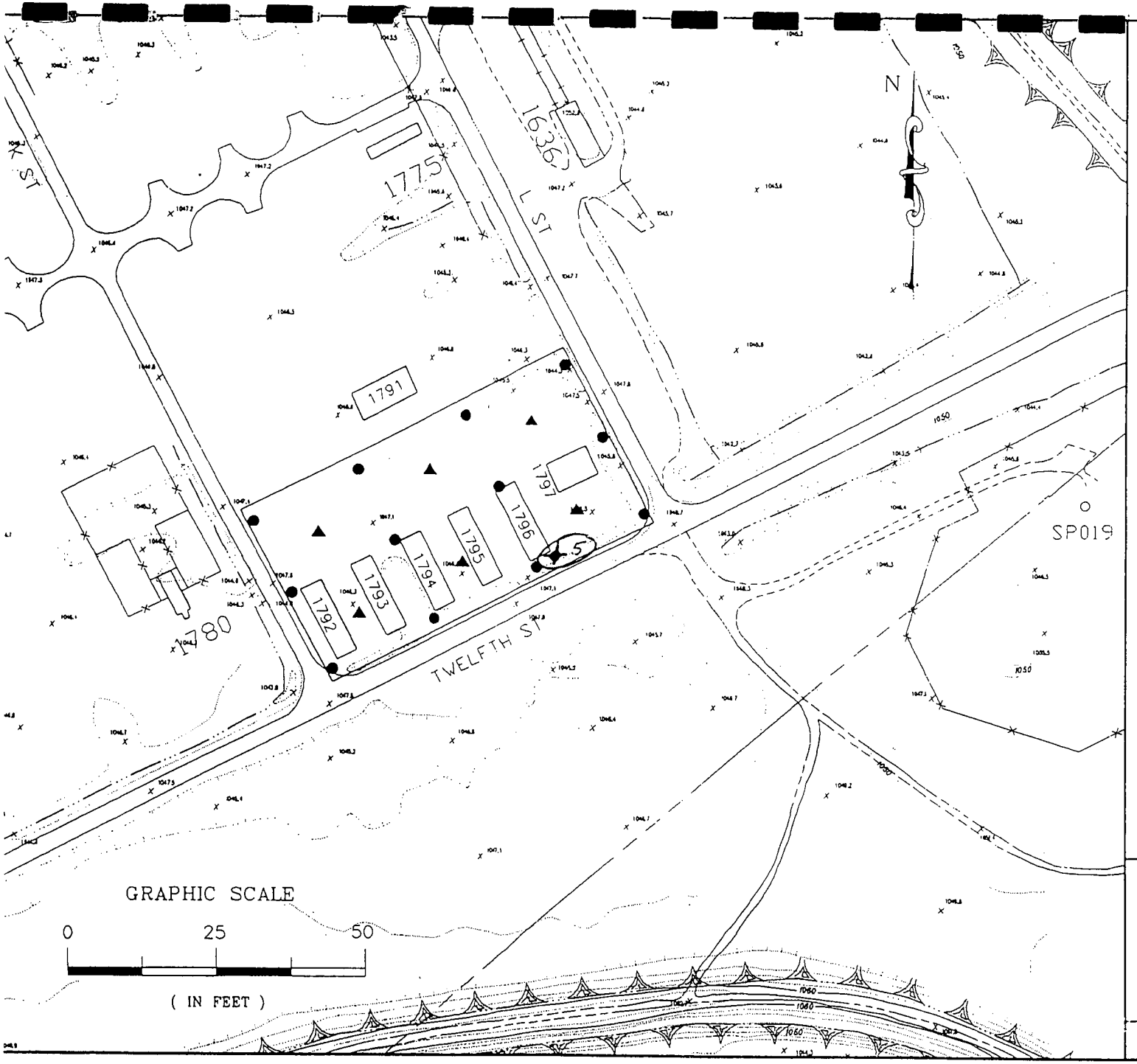
(One data table attached.)
(One site sketch attached.)

DRMO AREA 2

GROUNDWATER SCREENING SAMPLES

Analyte (μg/l)	Sample ID	Regulatory Comparison Values		
	DA2GS3-5	KAL	KNL	MCL
Benzene	{0.4}	5	0.5	5
m &/or p-xylene	{0.9}	440	44	10,000
Tetrachloroethylene	{6.2}	7	0.7	5

{}: Indicate that the data is preliminary and has not been verified by QA.
--: Standard Not Available
KAL: Kansas Action Level. From: Final 880607 Groundwater Contaminant Cleanup Target Concentrations.
KNL: Kansas Notification Level. From: Final 880607 Groundwater Contaminant Cleanup Target Concentrations.
MCL: Federal Maximum Contaminant Level. From: Drinking Water Regulations and Health Advisories, Office of Water, United States Environmental Protection Agency, December 1993.



LEGEND

- SOIL GAS (4 & 12')
- SURFACE SOIL (0-1') SAMPLES
- DRAINAGE
- BUILDINGS
- AREA OF CONCERN
- ROAD
- RAIL LINES
- FENCE LINES
- LEVEE
- GROUNDWATER SCREENING

ID = DA2653-~~FF~~

Figure 11-2
SAMPLING GRID-
DRMO AREA 2

January, 1994

TECHNICAL MEMORANDUM #14

Draft Technical Memorandum #14/Other Sites SI

Print and Publication Shop

9 May 1994

1.0 Overview

Sampling and analysis for the Print and Publication Shop included Phase I soil gas samples (30); Phase II soil gas samples (26), as outlined in Technical Memorandum 3; and Phase III soil samples (23), as outlined in Technical Memorandum 4. Below is a brief summary of the results and findings:

- Phase I Soil Gas Survey - identified trichloroethylene (TCE) and tetrachloroethylene (PCE) at locations south of Building 263 (the Print and Publication Shop) and along the sewer line with the highest concentrations at 6.7 μg/L, and total petroleum hydrocarbon detections at the north end of the Building 263 at 60 μg/L for total FID. These results prompted an expansion of the soil gas grid along the sewer line and several points to the north of the building, Phase II soil gas.

- Phase II Soil Gas Survey - the presence of PCE, TCE and total FID were confirmed during this phase, exceeding actions levels for both total chlorinated solvents (10 μg/L) and total FID (20 μg/L). During both Phase I and Phase II soil gas surveys, the most prominent detections of VOCs occurred in the shallow soil samples (4 feet below ground surface). Also determined during Phase II was that depth to bedrock is 20 feet at the southern end of the building and that no groundwater is present in the materials overlying the bedrock. Nor was there visual evidence of groundwater in the upper bedrock units. Therefore, it was not feasible to conduct a groundwater screening survey, as outlined in the Other Sites SI SAP, rather Phase III consisted of soil sampling to determine the origin and extent of the contamination within the alluvial materials above bedrock (i.e. due to surficial releases, sewer line releases and migration to bedrock surface).

- Phase III Soil Sampling - PCE (83 μg/kg), toluene (33 μg/kg) and TCE (33 μg/kg) was detected in one soil sample, PPS-SB5-1. PPS-SB5-1 was sample in the 4 to 5 foot sample interval which is above the present sewer line. These concentrations do not exceed the EPA Regions III, IX and X Risk-based standards or the KDHE Interim Soil Clean-up Standards. A summary of the positive detections for Phase III soil samples are provided on the attached table and the sample locations are provided on the attached site sketch.

2.0 Issue

The Other Sites SAP outlined Phase III groundwater screening samples for the site followed by Phase IV installation and sampling of groundwater monitor wells. The Phase III groundwater

screening sampling was replaced by soil sampling because there was no groundwater overlying bedrock or evidence that groundwater is present in the upper bedrock units.

3.0 Proposed Action

The soil sample detections have concentrations well below both the KDHE Interim Soil Clean-up Standards and the Risk-Based concentrations of Commercial/Industrial Soil for EPA Regions III and IX, and Residential Soil for EPA Region X. Because the soils pose little threat to the public and the environment at this site and it is not viable to install and sample monitor wells in this area, no further investigation is planned at this time.

-- End Technical Discussion --

(One data table attached.)
(One site sketch attached.)

PRINT AND PUBLICATION SHOP

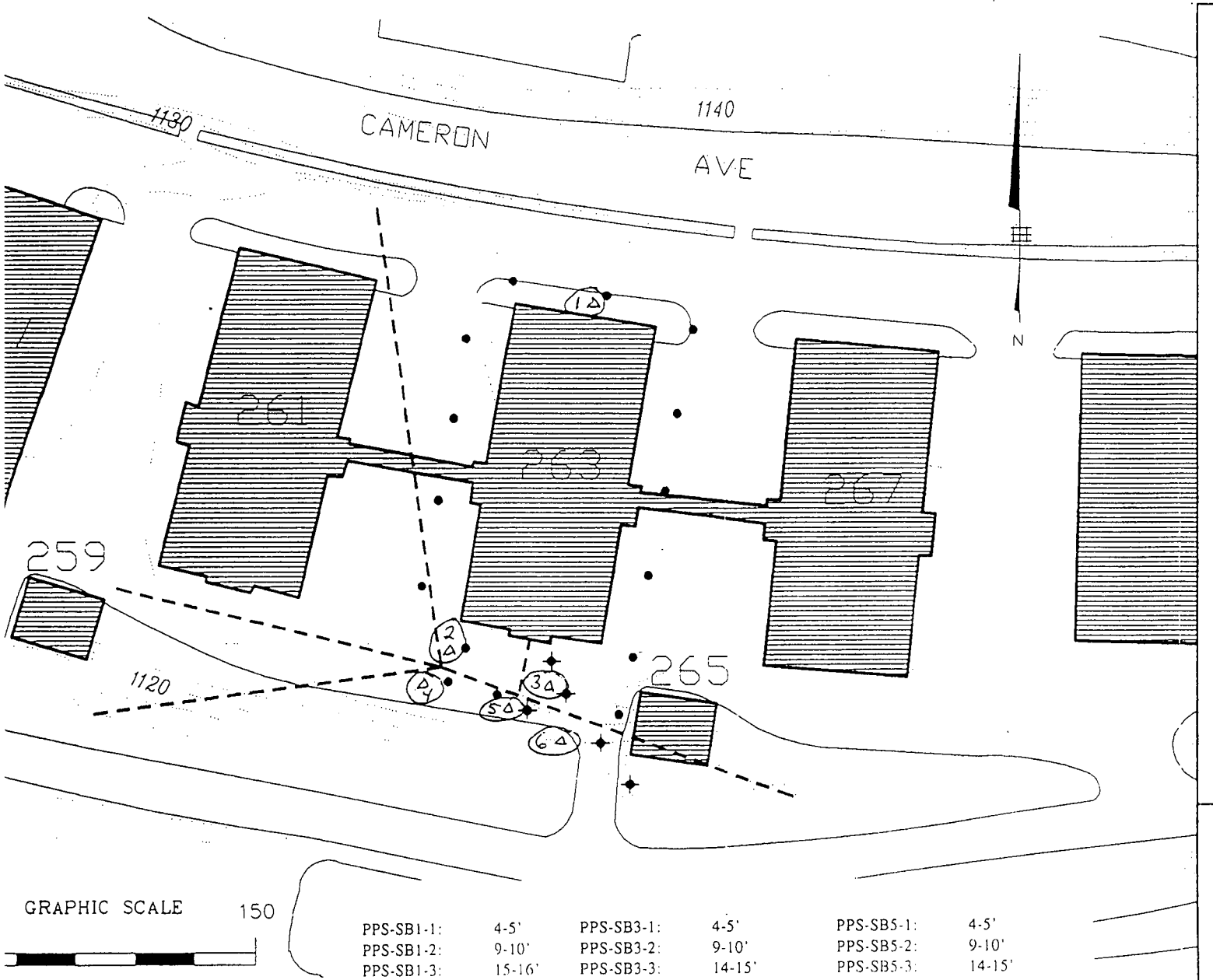
SOIL SAMPLE

Analyte (μg/kg)	Sample ID	Risked-Based Concentrations Commercial/ Industrial Soil[A]			KDHE Interim Soil Clean-up Standards.[B]
	PPS-SB5-1	Region III	Region IX	Region X	
Tetrachloroethylene	{83}	55,000	650	10,000-3,000,000	--
Toluene	{33}	200,000,000	2,800,000	50,000,000	288,000
Trichloroethylene	{33}	260,000	34,000	60,000-2,000,000	--

{}: Indicate that the data is preliminary and has not been verified by QA.
--: Standard not available

A: From: EPA Region III -- Risk Based Concentration Tables, 4th Quarter, Roy L. Smith, Senior Toxicologist -- Technical Support Section (3HN13); EPA Region IX -- Preliminary Remediation Goals (PRGS), 1st Quarter 1993, Stanford J. Smucker, PhD., Regional Toxicologist; EPA Region X -- Appendix II -- Human Health Risk -- based "Preliminary Remediation Goals" for Water and Soil, October 1992.

B: Kansas Department of Health and Environment Bureau of Environmental Remediation, Interim Soil Clean-up Standards, August 1993.



LEGEND

- SOIL GAS (4')
- SOIL GAS (4&12')
- ELEVATION CONTOUR
- SEWER LINES
- BUILDINGS
- ROAD
- Δ Soil Sample

Sample id. & location

[ID: PPS-SB# - #']

↑ Location ID (next to Δ)

GRAPHIC SCALE 150

(IN FEET)

PPS-SB1-1:	4-5'	PPS-SB3-1:	4-5'	PPS-SB5-1:	4-5'
PPS-SB1-2:	9-10'	PPS-SB3-2:	9-10'	PPS-SB5-2:	9-10'
PPS-SB1-3:	15-16'	PPS-SB3-3:	14-15'	PPS-SB5-3:	14-15'
		PPS-SB3-4:	19-20.8'	PPS-SB5-4:	20-20'8"
		PPS-SB3-5:	duplicate of PPS-SB3-2 (9-10')	PPS-SB5-5:	duplicate of PPS-SB5-3 (14-15')
PPS-SB2-1:	4-5'	PPS-SB4-1:	4-5'	PPS-SB6-1:	4-5'
PPS-SB2-2:	9-10'	PPS-SB4-2:	9-10'	PPS-SB6-2:	9-10'
PPS-SB2-3:	14-15'	PPS-SB4-3:	14-15'	PPS-SB6-3:	14-15'
PPS-SB2-4:	19-20'	PPS-SB4-4:	20'1"	PPS-SB6-4:	18'6"-19'

Figure 13-1
SAMPLING GRID-
PRINT AND PUBLICATION
SHOP

January, 1994

TECHNICAL MEMORANDUM #15

Draft Technical Memorandum #15/Other Sites SI

Driven Well Points - Southeast Funston Landfill

23 June 1994

1.0 Overview

The results of the Phase I investigation of the Southeast Funston landfill indicated that additional investigation of groundwater quality at the site was warranted. As outlined in Technical Memorandum #9, three groundwater monitor wells were to be installed around the site. The installation of these wells was planned for the week of 20 June 1993. In support of this effort, technical support has been arranged to identify and clear the areas of investigation of unexploded ordnance (UXO).

The area of the site is heavily vegetated and wooded. Further, due to its location, access to the site is limited. During the Phase I investigation, it was necessary to conduct investigations with equipment that could be hand-carried.

2.0 Issue

As part of UXO clearance activities, access routes to the proposed well locations were identified so that the cutting of large trees would be avoided or minimized. Also, the access routes selected terrain best suited to movement of mechanized, all-terrain vehicles. The intent was to use a bulldozer to clear the access routes of vegetation, and the bulldozer and operator arrived on-site the morning of 22 June. Also on 22 June, there was a substantial rainfall in the morning. The bulldozer operator inspected the terrain of the site and concluded that the dozer would not be effective because of the soft, moist ground. Further, because of the low areas in the landfill that would have to be traversed, the dozer operator stated that substantial drying (several weeks with no additional rainfall) of the landfill surface would have to occur prior to successfully performing vegetation clearance. As a result, the groundwater monitor wells planned as part of Technical Memorandum #9 cannot be installed at this time or in the near future.

3.0 Proposed Action

Three groundwater well points will be driven into the water-bearing alluvial materials and installed as permanent groundwater monitoring locations in place of the planned wells. The well points will be constructed of 2-inch diameter stainless steel well screen (10 feet in length) with connecting steel pipe to the surface. The well points will be installed at the same locations as the proposed monitor wells with seven feet of screen placed below the water table. As part of UXO clearance at the site, hand augers were used to install 4-inch borings to groundwater at each of the proposed well

locations. The borings were installed by the UXO specialists, and downhole clearance was conducted. All three borings are clear of UXO.

The well points will be installed within the hand auger borings that were used for UXO clearance. The upper five feet of the boring will be enlarged to a diameter of six inches. The well points will include a sanitary seal of cement grout that extends from the surface to at least four feet beneath the surface. Granular bentonite will be placed into the annular space first, and hydrated, to prevent grout from moving down towards the screen of the well point. The well point will be completed with a locking cap and protective cover.

The well point will be developed and sampled using the same methodologies used to develop and sample wells. The primary difference between a well point and a monitor well is that a well point does not have a filter pack installed between the natural formation and the well screen. This difference is negligible in alluvial materials where the filter pack materials are comparable to the alluvial materials.

The well point is an established method of collecting groundwater samples in alluvial materials. As identified in EPA's Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Wells, EPA/600/4-89/034-March 1991, driven well points are an acceptable technique for collecting reliable groundwater samples in unconsolidated materials. As evidence, driven well points have been used as part of the RI/FS of the drycleaning facility at Fort Riley. These points are permanently installed and provide water quality samples with turbidities of less than 30 NTU.

The samples collected from the well points will be analyzed for volatile organic compounds and priority pollutant metals. In addition, to evaluate whether the absence of a filter pack has a substantial impact on the particulate and corresponding metals concentrations in groundwater, two samples will be analyzed for metals: one will be unfiltered and one will be filtered in the field using a 0.45 micron filter prior to containerization and preservation.

-- End Technical Discussion --

FEDERAL EXPRESS

USE THIS AIRBILL FOR SHIPMENTS WITHIN THE CONTINENTAL U.S.A., ALASKA AND HAWAII.
USE THE INTERNATIONAL AIR WAYBILL FOR SHIPMENTS TO PUERTO RICO AND ALL NON U.S. LOCATIONS.
QUESTIONS? CALL 800-238-5355 TOLL FREE.

AIRBILL
PACKAGE
TRACKING NUMBER

2494163173

4223N 2494163173

RECIPIENT'S COPY

1 [redacted] Date 10/5/94

From (Your Name) Please Print: KATE DICKERSON
Your Phone Number (Very Important): (401) 521-5980
Department/Floor No.:
Company: LOUIS BERGER ASSOCIATES
Street Address: 295 PROMENADE ST
City: PROVINCE
State: RI
ZIP Required: 02908

2 To (Recipient's Name) Please Print: KATIE WATSON
Recipient's Phone Number (Very Important): (913) 239-[illegible]
Department/Floor No.: ATTN: [illegible]
Company: DEH, ENV. & NAT. RES. DIV.
Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.): BUILDING 1970 - CAMP FUNSTON
City: FT. RILEY
State: KS.
ZIP Required: 66442-6000

YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice.)
JH 10225

H IF HOLD AT FEDEX LOCATION, Print FEDEX Address Here
Street Address:
City:
State:
ZIP Required:

3 PAYMENT 1 ☐ Bill Sender 2 ☐ Bill Recipient's FedEx Acct. No. 3 ☒ Bill 3rd Party FedEx Acct. No. 4 ☐ Bill Credit Card 5 ☐ Cash/Check
[redacted]

4 SERVICES (Check only one box)

Priority Overnight (Delivery by next business morning†)
11 ☐ OTHER PACKAGING
16 ☒ FEDEX LETTER*
12 ☐ FEDEX PAK*
13 ☐ FEDEX BOX
14 ☐ FEDEX TUBE

Standard Overnight (Delivery by next business afternoon. No Saturday delivery†)
51 ☐ OTHER PACKAGING
56 ☐ FEDEX LETTER*
52 ☐ FEDEX PAK*
53 ☐ FEDEX BOX
54 ☐ FEDEX TUBE

Economy Two-Day (Delivery by second business day†)
30 ☐ ECONOMY*
*Economy Letter Rate not available. Minimum charge: One pound Economy rate.

Government Overnight (Restricted to authorized users only)
46 ☐ GOV'T LETTER
41 ☐ GOV'T PACKAGE

Freight Service (for packages over 150 lbs.)
70 ☐ OVERNIGHT FREIGHT** (Confirmed reservation required)
80 ☐ TWO-DAY FREIGHT**

5 DELIVERY AND SPECIAL HANDLING (Check services required)

Weekday Service
1 ☐ HOLD AT FEDEX LOCATION WEEKDAY (Fill in Section H)
2 ☐ DELIVER WEEKDAY

Saturday Service
31 ☐ HOLD AT FEDEX LOCATION SATURDAY (Fill in Section H)
3 ☐ DELIVER SATURDAY (Extra charge) (Not available to all locations)
9 ☐ SATURDAY PICK-UP (Extra charge)

Special Handling
4 ☐ DANGEROUS GOODS (Extra charge)
6 ☐ DRY ICE Dangerous Goods Shipper's Declaration not required
Dry Ice, 9, UN 1845, ____ X ____ kg, 904 III
☐ DESCRIPTION

6

PACKAGES	WEIGHT In Pounds Only	YOUR DECLARED VALUE (See right)
Total	Total	Total

DIM SHIPMENT (Chargeable Weight)
____ lbs.
L x W x H

Received At
1 ☐ Regular Stop 3 ☐ Drop Box 4 ☐ B.S.C.

7 Release

Emp. No. Date
☐ Cash Received
☐ Return Shipment
☐ Third Party ☐ Chg. To Del. ☐ Chg. To Hold
Street Address
City State Zip
Received By: X
Date/Time Received FedEx Employee Number

Federal Express Use
Base Charges
Declared Value Charge
Other 1
Other 2
Total Charges

REVISION DATE 4/94
PART #145412 WCSL0795
FORMAT #160
160