INSTALLATION RESTORATION PROGRAM

(2)

FINAL
REMEDIAL INVESTIGATION

VOLUME II

VOLK FIELD AIR NATIONAL GUARD
CAMP DOUGLAS, WI

SEPTEMBER 1993

HAZWRAP SUPPORT CONTRACTOR OFFICE
Oak Ridge, Tennessee 37831
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Investigation at Volk Field in 1989, 1990 & 1991 to confirm the presence or absence of contamination at 10 sites to determine the extent, degree, and potential contaminant migration is documented in this report. Additionally, An evaluation of risks posed to human health & the environment & remedial action alternatives or future action at two sites was documented. Site investigation involved soil, sediment and/or groundwater monitoring/analysis.

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FINAL

INSTALLATION RESTORATION PROGRAM

REMEDIAL INVESTIGATION

VOLUME II

VOLK FIELD AIR NATIONAL GUARD BASE
Camp Douglas, Wisconsin

SEPTEMBER 1993

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REMEDIAL INVESTIGATION REPORT
VOLK FIELD ANGB
ABBREVIATED TABLE OF CONTENTS

VOLUME I

ABBREVIATED TABLE OF CONTENTS (CONTINUED)

APPENDIX A
SELECT DEFINITIONS

APPENDIX A
SELECT DEFINITIONS

ACIDS: Chemical compounds that yield hydrogen ions in an aqueous solution.

ACIDIC: Refers to water having a pH value less than 7, aqueous solutions containing dissolved acids.

ADSORPTION: The attachment of dissolved matter to the surface of solids through weak chemical interactions which are usually reversible.

AEOLIAN: Applied to the erosive action of the wind, and to deposits which are due to the transporting action of the wind.

ALIPHATICS: Hydrocarbons that do not contain benzene rings.

ALKALINE: Refers to water having a pH value greater than 7, aqueous solutions containing dissolved bases.

ALLUVIAL: Pertaining to or composed of alluvium or deposited by a stream or running water.

ALLUVIUM: Materials eroded, transported and deposited by streams.

ANION: A negatively charged ion in solution.

AQUIFER: A geologic formation, group of formations or part of a formation that is capable of yielding useable quantities of water to a well or spring.

AROMATICS: Organic chemical compounds such as benzene, toluene, and xylenes, having a stable six-carbon ring as their basic structure.

ARTESIAN: A condition of confined aquifers in which water levels in wells rise above the top of the aquifer.

BASE: Chemical compounds that yield hydroxide ions in aqueous solution.

BEDROCK: Any solid rock in place; may be exposed at the surface of the earth or overlain by unconsolidated material.

BIOACCUMULATION: Refers to tendency of some chemical elements or compounds to become concentrated in the tissues of living organisms as a result of chronic exposures, mainly ingestion and inhalation.

BIODEGRADABLE: Refers to organic compounds that are broken down into simpler chemical compounds or elements by natural mircoorganisms in the environment.

CARBONATE ROCKS: A rock consisting chiefly of carbonate minera! , such as limestone and dolomite.

CATION: A positively charged ion in solution.

CONFINED AQUIFER: An aquifer bounded above and below by impermeable strata or geologic units of distinctly lower permeability than that of the aquifer itself.

CONFINING UNIT: A low-permeability layer which restricts the movement of groundwater.

CONTAMINANT: As defined by section 104(a)(2) of CERCLA, shall include, but not be limited to, any element, substance, compound or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunction (including malfunctions in reproduction) or physical deformation, in such organisms or their offspring.

DENSITY: Physical property of materials equal to mass per unit volume.

DISCHARGE: The process involved in the draining or seepage of water out of a groundwater aquifer.

DOWNGRADIENT: A direction that is hydraulically downslope; the direction in which groundwater flows.

DRAINAGE BASIN: The land area from which all surface runoff drains into one stream channel or system of channels, lake reservoir or other body of water.

DRAWDOWN: The difference between the static water level and the water level in a well that is pumped.

EFFECTIVE POROSITY: The amount of interconnected pore space in an aquifer available for water transmission.

EROSION: The wearing away of land surface by wind, water or chemical processes.

EVAPOTRANSPIRATION: Loss of water from a land area through transpiration of plants and evaporation from the soil.

FAULT: A fracture in rock along which the adjacent rock surfaces have been displaced.

FLOW LINES (PATHS): Lines indicating the direction of groundwater movement.

gal/day/ft: Gallons per day per foot. Units used to define transmissivity.

GAL/DAY/FT^{2}gal/day/ft^2: Gallons per day per foot squared. Units used for hydraulic conductivity.

GC: Gas chromatograph. An analytical laboratory instrument u ›ed for the quantitation and identification of organic compounds.

GROUNDWATER: Water beneath the land surface in the saturated zone.

HALIDES: Refers to the salts of halogen elements or the anions formed by halogens in aqueous solution.

HALOGEN: Refers to any one of a group of chemical elements including fluorine, chlorine, bromine and iodine.

HALOGENATED ORGANIC: Refers to any organic compound that contains one or more halogens as a substituent group.

HAZARDOUS WASTE: A solid or liquid waste that, because of its quantity, concentration, or physical, chemical or infectious characteristics may:

(a) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible or incapacitating reversible illness.

(b) pose a substantial present or potential harm to human health or the environment when improperly treated, stored, transported or disposed of, or otherwise managed.

HEAVY METALS: Metal elements, including the transition elements, with atomic weights greater than 50. Many of these elements are required for plant and animal nutrition in trace concentrations but are toxic at higher concentrations.

HNu® METER: An instrument that uses a photoionization detector to measure organic vapors.

HYDRAULIC CONDUCTIVITY: The rate of flow of liquid through a unit cross section of porous media under hydraulic gradient at the prevailing temperature.

HYDRAULIC GRADIENT: The change in static head per unit of direction in a given direction.

HYDROCARBONS: Organic chemical compounds composed of hydrogen and carbon atoms. Hydrocarbons may be straight chain, cyclic, braced chain aromatic or polycyclic depending upon arrangement of carbon atoms. Halogenated hydrocarbons are hydrocarbons in which one or more hydrogen atoms has been replaced by a halogen atom.

INDUCTION-COUPLED ARGON PLASMA: An instrumental analytical method for quantitation of metal elements.

IGNEOUS ROCKS: Rocks that are solidified from molten or partly molten material.

INFILTRATION: The movement of water through land surface into the ground.

JP-4: Jet propulsion fuel number four (contains kerosene and gasoline fractions, used in most military jet aircraft).

LACUSTRINE: Pertaining to, produced by, or formed in a lake or lakes.

LEACHING: The process by which soluble materials in soils or a landfill dissolve in water. The resulting leachate may percolate down into lower layers or, in a secure landfill, is collected for treatment.

LITHOLOGY: The description of the physical character of rocks and soil.

LOAM: A permeable soil composed of a friable mixture of relatively equal proportions of clay, silt and sand particles usually containing organic matter (humus) with a minor amount of gravel.

MIGRATION (Containment): The movement of contaminants through pathways (groundwater, surface water, soil and air).

ORDNANCE: Any form of artillery, weapons or ammunition used in warfare.

ORGANIC: Refers to chemical compounds having carbon atoms as their main skeletal structure. Most organic chemicals are created by living organisms or from their remains (such as fossil fuels) and occur naturally in the environment; other organic chemicals are manmade.

OUTCROP: Zone or area where a geologic unit or formation occurs at or near land surface. "Outcrop area" is an important factor in studies of aquifers as this zone usually corresponds to the point where significant recharge occurs. Occasionally, this term is used as an intransitive verb: "Where the unit crops out. . ."

OUTWASH: Drift deposited by meltwater streams beyond active glacier ice.

OVA METER: An instrument that uses a flame ionization detector to measure organic vapors.

PCBs: Polychlorinated biphenyls. Liquid halogenated polycyclic organic compounds commonly used as insulating and cooling fluids in electrical equipment. Commercial mixtures of PCBs are referred to as Arochlors.

PERCHED WATER TABLE: Unconfined groundwater separated from an underlying water table by an unsaturated zone.

PERCOLATION: Movement of moisture by gravity or hydrostatic pressure through interstices of unsaturated rock or soil.

PERMEABILITY: The capacity of a porous rock, sediment or soil to transmit a fluid without impairment of the structure of the medium; it is a measure of the relative ease of the fluid flow under unequal pressure.

PESTICIDE: A chemical agent used to destroy pests, includes specialty groups known as herbicides, fungicides, insecticides, rodenticides, etc.

pH: A measure of the acidic or alkaline nature of aqueous solutions, specifically the negative logarithm of the hydrogen ion concentration.

POLYCYCLIC COMPOUND: An organic compound in which the carbon atoms are arranged into two or more six-carbon rings, usually aromatic in nature.

POTENTIOMETRIC SURFACE: An imaginary surface that coincides with the elevation to which water from a pumped or nonpumped aquifer would rise in a well hydraulically connected to that aquifer.

ppb: Parts per billion by weight, roughly micrograms per kilogram.

ppm: Parts per million by weight, roughly millograms per kilogram.

PRECIPITATION: Rainfall and snowfall.

QUATERNARY: The second period of the Cenozoic geologic era, following the Tertiary, and including the last 2-3 million years.

RECEPTORS: Individuals or groups of organisms or resources that are potentially affected by a contamination source.

RECHARGE: The addition of water to the zone of saturation by natural or artificial processes.

RECHARGE AREA: The part of an aquifer that receives water by infiltration from surface water, precipitation or an overlying aquifer. Recharge areas may be natural or manmade.

SATURATED ZONE: The part of the earth's crust in which all voids are filled with water.

SEDIMENTARY ROCKS: Rocks formed by the consolidation of loose sediments that have accumulated in layers.

SPECIFIC CAPACITY: The discharge of water from a well per unit of drawdown, commonly expressed in gpm/ft.

SPECIFIC YIELD: The change that occurs in the amount of water in storage per unit area of an unconfined aquifer as a result of a unit change in static head.

STATIC HEAD: The height above a standard datum in an aquifer that water will rise in a tightly cased well.

STATIC WATER ELEVATION: The elevation to which water from a nonpumped aquifer would rise in a well.

STATIC WATER LEVEL: The level of water in a well that is not being affected by withdrawal of groundwater.

STORAGE COEFFICIENT: The volume of water an aquifer releases from or takes into storage per unit surface area of an aquifer per unit change in head. The storage coefficient is essentially equal to specific yield for an unconfined aquifer.

STRATA: Distinguishable horizontal layers separated vertically from other layers.

SURFACE WATER: All water exposed at the ground surface, including streams, rivers, ponds and lakes.

TOXICITY: The ability of a material to produce injury or disease upon exposure, ingestion, inhalation or assimilation by a living organism.

TRACE METALS: Metal elements that occur in low abundances in natural materials.

TRANSMISSIVITY: A measure of an aquifer's capability to yield water; the rate at which water is transmitted through a unit width of aquifer under a unit hydraulic gradient.

TRANSPIRATION: The process by which water absorbed by plants, usually through the roots, is evaporated into the atmosphere from the plant surface.

UNCONFINED AQUIFER: An aquifer that has a water table. The aquifer is not overlain by a confining unit.

UPGRADIENT: In the direction of increasing hydraulic head; the direction opposite the prevailing flow of groundwater.

VARVE: A pair of contrasting laminae representing seasonal sedimentation, as summer (light) and winter (dark) within a single year.

VOLATILITY: The quality or state of being readily vaporized.

WATER TABLE: Surface of a body of unconfined groundwater at which the pressure is equal to that of the atmosphere.

WETLAND: An area subject to permanent or prolonged inundation or saturation that exhibits plant communities adapted to this environment.

APPENDIX B
HYDROGEOLOGIC INVESTIGATION DATA

APPENDIX B
HYDROGEOLOGIC INVESTIGATION DATA
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APPENDIX B
HYDROGEOLOGIC INVESTIGATION DATA

INTRODUCTION

Soil Boring Logs

Soil samples were collected to perform visual and lithologic classification, organic vapor scanning and chemical analysis. Soil samples were obtained using a split-spoon, Shelby tube, hand auger or stainless steel trowel or spoon in unconsolidated materials. Lithologic "grab" samples were collected from mud returns with a steel shovel when drilling through bedrock. In general, soil samples were lithologically logged and screened for volatile contamination as outlined in Section 3.4.2.1 of the Work Plan [ES, 1990d]. The soil boring logs and boring data in tabular form are presented by site in this Appendix.

Most of the 1989-1991 soil borings were drilled using continuous flight, hollow-stem augers. Lithologic and analytical soil samples were obtained using either a 30-inch Shelby tube or an 18-inch split-spoon sampler. Samples were collected at 5-foot intervals following Standard Penetration Test Procedures (ASTM Test D-1586). The samples were logged, screened and packaged according to the procedures outlined in subsection 3.4.2.1 of the Work Plan [ES, 1990d]. Visual observations and results of the organic vapor screening determined which samples would be submitted for chemical analysis. All downhole equipment was decontaminated according to procedures outlined in Section 3.4.6 of the Work Plan [ES, 1990d]. Samples were obtained in this manner at Sites 1, 4, 5 and 8.

The soil borings were abandoned by backfilling with a mixture of bentonite/cement grout (94 pounds of cement/5 pounds of granular bentonite/6 gallons of water). The grout was pumped into the boring through a tremie pipe. Grout was pumped from the bottom of the boring to land surface by gradually raising the tremie pipe so that it was always just below the rising grout level.

Hand Auger Summary

Shallow soil borings which were required near utilities, or where use of a drill rig was deemed uneconomical, were performed with a hand auger or stainless steel trowel or spoon. Soil samples were obtained in this manner at Sites 2, 3/6, 9 and 10. The samples were logged, screened, selected for chemical analysis and packaged as described above.

Additional hand augering was performed at Site 2, Former Landfill C, and at Site 7, Former Landfill A, to determine the thickness of the material covering the landfill. The location of these borings is shown on Figures B.1 and B.2, respectively; the results of these sampling efforts are provided in Tables B.1 and B.2.

Exploratory hand augering, completed as described above, was conducted at Site 3/6 in 1990 to determine the placement of monitoring wells and to obtain soil samples. Additional hand augering was conducted in 1991 to determine the source of contamination detected in 1990 at monitoring well VF3/6 MW-1. The location of all of the exploratory hand augered borings are indicated on Figure B.3. HA1-HA33 were completed in 1990 and HA40-HA47 were completed in 1991. A summary of these logs are included in Table B.3.

Hand augered holes were abandoned by filling the hole with bentonite pellets.

Monitoring Well Logs

Thirty-one groundwater monitoring wells (including piezometers and temporary wells) were installed at the ten IRP sites during the 1989-1991 field investigation. Monitoring wells and piezometers were drilled by three methods: hollow-stem augering, rotary wash drilling and hand augering. The monitoring well logs prepared using data obtained during well installation are included in this subsection. Well construction details for all wells installed at these sites are presented in Table B.4. Monitoring well logs were not prepared for the temporary monitoring wells.

Most of the monitoring wells installed during the course of this RI were installed by the rotary wash drilling method. The wells were installed using either a 9-7/8-inch or 6-7/8-inch roller bit to drill through the unconsolidated soils and a 5-7/8-inch bit in bedrock. Wells were installed by this method at Sites 1, 2, 3/6, 5, 7, 10 and the Base boundary. These wells were all constructed of 2-inch inside diameter (ID) Schedule 40 PVC casing and screen with threaded, flush joints. The well screens were either 10 or 15 feet in length, wire-wrapped with 0.010-inch openings, and included a threaded bottom cap and 2-foot sump. A silica sand pack was placed in the annular space around the screen, from approximately 2 feet below the bottom of the screen to at least 3 feet above the top of the screen. A minimum 2-foot thick bentonite pellet seal was placed above the sand pack. The borehole was tremie-grouted to the surface with a cement/bentonite grout.

A 6-inch diameter steel security riser with locking lid and three steel guardposts were installed around each PVC well riser. All risers were marked with well identification numbers.

The monitoring well and piezometers at Site 8 were installed using 6.25-inch ID hollow-stem augers. The monitoring well was constructed as described above. The piezometers were constructed of 1-inch ID Schedule 40 PVC casing and screen. All screens were 5 feet in length with 0.010-inch openings and included a threaded bottom cap. A silica sand pack was placed in the annular space around the screen bottom cap. A silica sand pack was placed in the annular space around the screen from approximately 2 feet below the bottom of the screen to about 3 feet above the top of the screen. The annular space was sealed with a minimum two-foot bentonite seal, followed by a bentonite-cement grout mixture which was tremied to the surface. The monitoring well and piezometers at Site 8 were completed with 9-5/8-inch O.D. (outside diameter) flush, locking, protective covers set in concrete.

A total of three temporary monitoring wells were installed at Volk Field. Two of these wells were installed at Site 3/6 and one at Site 1. The temporary monitoring wells were installed to help define the extent of contamination. The wells were constructed of 4-inch ID Schedule 40 PVC casing and screen. The screen was wire-wrapped with 0.010-inch openings and included a threaded bottom cap. The screens were 5 feet long at Site 3/6 and 10 feet long at Site 1. These wells were installed with approximately 2 feet of screen below the water table. The wells were not sand packed or grout sealed due to their temporary nature. The wells were developed by pumping. After obtaining samples for visual or analytic purposes, each well was checked for free product and then removed. The boreholes were abandoned by backfilling with bentonite pellets.

Groundwater Level Summary

Groundwater data were obtained to determine the depth to groundwater and flow patterns, including horizontal and vertical gradients, at Volk Field and Hardwood Range. This subsection includes a summary of groundwater level measurements and groundwater contour maps.

Groundwater Level Measurements

The water level in each well at the Base and Hardwood Range was measured within a 12-hour period. The water levels were measured to the nearest 0.01 foot using an electronic water level indicator referenced to the surveyor's mark made on the top of the PVC riser. The elevation of this mark was determined to the nearest 0.01 foot and referenced to an established datum. Eleven rounds of water level measurements were made during the course of the investigation. Not all rounds included every well. Tables summarizing the depth to groundwater (Table B.5), water elevation measurements (Table B.6) and changes in water elevations (Table B.7) are included in this subsection. Tables B.8 through B.10 summarize the vertical and horizontal gradient at Volk Field.

Groundwater Contour Maps

Groundwater contour maps were prepared using the information presented in Table B.6. A maximum of five contour maps for each of the sites and four Base-wide contour maps were completed. These maps are presented by site in this subsection.

SOIL BORING LOGS

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 1	Well I.D.
Boring I.D. SB16	Date Installed
Geologist/Engineer K. S. Charick	Date Grouted
Drilling Method HSA	Casing Material
Sampling Method Grab	Screen Material
Date Started 11-2-89	Casing Interval (ft)
Date Completed 11-2-89	Screened Interval (ft)
Driller North Star	Sump Installed?
Borehole Diameter (in) 9	Well Depth (ft)
Depth Drilled (ft) 10	TOC Elevation (ft)
Ground Elevation (ft) 920.0	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-29-89	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X				SAND, light brown to moderate black, very fine to medium.	SW		
					Same as above except dark yellowish orange to 6 feet.			
5	X				Same as above except pale yellowish orange to 10 feet.			
10								
15								
20								
25								

SOILBORB.PDT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	
Site 1	Project I.D. AT077
Boring I.D. SB17	Well I.D.
Geologist/Engineer K. S. Charick	Date Installed
Drilling Method HSA	Date Grouted
Sampling Method Split Spoon	Casing Material
Date Started 11-2-89	Screen Material
Date Completed 11-2-89	Casing Interval (ft)
Driller North Star	Screened Interval (ft)
Borehole Diameter (in) 9	Sump Installed?
Depth Drilled (ft) 6	Well Depth (ft)
Ground Elevation (ft) 916.5	TOC Elevation (ft)
Depth to Water (ft)	Water Level (ft)
Date Measured 11-29-89	Date Measured

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0			75	540	SILT, some sand, black discoloration, very fine to slightly coarse, rocks (cobbles), strong hydrocarbon odor to 2 feet.	ML / SW		
			50	1000+	SAND, moderate yellowish brown to grayish orange, slight discoloration, very fine to slightly coarse, strong hydrocarbon odor.			
5								
10								
15								
20								
25								

SOILBORG.PDT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB
Site 1
Boring I.D. SB18
Geologist/Engineer K. S. Charick
Drilling Method HSA
Sampling Method Split Spoon
Date Started 11-2-86
Date Completed 11-2-89
Driller North Star
Borehole Diameter (in) 9
Depth Drilled (ft) 6
Ground Elevation (ft) 916.6
Depth to Water (ft)
Date Measured 11-29-89

Project I.D. AT077
Well I.D.
Date Installed
Date Grouted
Casing Material
Screen Material
Casing Interval (ft)
Screened Interval (ft)
Sump Installed?
Well Depth (ft)
TOC Elevation (ft)
Water Level (ft)
Date Measured

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0						SW		
	X		30	0	SAND, moderate yellowish brown, some rock fragments (cobbles), very fine to slightly medium, strong hydrocarbon odor to 2 feet, black discoloration from 2 to 3 feet.			
5	X			600	SAND, moderate yellowish brown to black, slight discoloration, very fine to medium, strong hydrocarbon odor to 5.5 feet.			
10								
15								
20								
25								

SOILBORG.FOT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 1	Well I.D.
Boring I.D. SB19	Date Installed
Geologist/Engineer K. S. Charick	Date Grouted
Drilling Method HSA	Casing Material
Sampling Method Shelby Tubes	Screen Material
Date Started 11-7-89	Casing Interval (ft)
Date Completed 11-7-89	Screened Interval (ft)
Driller North Star	Sump Installed?
Borehole Diameter (in) 8	Well Depth (ft)
Depth Drilled (ft) 5	TOC Elevation (ft)
Ground Elevation (ft) 913.3	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-29-89	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X		90	0	SAND, trace silt, trace clay, moderate yellowish brown to dusky yellowish brown, fine to medium, subrounded to subangular.	SW		
5	X		60	0	SAND, fine to medium, pale yellowish orange to 7.7 feet. SANDSTONE, moderate orange pink, very fine to medium, weathered.			
10								
15								
20								
25								

SOILBORG.PDT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB
Site 1
Boring I.D. SB19a
Geologist/Engineer K. S. Charick
Drilling Method HSA
Sampling Method Split Spoon
Date Started 11-3-89
Date Completed 11-3-89
Driller North Star
Borehole Diameter (in) 9
Depth Drilled (ft) 6
Ground Elevation (ft)
Depth to Water (ft)
Date Measured

Project I.D. AT077
Well I.D.
Date Installed
Date Grouted
Casing Material
Screen Material
Casing Interval (ft)
Screened Interval (ft)
Sump Installed?
Well Depth (ft)
TOC Elevation (ft)
Water Level (ft)
Date Measured

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X		4	2	SILT, some sand, fine, little clay, cobbles to 2 feet.	ML		
					SAND, pale yellowish orange and light brown, very fine to fine, well sorted.	SW		
			6					
5	X					ML		
					SILT, black, some sand, fine, and clay to 6 feet.			
10								
15								
20								
25								

SOILBORE.FC

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AI077
Site 1	Well I.D.
Boring I.D. SB20	Date Installed
Geologist/Engineer K. S. Charick	Date Grouted
Drilling Method HSA	Casing Material
Sampling Method Shelby Tubes	Screen Material
Date Started 11-7-89	Casing Interval (ft)
Date Completed 11-7-89	Screened Interval (ft)
Driller North Star	Sump Installed?
Borehole Diameter (in) 8	Well Depth (ft)
Depth Drilled (ft) 8	TOC Elevation (ft)
Ground Elevation (ft) 914.2	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-29-89	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X		75	0	SAND and SILT, light brown and black, fine to slightly medium, moderately sorted.	SM		
5	X		75	0	SAND and SILT, trace clay, moderate brown to dusky yellowish brown, fine to medium to 7 feet.			
				0	SAND, pale yellowish orange, very fine to 7.5 feet.	SW		
					SANDSTONE, moderate orange pink, very fine, weathered.			
10								
15								
20								
25								

SOILBORG.PDT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 1	Well I.D.
Boring I.D. SB21	Date Installed
Geologist/Engineer K. S. Charick	Date Grouted
Drilling Method HSA	Casing Material
Sampling Method Shelby Tubes	Screen Material
Date Started 11-7-89	Casing Interval (ft)
Date Completed 11-7-89	Screened Interval (ft)
Driller North Star	Sump Installed?
Borehole Diameter (in) 8	Well Depth (ft)
Depth Drilled (ft) 8	TOC Elevation (ft)
Ground Elevation (ft) 915.3	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-29-89	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X		65	0	SAND, some silt, trace clay, moderate brown and black to moderate yellowish brown, very fine to medium.	SW		
5	X		100	0	SAND, pale yellowish orange, very fine to fine, well sorted to 7 feet.			
				0	Same as above except moderate brown to 8 feet.			
10								
15								
20								
25								

SOILBORG.FOT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 1	Well I.D.
Boring I.D. SB22	Date Installed
Geologist/Engineer K. S. Charick	Date Grouted
Drilling Method HSA	Casing Material
Sampling Method Shelby Tubes	Screen Material
Date Started 11-7-89	Casing Interval (ft)
Date Completed 11-7-89	Screened Interval (ft)
Driller North Star	Sump Installed?
Borehole Diameter (in) 8	Well Depth (ft)
Depth Drilled (ft) 8	TOC Elevation (ft)
Ground Elevation (ft) 915.4	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-29-89	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X		100	0	SANDSTONE, trace silt, trace clay, dark yellowish orange, very fine to fine, weathered, friable.			
					Same as above except moderate brown to 2.5 feet.			
5	X		100	0	Same as above except pale yellowish orange.			
					Same as above except light brown.			
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SOILBORE.FDT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 1	Well I.D.
Boring I.D. SB23	Date Installed
Geologist/Engineer K. S. Charick	Date Grouted
Drilling Method HSA	Casing Material
Sampling Method Shelby Tubes	Screen Material
Date Started 11-7-89	Casing Interval (ft)
Date Completed 11-7-89	Screened Interval (ft)
Driller North Star	Sump Installed?
Borehole Diameter (in) 8	Well Depth (ft)
Depth Drilled (ft) 12.5	TOC Elevation (ft)
Ground Elevation (ft) 915.6	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-29-89	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X		75	0	SAND, light brown, very fine to medium, very strong hydrocarbon odor to 2 feet.	SW		
					SAND and SILT, black, fine to 2.5 feet.	ML		
						SW		
5	X		70	0	SAND, dark yellowish orange, very fine to 7 feet.			
					SAND and SILT, black, very fine to fine, strong hydrocarbon odor to 8 feet.			
10	X		70		SAND, dark yellowish orange, very fine to 12 feet.			
					SAND and SILT, black, very fine to fine, strong hydrocarbon odor to 12.5 feet.	SM		
15								
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SOILBORG.PDT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AI077
Site 1	Well I.D.
Boring I.D. SB24	Date Installed
Geologist/Engineer K. S. Charick	Date Grouted
Drilling Method HSA	Casing Material
Sampling Method Shelby Tubes	Screen Material
Date Started 11-8-89	Casing Interval (ft)
Date Completed 11-8-89	Screened Interval (ft)
Driller North Star	Sump Installed?
Borehole Diameter (in) 8	Well Depth (ft)
Depth Drilled (ft) 12.5	TOC Elevation (ft)
Ground Elevation (ft) 917.6	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-29-89	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X		75	0.1	SAND, light brown, fine to slightly medium to 2.2 feet.	SW		
					SILT and SAND, black, very fine to fine to 2.5 feet.	SM		
5	X		100	0	SANDSTONE, pale yellowish orange, very fine, weathered to 6.5 feet.			
					SAND, light brown, very fine to fine to 7.8 feet.	SW		
					SILT and SAND, black, very fine to 8 feet.	SM		
10								
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SOILBORG.FOT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB
Site 1
Boring I.D. SB25
Geologist/Engineer K. S. Charick
Drilling Method HSA
Sampling Method Shelby Tubes
Date Started 11-8-89
Date Completed 11-8-89
Driller North Star
Borehole Diameter (in) 8
Depth Drilled (ft) 8
Ground Elevation (ft) 917.9
Depth to Water (ft)
Date Measured 11-29-89

Project I.D. AT077
Well I.D.
Date Installed
Date Grouted
Casing Material
Screen Material
Casing Interval (ft)
Screened Interval (ft)
Sump Installed?
Well Depth (ft)
TOC Elevation (ft)
Water Level (ft)
Date Measured

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X		100	0	SAND, trace silt, trace clay, light brown, very fine to slightly medium to 2 feet.	SW		
					SAND and SILT, dark yellowish brown, very fine to fine to 2.5 feet.	SM		
5	X		100	1.2	SAND, little silt, little clay, dark yellowish brown, very fine, strong hydrocarbon odor to 7 feet.	SW		
10								
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SOILBORG.PDT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 1	Well I.D.
Boring I.D. SB26	Date Installed
Geologist/Engineer K. S. Charick	Date Grouted
Drilling Method HSA	Casing Material
Sampling Method Shelby Tubes	Screen Material
Date Started 11-8-89	Casing Interval (ft)
Date Completed 11-8-89	Screened Interval (ft)
Driller North Star	Sump Installed?
Borehole Diameter (in) 8	Well Depth (ft)
Depth Drilled (ft) 8	TOC Elevation (ft)
Ground Elevation (ft) 917.8	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-29-89	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X		75	0	SAND, light brown, very fine, well sorted, no odor to 2 feet.	SW		
					SAND, little silt, trace clay, moderate brown, very fine to medium to 2.5 feet.			
5	X		100	0	SANDSTONE, pale yellowish orange, very fine, weathered to 7.5 feet.			
					SAND, little silt, trace clay, light brown, very fine to medium.	SW		
10								
15								
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SOILBORG.FOT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB
Site 1
Boring I.D. SB27
Geologist/Engineer K. S. Charick
Drilling Method HSA
Sampling Method Shelby Tubes
Date Started 11-8-89
Date Completed 11-8-89
Driller North Star
Borehole Diameter (in) 8
Depth Drilled (ft) 8
Ground Elevation (ft) 917.5
Depth to Water (ft)
Date Measured 11-29-89

Project I.D. AT077
Well I.D.
Date Installed
Date Grouted
Casing Material
Screen Material
Casing Interval (ft)
Screened Interval (ft)
Sump Installed?
Well Depth (ft)
TOC Elevation (ft)
Water Level (ft)
Date Measured

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X		75	0	SAND, trace silt, trace clay, light brown, very fine to fine.	SW		
5	X		100	0	SAND, trace silt, trace clay, moderate brown, very fine to fine to 6.5 feet.			
					SANDSTONE, trace silt, pale yellowish orange, very fine, weathered to 8 feet.			
10								
15								
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25								

SOILBORG.PDT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 1	Well I.D.
Boring I.D. SB28	Date Installed
Geologist/Engineer K. S. Charick	Date Grouted
Drilling Method HSA	Casing Material
Sampling Method Shelby Tubes	Screen Material
Date Started 11-7-89	Casing Interval (ft)
Date Completed 11-7-89	Screened Interval (ft)
Driller North Star	Sump Installed?
Borehole Diameter (in) 8	Well Depth (ft)
Depth Drilled (ft) 8	TOC Elevation (ft)
Ground Elevation (ft) 914.5	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-29-89	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X		90	0	SAND, light brown, fine to medium to 2 feet.	SW		
					SAND and SILT, dusky yellowish brown, very fine to fine to 2.5 feet.	SM		
5	X		90	0	SANDSTONE, very pale orange, very fine, weathered to 5.8 feet.	SW		
					SAND, pale yellowish orange, very fine to fine to 6.2 feet.			
					SAND, light brown, fine to 7.5 feet.			
					SAND and SILT, dusky yellowish brown, very fine to fine to 8 feet.	SM		
10								
15								
20								
25								

SOILBORG.PDT

ENGINEERING - SCIENCE

SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 1	Well I.D.
Boring I.D. SB29	Date Installed
Geologist/Engineer K. S. Charick	Date Grouted
Drilling Method HSA	Casing Material
Sampling Method Shelby Tubes	Screen Material
Date Started 11-8-89	Casing Interval (ft)
Date Completed 11-8-89	Screened Interval (ft)
Driller North Star	Sump Installed?
Borehole Diameter (in) 8	Well Depth (ft)
Depth Drilled (ft) 8	TOC Elevation (ft)
Ground Elevation (ft) 915.0	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-29-89	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X		65	0	SAND, pale yellowish orange, very fine to 1.5 feet.	SW		
					Same as above except moderate brown to 1.8 feet.	ML		
					SILT, little sand, trace clay to 2 feet.			
5	X		65	0.1	SAND, pale yellowish orange, very fine to 7.8 feet.	SW		
					SILT, little sand, little clay, black to 8 feet.	ML		
10								
15								
20								
25								

SOILBORG.PDT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB
Site 1
Boring I.D. SB30
Geologist/Engineer K. S. Charick
Drilling Method HSA
Sampling Method Shelby Tubes
Date Started 11-8-89
Date Completed 11-8-89
Driller North Star
Borehole Diameter (in) 8
Depth Drilled (ft) 8
Ground Elevation (ft) 914.8
Depth to Water (ft)
Date Measured 11-29-89

Project I.D. AT077
Well I.D.
Date Installed
Date Grouted
Casing Material
Screen Material
Casing Interval (ft)
Screened Interval (ft)
Sump Installed?
Well Depth (ft)
TOC Elevation (ft)
Water Level (ft)
Date Measured

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X		60	0.3	SAND, little silt, trace clay, light brown, very fine to fine, well sorted to 1 foot.	SW		
					Same as above except moderate brown to 1.5 feet.	SM		
					SAND and SILT, black, very fine to fine to 2 feet.			
5	X		75	0	SAND, pale yellowish orange to 7 feet.	SW		
					Same as above except moderate brown to 7.8 feet.			
					SILT, little clay, trace sand, black to 8 feet.	ML		
10								
15								
20								
25								

SOILBORG.PDT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB
Site 1
Boring I.D. SB31
Geologist/Engineer K. S. Charick
Drilling Method HSA
Sampling Method Shelby Tubes
Date Started 11-8-89
Date Completed 11-8-89
Driller North Star
Borehole Diameter (in) 8
Depth Drilled (ft) 8
Ground Elevation (ft) 915.3
Depth to Water (ft)
Date Measured 11-29-89

Project I.D. AT077
Well I.D.
Date Installed
Date Grouted
Casing Material
Screen Material
Casing Interval (ft)
Screened Interval (ft)
Sump Installed?
Well Depth (ft)
TOC Elevation (ft)
Water Level (ft)
Date Measured

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X		75	0	SAND, trace silt, light brown, very fine to fine, well sorted to 2 feet.	SW		
					SAND and SILT, trace clay, dusky brown to black, very fine to 2.5 feet.	SM		
5	X		100	0	SANDSTONE, trace silt, trace sand, pale yellowish orange, very fine, weathered to 8 feet.			
10								
15								
20								
25								

SOILBORG.POT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 2	Well I.D.
Boring I.D. SB1	Date Installed
Geologist/Engineer J. Pirkle	Date Grouted
Drilling Method Hand Auger	Casing Material
Sampling Method Hand Auger	Screen Material
Date Started 10-29-90	Casing Interval (ft)
Date Completed 10-29-90	Screened Interval (ft)
Driller	Sump Installed?
Borehole Diameter (in) 6	Well Depth (ft)
Depth Drilled (ft) 2	TOC Elevation (ft)
Ground Elevation (ft) 909.18	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X			0	SAND, brown, moist.	SW		
5								
10								
15								
20								
25								

SOILBORG.PDT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB
Site 2
Boring I.D. SB2
Geologist/Engineer M. Jones
Drilling Method Hand Auger
Sampling Method Hand Auger
Date Started 10-30-90
Date Completed 10-30-90
Driller
Borehole Diameter (in) 6
Depth Drilled (ft) 2
Ground Elevation (ft) 910.56
Depth to Water (ft)
Date Measured 11-13-90

Project I.D. AT077
Well I.D.
Date Installed
Date Grouted
Casing Material
Screen Material
Casing Interval (ft)
Screened Interval (ft)
Sump Installed?
Well Depth (ft)
TOC Elevation (ft)
Water Level (ft)
Date Measured

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X			-	SAND, dark gray, loamy, moist.	SW		
5								
10								
15								
20								
25								

SOILBORG.FOT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Page 1 of 1

Client Volk Field ANGB	Project I.D. AT077
Site 2	Well I.D.
Boring I.D. SB3	Date Installed
Geologist/Engineer M. Jones	Date Grouted
Drilling Method Hand Auger	Casing Material
Sampling Method Hand Auger	Screen Material
Date Started 10-30-90	Casing Interval (ft)
Date Completed 10-30-90	Screened Interval (ft)
Driller	Sump Installed?
Borehole Diameter (in) 8	Well Depth (ft)
Depth Drilled (ft) 2	TOC Elevation (ft)
Ground Elevation (ft) 908.36	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X			0	SAND, little gravel, yellowish, loose, moist.	SW		
5								
10								
15								
20								
25								

SOILBORG.PDT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 2	Well I.D.
Boring I.D. SB4	Date Installed
Geologist/Engineer M. Jones	Date Grouted
Drilling Method Hand Auger	Casing Material
Sampling Method Hand Auger	Screen Material
Date Started 10-30-90	Casing Interval (ft)
Date Completed 10-30-90	Screened Interval (ft)
Driller	Sump Installed?
Borehole Diameter (in) 8	Well Depth (ft)
Depth Drilled (ft) 2	TOC Elevation (ft)
Ground Elevation (ft) 911.5	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X			0	SAND, some gravel, brown, loose.	SW		
5								
10								
15								
20								
25								

SOILBORG.POT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Page 1 of 1

Client Volk Field ANGB	Project I.D. AT077
Site 2	Well I.D.
Boring I.D. SB5	Date Installed
Geologist/Engineer M. Jones	Date Grouted
Drilling Method Hand Auger	Casing Material
Sampling Method Hand Auger	Screen Material
Date Started 10-30-90	Casing Interval (ft)
Date Completed 10-30-90	Screened Interval (ft)
Driller	Sump Installed?
Borehole Diameter (in) 8	Well Depth (ft)
Depth Drilled (ft) 2	TOC Elevation (ft)
Ground Elevation (ft) 904.42	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X			0	SAND, brown.	SW		
5								
10								
15								
20								
25								

SOILBORG.FOT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	
Site 3/6	Project I.D. AT077
Boring I.D. SB1	Well I.D.
Geologist/Engineer D. Moutoux	Date Installed
Drilling Method Hand Auger	Date Grouted
Sampling Method Hand Auger	Casing Material
Date Started 10-14-90	Screen Material
Date Completed 10-16-90	Casing Interval (ft)
Driller	Screened Interval (ft)
Borehole Diameter (in) 6	Sump Installed?
Depth Drilled (ft) 5	Well Depth (ft)
Ground Elevation (ft) 920.25	TOC Elevation (ft)
Depth to Water (ft)	Water Level (ft)
Date Measured 11-13-90	Date Measured

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X			10	GRAVEL and SAND, brown, dry.	GW		
				47	Black stained soil with fuel odor.	SW		
				13	SAND, orange.			
					As above except lighter.			
5	X			3.8	As above except wet.			
10								
15								
20								
25								

SOILBORG.FOT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 3/6	Well I.D.
Boring I.D. SB2	Date Installed
Geologist/Engineer D. Moutoux	Date Grouted
Drilling Method Hand Auger	Casing Material
Sampling Method Hand Auger	Screen Material
Date Started 10-14-90	Casing Interval (ft)
Date Completed 10-16-90	Screened Interval (ft)
Driller	Sump Installed?
Borehole Diameter (in) 6	Well Depth (ft)
Depth Drilled (ft) 5	TOC Elevation (ft)
Ground Elevation (ft) 918.63	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X			0	SAND and GRAVEL, very brown.	GW		
				0	SAND, dark brown, fine.			
				7.4	CLAY and SILT.	CL ML		
				>1000	As above except wet with dark staining.	SW		
5	X				SAND.			
				18	Fuel odor, wet.			
10								
15								
20								
25								

SOILBORG.PDT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 3/6	Well I.D.
Boring I.D. SB3	Date Installed
Geologist/Engineer D. Moutoux	Date Grouted
Drilling Method Hand Auger	Casing Material
Sampling Method Hand Auger	Screen Material
Date Started 10-14-90	Casing Interval (ft)
Date Completed 10-16-90	Screened Interval (ft)
Driller	Sump Installed?
Borehole Diameter (in) 6	Well Depth (ft)
Depth Drilled (ft) 6	TOC Elevation ( )
Ground Elevation (ft) 920.19	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X			0	Sandy soil with some gravel, dark brown.	SW		
				0	As above except lighter and sandier.			
					As above except dark tan.			
5	X			0	As above except light tan.			
				0	SAND, some clay (medium brown), rust colored.			
					Wet.			
10								
15								
20								
25								

SOILBORG.FOT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 3/6	Well I.D.
Boring I.D. SB4	Date Installed
Geologist/Engineer D. Moutoux	Date Grouted
Drilling Method Hand Auger	Casing Material
Sampling Method Hand Auger	Screen Material
Date Started 10-14-90	Casing Interval (ft)
Date Completed 10-16-90	Screened Interval (ft)
Driller	Sump Installed?
Borehole Diameter (in) 6	Well Depth (ft)
Depth Drilled (ft) 7	TOC Elevation (ft)
Ground Elevation (ft) 922.55	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X			0	SAND, light tan/slightly orange.	SW		
				0				
5				0.3				
	X			110	AS above except wet.			
10								
15								
20								
25								

SOILBORE.FOT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 3/6	Well I.D.
Boring I.D. SB5	Date Installed
Geologist/Engineer D. Moutoux	Date Grouted
Drilling Method Hand Auger	Casing Material
Sampling Method Hand Auger	Screen Material
Date Started 10-16-90	Casing Interval (ft)
Date Completed 10-16-90	Screened Interval (ft)
Driller	Sump Installed?
Borehole Diameter (in) 6	Well Depth (ft)
Depth Drilled (ft) 6	TOC Elevation (ft)
Ground Elevation (ft) 922.9	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0				0	Sandy soil, brown.	SW		
				>1000				
					As above except very light tan.			
5	X			>1000				
10								
15								
20								
25								

SOILBORG.PDT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 3/6	Well I.D.
Boring I.D. SB6	Date Installed
Geologist/Engineer D. Moutoux	Date Grouted
Drilling Method Hand Auger	Casing Material
Sampling Method Hand Auger	Screen Material
Date Started 10-16-90	Casing Interval (ft)
Date Completed 10-16-90	Screened Interval (ft)
Driller	Sump Installed?
Borehole Diameter (in) 6	Well Depth (ft)
Depth Drilled (ft) 6	TOC Elevation (ft)
Ground Elevation (ft) 922.89	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNU/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0				0	SAND, light orange/tan becoming dark brown at 2.5 feet.	SW		
				0				
5	X			120	Strong petroleum odor (OVA reading over hole: 80ppm). Hit concrete.			
10								
15								
20								
25								

SOILBORB.PDT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	
Site 3/6	Project I.D. AT077
Boring I.D. SB7	Well I.D.
Geologist/Engineer D. Moutoux	Date Installed
Drilling Method Hand Auger	Date Grouted
Sampling Method Hand Auger	Casing Material
Date Started 10-17-90	Screen Material
Date Completed 10-17-90	Casing Interval (ft)
Driller	Screened Interval (ft)
Borehole Diameter (in) 6	Sump Installed?
Depth Drilled (ft) 6	Well Depth (ft)
Ground Elevation (ft) 922.41	TOC Elevation (ft)
Depth to Water (ft)	Water Level (ft)
Date Measured 11-13-90	Date Measured

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0				0	SAND, light tan/slightly orange.	SW		
				0	As above except OVA reading over hole: 0.4ppm.			
5	X			0.3				
				110	As above except wet.			
10								
15								
20								
25								

SOILBORG.FOT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 3/6	Well I.D.
Boring I.D. SB8	Date Installed
Geologist/Engineer D. Moutoux	Date Grouted
Drilling Method Hand Auger	Casing Material
Sampling Method Hand Auger	Screen Material
Date Started 10-17-90	Casing Interval (ft)
Date Completed 10-17-90	Screened Interval (ft)
Driller	Sump Installed?
Borehole Diameter (in) 6	Well Depth (ft)
Depth Drilled (ft) 6	TOC Elevation (ft)
Ground Elevation (ft) 922.89	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0				0	SAND, light tan/brown.	SW		
					CLAY and GRAVEL.	CL GP		
				0	SAND, orange.	SW		
5	X			0	As above except tan.			
				0	As above except wet.			
10								
15								
20								
25								

SOILBORS.POT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 3/6	Well I.D.
Boring I.D. SB9	Date Installed
Geologist/Engineer D. Moutoux	Date Grouted
Drilling Method Hand Auger	Casing Material
Sampling Method Hand Auger	Screen Material
Date Started 10-17-90	Casing Interval (ft)
Date Completed 10-17-90	Screened Interval (ft)
Driller	Sump Installed?
Borehole Diameter (in) 6	Well Depth (ft)
Depth Drilled (ft) 5	TOC Elevation (ft)
Ground Elevation (ft) 918.98	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNU/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0				0	SAND and GRAVEL.	GW		
				0	SAND, light black to dark gray stained looking, 2 to 3 inch layer.	SW		
					SAND, dark brown.			
					As above except beige brown.			
	X			0	As above except gold orange.	CL		
5					Sand, light and wet.			
					CLAY and wet.			
10								
15								
20								
25								

SOILBORE.PDT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Page 1 of 1

Client Volk Field ANGB	Project I.D. AT077
Site 3/6	Well I.D.
Boring I.D. SB10	Date Installed
Geologist/Engineer D. Moutoux	Date Grouted
Drilling Method Hand Auger	Casing Material
Sampling Method Hand Auger	Screen Material
Date Started 10-17-90	Casing Interval (ft)
Date Completed 10-17-90	Screened Interval (ft)
Driller	Sump Installed?
Borehole Diameter (in) 6	Well Depth (ft)
Depth Drilled (ft) 3	TOC Elevation (ft)
Ground Elevation (ft) 919.59	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNU/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0				0	SAND, light tan to brown becoming progressively more brown to 1 foot.	SW		
	☒			26				
5								
10								
15								
20								
25								

SOILBORG.FOT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB
Site 3/6
Boring I.D. SB11
Geologist/Engineer D. Moutoux
Drilling Method Hand Auger
Sampling Method Hand Auger
Date Started 11-7-90
Date Completed 11-7-90
Driller
Borehole Diameter (in) 6
Depth Drilled (ft) 6
Ground Elevation (ft) 921.38
Depth to Water (ft)
Date Measured 11-13-90

Project I.D. AT077
Well I.D.
Date Installed
Date Grouted
Casing Material
Screen Material
Casing Interval (ft)
Screened Interval (ft)
Sump Installed?
Well Depth (ft)
TOC Elevation (ft)
Water Level (ft)
Date Measured

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNU/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0				0	Sandy soil from 0 to 1 foot.	SW		
					SAND, brown.			
				0	As above except light orange			
					As above except light tan.			
5	X				As above except orange gold.			
				0				
10								
15								
20								
25								

SOILBORG.FOT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 3/6	Well I.D.
Boring I.D. SB12	Date Installed
Geologist/Engineer D. Moutoux	Date Grouted
Drilling Method Hand Auger	Casing Material
Sampling Method Hand Auger	Screen Material
Date Started 11-7-90	Casing Interval (ft)
Date Completed 11-7-90	Screened Interval (ft)
Driller	Sump Installed?
Borehole Diameter (in) 6	Well Depth (ft)
Depth Drilled (ft) 4	TOC Elevation (ft)
Ground Elevation (ft) 922.98	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0				0	SAND, brown becoming lighter with depth.	SW		
	☒			0	SAND, small amount of red/brown clay.			
5								
10								
15								
20								
25								

SOILBORG.PLOT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 3/6	Well I.D.
Boring I.D. SB13	Date Installed
Geologist/Engineer D. Moutoux	Date Grouted
Drilling Method Hand Auger	Casing Material
Sampling Method Hand Auger	Screen Material
Date Started 11-7-90	Casing Interval (ft)
Date Completed 11-7-90	Screened Interval (ft)
Driller	Sump Installed?
Borehole Diameter (in) 6	Well Depth (ft)
Depth Drilled (ft) 6	TOC Elevation (ft)
Ground Elevation (ft) 922.60	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0				0	Sandy soil, brown/black from 0 to 0.5 feet.	SW		
					SAND, brown becoming progressively more orange and light brown, fine.			
				0	SAND, light orange/tan.			
					SAND, tan.			
5	X				SAND, off white/tan.			
				0	SAND, wet.			
10								
15								
20								
25								

SOILBORG.FOT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 3/6	Well I.D.
Boring I.D. SB14	Date Installed
Geologist/Engineer D. Moutoux	Date Grouted
Drilling Method Hand Auger	Casing Material
Sampling Method Hand Auger	Screen Material
Date Started 11-7-90	Casing Interval (ft)
Date Completed 11-7-90	Screened Interval (ft)
Driller	Sump Installed?
Borehole Diameter (in) 6	Well Depth (ft)
Depth Drilled (ft) 6	TOC Elevation (ft)
Ground Elevation (ft) 923.08	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0				0	SAND, brown.	SW		
				0	As above.			
5	X							
				0	As above.			
10								
15								
20								
25								

SOILBORE.PLT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 3/6	Well I.D.
Boring I.D. SB15	Date Installed
Geologist/Engineer D. Moutoux	Date Grouted
Drilling Method Hand Auger	Casing Material
Sampling Method Hand Auger	Screen Material
Date Started 11-7-90	Casing Interval (ft)
Date Completed 11-7-90	Screened Interval (ft)
Driller	Sump Installed?
Borehole Diameter (in) 6	Well Depth (ft)
Depth Drilled (ft) 8	TOC Elevation (ft)
Ground Elevation (ft) 923.30	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0				0	Sandy soil, dark with possible staining from 0 to 1 foot.	SW		
					SAND, dark, rich brown.			
				0	SAND, lighter with orangish tint. OVA reading over hole: 0.4ppm.			
5					SAND, rusty orange.			
					SAND, light tan to white.			
	X			1.9	As above except small amout of gray clay in a lense.			
				740	SAND, red/brown with clay lense of same color.			
10					SAND, tan.			
					SAND, wet with moderate fuel odor.			
15								
20								
25								

SOILBORE.FOT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB
Site 3/6
Boring I.D. SB16
Geologist/Engineer D. Moutoux
Drilling Method Hand Auger
Sampling Method Hand Auger
Date Started 11-7-90
Date Completed 11-7-90
Driller
Borehole Diameter (in) 6
Depth Drilled (ft) 6
Ground Elevation (ft) 923.07
Depth to Water (ft)
Date Measured 11-13-90

Project I.D. AT077
Well I.D.
Date Installed
Date Grouted
Casing Material
Screen Material
Casing Interval (ft)
Screened Interval (ft)
Sump Installed?
Well Depth (ft)
TOC Elevation (ft)
Water Level (ft)
Date Measured

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0				1	SAND and GRAVEL, brown from 0 to 1 foot.	GW		
					Tan soil at 2 feet.	SW		
				40	SAND, light gray, strong odor.			
5	X				CLAY, red.	CL		
				>1000	SAND, gray/white.			
10								
15								
20								
25								

SOILBORG.POT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 4	Well I.D.
Boring I.D. SB9	Date Installed
Geologist/Engineer K. S. Charick	Date Grouted
Drilling Method HSA	Casing Material
Sampling Method Split Spoon	Screen Material
Date Started 11-2-89	Casing Interval (ft)
Date Completed 11-2-89	Screened Interval (ft)
Driller North Star	Sump Installed?
Borehole Diameter (in) 9	Well Depth (ft)
Depth Drilled (ft) 10.5	TOC Elevation (ft)
Ground Elevation (ft) 916.6	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-29-89	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X		5	0.2	SAND, trace silt, large rock fragments (weathered), dark yellowish orange, fine to medium, well sorted.	SW		
	X		40	0.1	SAND, trace silt, dark yellowish orange, trace black granules, very fine to fine, well sorted to 5 feet.			
5					SAND, very pale orange, fine to slightly medium to 5.5 feet.			
	X		40	0.4	SAND, trace silt, light brown, trace black granules, very fine to fine to 10.5 feet.			
10					SAND, trace silt, orange mottling, trace black granules to 10.5 feet.			
15								
20								
25								

SOILBORG.FDT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB
Site 4
Boring I.D. SB10
Geologist/Engineer K. S. Charick
Drilling Method HSA
Sampling Method Split Spoon
Date Started 11-2-89
Date Completed 11-2-89
Driller North Star
Borehole Diameter (in) 9
Depth Drilled (ft) 10
Ground Elevation (ft) 915.9
Depth to Water (ft)
Date Measured 11-2-89

Project I.D. AT077
Well I.D.
Date Installed
Date Grouted
Casing Material
Screen Material
Casing Interval (ft)
Screened Interval (ft)
Sump Installed?
Well Depth (ft)
TOC Elevation (ft)
Water Level (ft)
Date Measured

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0			80	0	GRAVEL, to 1 foot.	GW		
					SAND and SILT, trace clay, black and moderate brown, very fine to fine.	SM		
			50	0.2	SAND, dusky yellowish brown and light brown, very fine to fine.	SW		
5					As above, trace silt, except dark yellowish brown with trace black granules, orange mottling to 6 feet.			
			30	0.3	SAND and SILT, dusky yellowish brown and dark yellowish orange, very fine to fine to 9.5 feet.	SM		
10					SAND, very pale orange, very fine to fine.	SW		
15								
20								
25								

SOILBORG.PDT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 4	Well I.D.
Boring I.D. SB11	Date Installed
Geologist/Engineer K. S. Charick	Date Grouted
Drilling Method HSA	Casing Material
Sampling Method Split Spoon	Screen Material
Date Started 11-2-89	Casing Interval (ft)
Date Completed 11-2-89	Screened Interval (ft)
Driller North Star	Sump Installed?
Borehole Diameter (in) 9	Well Depth (ft)
Depth Drilled (ft) 10	TOC Elevation (ft)
Ground Elevation (ft) 917.0	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-29-89	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0			80		GRAVEL, to 1 foot.	GW		
					SAND, light brownish orange to moderate brown, black granules, very fine to fine, well sorted.	SW		
					SAND, light brownish orange, very fine to fine to slightly medium, moderately sorted.			
5					SAND, pale yellowish orange with some orange mottling, very fine to fine.			
					SAND, moderate yellowish brown, very fine to slightly coarse to 9.5 feet, firm.			
10					SANDSTONE, white with deep red fibers, fine to slightly medium, weathered.			
15								
20								
25								

SOILBORG.FOT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB
Site 5
Boring I.D. SB1
Geologist/Engineer K. S. Charick
Drilling Method HSA
Sampling Method Shelby Tubes
Date Started 11-4-89
Date Completed 11-4-89
Driller North Star
Borehole Diameter (in) 8
Depth Drilled (ft) 5.5
Ground Elevation (ft) 901.2
Depth to Water (ft)
Date Measured 11-29-89

Project I.D. AI077
Well I.D.
Date Installed
Date Grouted
Casing Material
Screen Material
Casing Interval (ft)
Screened Interval (ft)
Sump Installed?
Well Depth (ft)
TOC Elevation (ft)
Water Level (ft)
Date Measured

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X		50	1.8	SILT, some sand, trace clay, plant roots, black, fine.	ML		
	X		40	140	SILT, some sand, little clay, light gray, fine, slight hydrocarbon odor.			
5								
10								
15								
20								
25								

SOILBORG.PDT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 5	Well I.D.
Boring I.D. SB2	Date Installed
Geologist/Engineer K. S. Charick	Date Grouted
Drilling Method HSA	Casing Material
Sampling Method Shelby Tubes	Screen Material
Date Started 11-4-89	Casing Interval (ft)
Date Completed 11-4-89	Screened Interval (ft)
Driller North Star	Sump Installed?
Borehole Diameter (in) 8	Well Depth (ft)
Depth Drilled (ft) 8	TOC Elevation (ft)
Ground Elevation (ft) 901.5	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-29-89	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X		75	0	SILT, some sand (fine), little clay.	ML		
	X		100	0	Same as above except more clay, dusky brown and black, sand, fine to slightly coarse.			
5	X		100	0	SAND and CLAY, little silt, medium dark gray, fine to coarse.	SC		
10								
15								
20								
25								

SOILBORG.FOT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 5	Well I.D.
Boring I.D. SB3	Date Installed
Geologist/Engineer K. S. Charick	Date Grouted
Drilling Method HSA	Casing Material
Sampling Method Shelby Tubes/Grab	Screen Material
Date Started 11-4-89	Casing Interval (ft)
Date Completed 11-4-89	Screened Interval (ft)
Driller North Star	Sump Installed?
Borehole Diameter (in) 8	Well Depth (ft)
Depth Drilled (ft) 6	TOC Elevation (ft)
Ground Elevation (ft) 900.1	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-29-89	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X			0	CLAY, some silt, little sand, dusky brown.	CL		
	X		95	0	SAND and SILT, little clay, dark grey, very fine to slightly coarse, saturated.	SM		
5								
10								
15								
20								
25								

SOILBORG.PDT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	
Site 5	Project I.D. AT077
Boring I.D. SB4	Well I.D.
Geologist/Engineer K. S. Charick	Date Installed
Drilling Method HSA	Date Grouted
Sampling Method Shelby Tubes	Casing Material
Date Started 11-4-89	Screen Material
Date Completed 11-4-89	Casing Interval (ft)
Driller North Star	Screened Interval (ft)
Borehole Diameter (in) 8	Sump Installed?
Depth Drilled (ft) 6	Well Depth (ft)
Ground Elevation (ft) 901.4	TOC Elevation (ft)
Depth to Water (ft)	Water Level (ft)
Date Measured 11-29-89	Date Measured

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X		100	0	SILT, little sand, trace clay, black, fine to 0.5 feet.	ML		
					SAND, light brown, fine to coarse, poorly sorted to 0.8 feet.	SW		
	X		100	0	SILT, little sand, trace clay, black, fine to 2.5 feet.	ML		
5					Same as above to 4.5 feet.			
					SAND, pinkish gray, fine to slightly medium to 5 feet.	SW		
					SILT, little sand, little clay, black, fine to 6 feet.	ML		
10								
15								
20								
25								

SOILBORG.PDT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB
Site 5
Boring I.D. SB5
Geologist/Engineer K. S. Charick
Drilling Method HSA
Sampling Method Shelby Tubes
Date Started 11-5-89
Date Completed 11-5-89
Driller North Star
Borehole Diameter (in) 8
Depth Drilled (ft) 6
Ground Elevation (ft) 901.1
Depth to Water (ft)
Date Measured 11-29-89

Project I.D. AT077
Well I.D.
Date Installed
Date Grouted
Casing Material
Screen Material
Casing Interval (ft)
Screened Interval (ft)
Sump Installed?
Well Depth (ft)
TOC Elevation (ft)
Water Level (ft)
Date Measured

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X			106	SILT, little sand, trace clay, fine.	ML		
	X		70	1.9	SAND and SILT, trace clay, very pale orange and moderate brown, very fine to coarse.	SM		
5								
10								
15								
20								
25								

SOILBORG.PDT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB
Site 5
Boring I.D. SB6
Geologist/Engineer K. S. Charick
Drilling Method HSA
Sampling Method Shelby Tubes
Date Started 11-5-89
Date Completed 11-5-89
Driller North Star
Borehole Diameter (in) 8
Depth Drilled (ft) 6
Ground Elevation (ft) 901.0
Depth to Water (ft)
Date Measured 11-29-89

Project I.D. AT077
Well I.D.
Date Installed
Date Grouted
Casing Material
Screen Material
Casing Interval (ft)
Screened Interval (ft)
Sump Installed?
Well Depth (ft)
TOC Elevation (ft)
Water Level (ft)
Date Measured

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0				0	SILT, little sand, trace clay, black fine.	ML		
			100	10.4	SILT, little sand, trace clay, black and dusky brown, fine.			
5								
10								
15								
20								
25								

SOILBORG.PLT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB
Site 5
Boring I.D. SB7
Geologist/Engineer K. S. Charick
Drilling Method HSA
Sampling Method Shelby Tubes
Date Started 11-5-89
Date Completed 11-5-89
Driller North Star
Borehole Diameter (in) 8
Depth Drilled (ft) 6
Ground Elevation (ft) 901.2
Depth to Water (ft)
Date Measured 11-29-89

Project I.D. AT077
Well I.D.
Date Installed
Date Grouted
Casing Material
Screen Material
Casing Interval (ft)
Screened Interval (ft)
Sump Installed?
Well Depth (ft)
TOC Elevation (ft)
Water Level (ft)
Date Measured

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X			0	SILT, some sand, trace clay, black, fine.	ML		
	X		100	0.1	SAND and SILT, trace clay, alternating sand and silt, varved, very pale orange and dusky brown, very fine to medium.	SM		
5								
10								
15								
20								
25								

SOILBORG.PDT

ENGINEERING - SCIENCE

SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB
Site 5
Boring I.D. SB8
Geologist/Engineer K. S. Charick
Drilling Method HSA
Sampling Method Shelby Tubes
Date Started 11-5-89
Date Completed 11-5-89
Driller North Star
Borehole Diameter (in) 8
Depth Drille (ft) 6
Ground Elevation (ft) 901.6
Depth to Water (ft)
Date Measured 11-29-89

Project I.D. AT077
Well I.D.
Date Installed
Date Grouted
Casing Material
Screen Material
Casing Interval (ft)
Screened Interval (ft)
Sump Installed?
Well Depth (ft)
TOC Elevation (ft)
Water Level (ft)
Date Measured

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X		75	0	SILT, some sand, little clay (light brown), dusky brown, very fine.	ML		
5	X		80	1.5	CLAY and SILT, little clay, black and very pale orange, very fine to coarse.	CL ML		
10								
15								
20								
25								

SOILBORG.PDT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB
Site 5
Boring I.D. SB9
Geologist/Engineer K. S. Charick
Drilling Method HSA
Sampling Method Shelby Tubes/Grab
Date Started 11-5-89
Date Completed 11-5-89
Driller North Star
Borehole Diameter (in) 8
Depth Drilled (ft) 5.5
Ground Elevation (ft) 902.4
Depth to Water (ft)
Date Measured 11-29-89

Project I.D. AT077
Well I.D.
Date Installed
Date Grouted
Casing Material
Screen Material
Casing Interval (ft)
Screened Interval (ft)
Sump Installed?
Well Depth (ft)
TOC Elevation (ft)
Water Level (ft)
Date Measured

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X		95	0.2	SILT, some sand, little clay, light brown to moderate brown, very fine to fine.	ML		
	X		95	56	SILT, some sand, some clay (light brown), black, very fine to fine.			
5								
10								
15								
20								
25								

SOILBORG.PDT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AI077
Site 5	Well I.D.
Boring I.D. SB10	Date Installed
Geologist/Engineer K. S. Charick	Date Grouted
Drilling Method HSA	Casing Material
Sampling Method Shelby Tubes	Screen Material
Date Started 11-5-89	Casing Interval (ft)
Date Completed 11-5-89	Screened Interval (ft)
Driller North Star	Sump Installed?
Borehole Diameter (in) 8	Well Depth (ft)
Depth Drilled (ft) 5.5	TOC Elevation (ft)
Ground Elevation (ft) 902.1	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-29-89	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X		90	0	SAND and SILT, trace clay, fine to slightly coarse.	SM		
	X		95	0.2	SILT, some sand, little clay, dusky brown, very fine to fine.	ML		
5								
10								
15								
20								
25								

SOILBORG.PLT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AI077
Site 5	Well I.D.
Boring I.D. SB11	Date Installed
Geologist/Engineer K. S. Charick	Date Grouted
Drilling Method HSA	Casing Material
Sampling Method Shelby Tubes	Screen Material
Date Started 11-5-89	Casing Interval (ft)
Date Completed 11-5-89	Screened Interval (ft)
Driller North Star	Sump Installed?
Borehole Diameter (in) 8	Well Depth (ft)
Depth Drilled (ft) 6	TOC Elevation (ft)
Ground Elevation (ft) 903.4	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-29-89	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X			0	SAND and SILT, little clay, moderate yellowish brown, very fine to medium.	SM		
	X		40	0	SAND and SILT, some clay, light brown to moderate brown.			
5								
10								
15								
20								
25								

SOILBORG.FOT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AI077
Site 8	Well I.D.
Boring I.D. SB1	Date Installed
Geologist/Engineer Julie Burgin	Date Grouted
Drilling Method HSA	Casing Material
Sampling Method Split Spoon	Screen Material
Date Started 9-30-90	Casing Interval (ft)
Date Completed 9-30-90	Screened Interval (ft)
Driller North Star	Sump Installed?
Borehole Diameter (in) 8	Well Depth (ft)
Depth Drilled (ft) 6	TOC Elevation (ft)
Ground Elevation (ft) 908.24	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-30-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X			0	TOPSOIL, silty, brownish black.	ML		
					SAND, silty, pinkish gray, fine to medium, moderate to well sorted, damp.	SW		
					CLAY, at 3 feet, moderate brown, firm.	CL		
5	X			>1000	SAND, brownish black (3.5'-4.5') grading to grayish orange (4.5'-5'), to pinkish gray (5'-6'), fine to medium grained, moderately sorted, silty, wet.	SW		
10								
15								
20								
25								

SOILBORG.PDT

ENGINEERING -- SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	
Site 9	Project I.D. AI077
Boring I.D. SB1	Well I.D.
Geologist/Engineer J. Pirkle	Date Installed
Drilling Method Hand Auger	Date Grouted
Sampling Method Hand Auger	Casing Material
Date Started 10-29-90	Screen Material
Date Completed 10-29-90	Casing Interval (ft)
Driller	Screened Interval (ft)
Borehole Diameter (in) 6	Sump Installed?
Depth Drilled (ft) 2	Well Depth (ft)
Ground Elevation (ft) 917.09	TOC Elevation (ft)
Depth to Water (ft)	Water Level (ft)
Date Measured 11-13-90	Date Measured

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X			0	Sandy soil, light brown, very loose, somewhat moist.	SW		
5								
10								
15								
20								
25								

SOILBORG.PCT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 9	Well I.D.
Boring I.D. SB2	Date Installed
Geologist/Engineer J. Pirkle	Date Grouted
Drilling Method Hand Auger	Casing Material
Sampling Method Hand Auger	Screen Material
Date Started 10-29-90	Casing Interval (ft)
Date Completed 10-29-90	Screened Interval (ft)
Driller	Sump Installed?
Borehole Diameter (in) 6	Well Depth (ft)
Depth Drilled (ft) 2	TOC Elevation (ft)
Ground Elevation (ft) 919.42	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X			0	Sandy soil, dark brown, moist.	SW		
5								
10								
15								
20								
25								

SOILBORG.PDT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 9	Well I.D.
Boring I.D. SB3	Date Installed
Geologist/Engineer J. Pirkle	Date Grouted
Drilling Method Hand Auger	Casing Material
Sampling Method Hand Auger	Screen Material
Date Started 10-29-90	Casing Interval (ft)
Date Completed 10-29-90	Screened Interval (ft)
Driller	Sump Installed?
Borehole Diameter (in) 6	Well Depth (ft)
Depth Drilled (ft) 2	TOC Elevation (ft)
Ground Elevation (ft) 933.17	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X			0	Sandy soil, brown, damp.	SW		
5								
10								
15								
20								
25								

SOILBORS.PO

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 10	Well I.D.
Boring I.D. SB1	Date Installed
Geologist/Engineer J. Pirkle	Date Grouted
Drilling Method Hand Auger	Casing Material
Sampling Method Hand Auger	Screen Material
Date Started 10-28-90	Casing Interval (ft)
Date Completed 10-28-90	Screened Interval (ft)
Driller	Sump Installed?
Borehole Diameter (in) 6	Well Depth (ft)
Depth Drilled (ft) 2	TOC Elevation (ft)
Ground Elevation (ft) 961.09	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X			-	SAND, pale yellowish brown.	SW		
5								
10								
15								
20								
25								

SOILBORG.PDT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 10	Well I.D.
Boring I.D. SB2	Date Installed
Geologist/Engineer J. Pirkle	Date Grouted
Drilling Method Hand Auger	Casing Material
Sampling Method Hand Auger	Screen Material
Date Started 10-28-90	Casing Interval (ft)
Date Completed 10-28-90	Screened Interval (ft)
Driller	Sump Installed?
Borehole Diameter (in) 6	Well Depth (ft)
Depth Drilled (ft) 2	TOC Elevation (ft)
Ground Elevation (ft) 962.02	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X			-	SAND, pale yellowish brown.	SW		
5								
10								
15								
20								
25								

SOILBORG.PGT

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 10	Well I.D.
Boring I.D. SB3	Date Installed
Geologist/Engineer J. Pirkle	Date Grouted
Drilling Method Hand Auger	Casing Material
Sampling Method Hand Auger	Screen Material
Date Started 10-28-90	Casing Interval (ft)
Date Completed 10-28-90	Screened Interval (ft)
Driller	Sump Installed?
Borehole Diameter (in) 6	Well Depth (ft)
Depth Drilled (ft) 2	TOC Elevation (ft)
Ground Elevation (ft) 954.67	Water Level (ft)
Depth to Water (ft)	Date Measured
Date Measured 11-13-90	

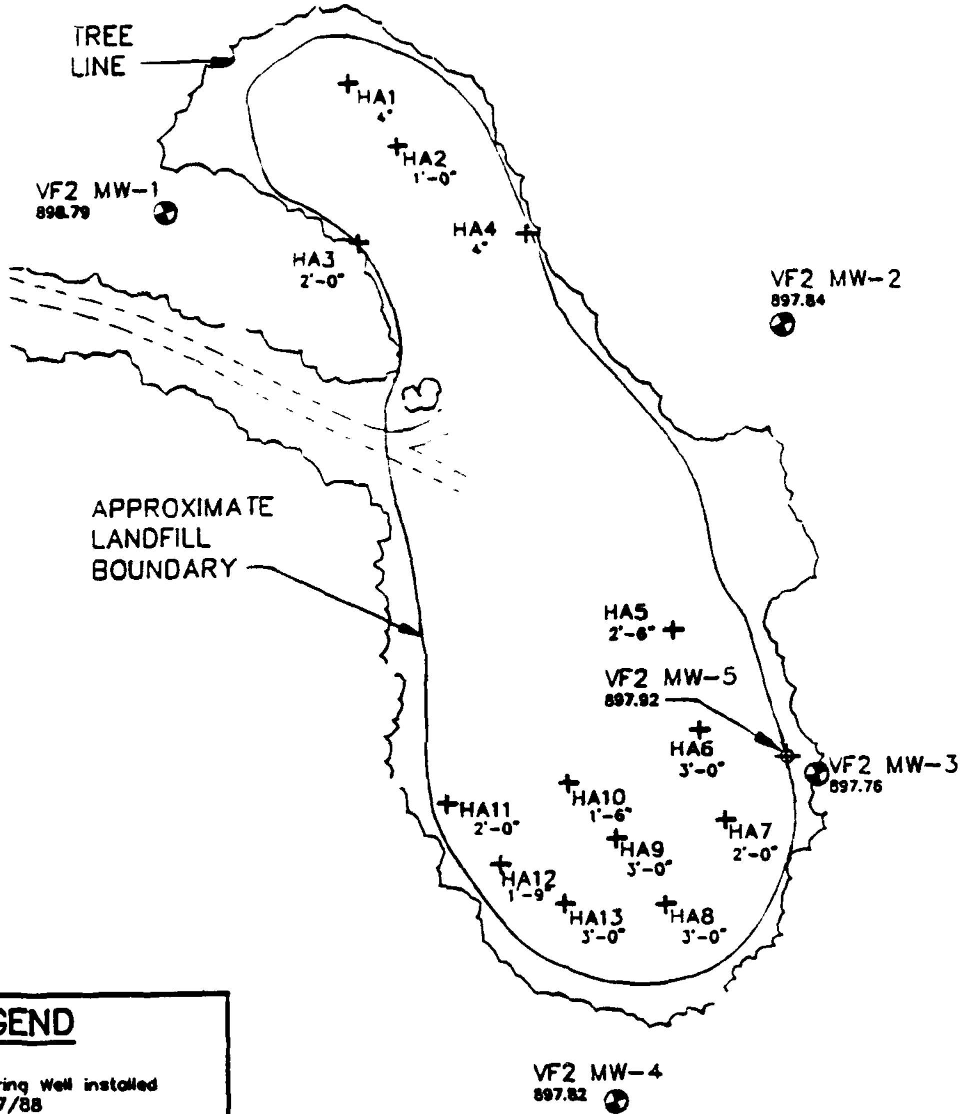
DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
0	X			-	SAND, pale yellowish brown.	SW		
5								
10								
15								
20								
25								

SOILBORG.FOT

HAND AUGER SUMMARY

Figure B.1

SITE 2, FORMER LANDFILL C
LANDFILL CAP THICKNESS
VOLK FIELD ANGB, WI



LEGEND

- Monitoring Well installed in 1987/88
- Monitoring Well installed in 1989
- + Hand Augering Location
- HA1 Hand Augering Number
- 1'-9" Depth of Augered Boring
- 897.82 Groundwater Elevation Measured 13/Nov/1990
- Road

-N-

SCALE 0 150 FEET

Source: Hazwrap 1990

AUGER #	DEPTH	DISCOVERY
HA1	4"	AL FOIL, FOAM RUBBER, WOOD
HA2	1'-0"	CONCRETE (FRESH CHIPS)
HA3	2'-0"	IMPENETRABLE
HA4	4"	CONCRETE
HA5	2'-6"	PLASTIC & CONCRETE
HA6	3'	---
HA7	2'-0"	POSSIBLE CONCRETE
HA8	3'-0"	LEAVES, ROPE
HA9	3'-0"	PLASTIC
HA10	1'-6"	PLASTIC
HA11	2'-0"	WIRE, DEBRIS
HA12	1'-9"	DEBRIS
HA13	3'-0"	---

J:\JOBS\AT077\CADD\SITE-2HA, 12/20/91 at 16:12

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TABLE B.1
SITE 2 EXPLORATORY HAND AUGER SUMMARY
VOLK FIELD ANGB, WI

Boring I.D.	Depth (feet)	Headspace Reading* (ppm)	Lithology
HA1	0	ND	Wood, brick, cable, pipe, concrete visible at surface
	0.33		Landfill material; aluminun foil, foam rubber
HA2	0	ND	Large concrete debris visible at surface
	0 - 1		Soil
	1		Concrete chips
HA3	0 - 1	ND	Topsoil
	1 - 2		Sandy soil with gravel
	2		Penetration prevented by large object
HA4	0.33	ND	Concrete, preventing penetration
HA5	0.5	0	Topsoil
	2		Sand
	2.5		Rubber or plastic strips along with concrete
HA6	0.75 - 1	0	Topsoil
	1 - 3		Sand (no landfill material encountered)
HA7	1	0	Topsoil
	1 - 2		Sand
	2		Dark sandy soil against rock/concrete
HA8	0 - 0.75	0	Topsoil
	0.75 - 3		Sand
	3		Landfill material; leaves, rope
HA9	0 - 0.5	0	Topsoil
	0.5 - 3		Sand
	3		Landfill material; plastic
HA10	0 - 0.5	0	Topsoil
	0.5 - 1.5		Sand

TABLE B.1--Continued
SITE 2 EXPLORATORY HAND AUGER SUMMARY
VOLK FIELD ANGB, WI

Boring I.D.	Depth (feet)	Headspace Reading* (ppm)	Lithology
	1.5		Landfill material; plastic
HA11	0 - 0.5	0	Topsoil
	0.5 - 1		Dark sand
	1.5 - 2		Landfill material; wire, debris, etc.
HA12	0 - 0.75	0	Topsoil
	0.75 - 1.5		Sand
	1.75		Landfill material
HA13	0	> 1,000**	No soil at surface, sand
	1		Light sand with gravel
	2.5		Dark sandy soil
	2.5 - 3		Sand

ND Not determined

* OVA readings were taken at the top of the boring hole upon completion of hand augering

** OVA meter working incorrectly

Figure B.2

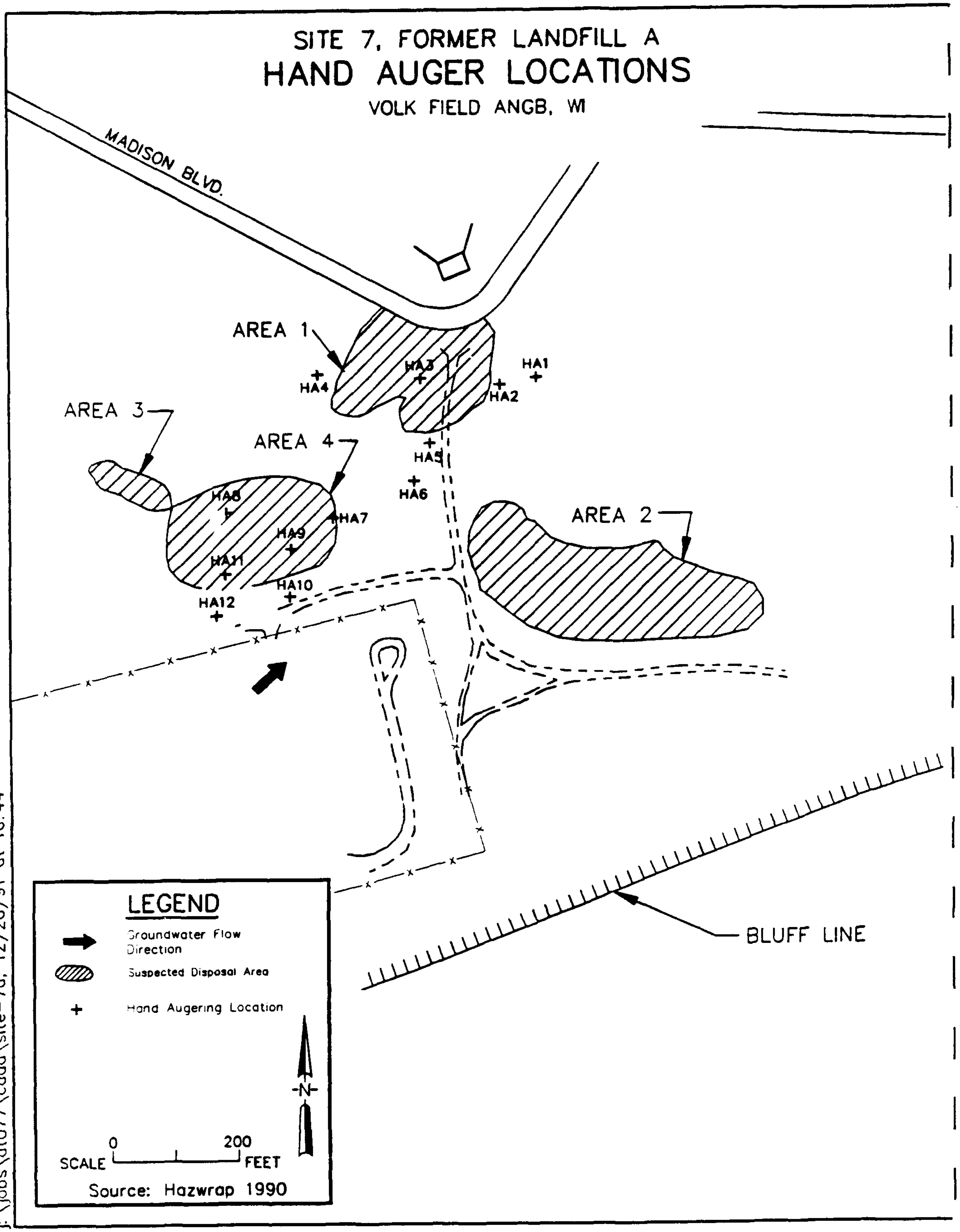

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TABLE B.2
SITE 7 EXPLORATORY HAND AUGER SUMMARY
VOLK FIELD ANGB, WI

Boring I.D.	Depth (feet)	Lithology
HA1	0 - 0.5	Topsoil
	0.5 - 3	Sand
HA2	0 - 1	Topsoil
	1 - 3	Sand
HA3	0 - 0.5	Topsoil
	0.5 - 3	Dark sand with some clay
HA4	0 - 0.75	Natural rock
HA5	0 - 1.5	Sandy soil
	1.5 - 3	Sand and clay
HA6	0 - 1.5	Sandy soil
	1.5 - 2.5	Sand with gray clay
	2.5 - 3	Sand with large stones
HA7	0 - 0.75	Topsoil
	0.75 - 1.5	Sand and gravel
	1.5	Sandstone
HA8	0 - 2	Sandy soil and clay
	2	Sandstone
HA9	0 - 2	Sandy soil with gravel
	2 - 3	Sand
HA10	0 - 1	Topsoil
	1 - 3	Sand
HA11	0 - 0.75	Topsoil
	0.75 - 3	Sand
HA12	0 - 0.5	Topsoil
	0.5 - 3	Sand

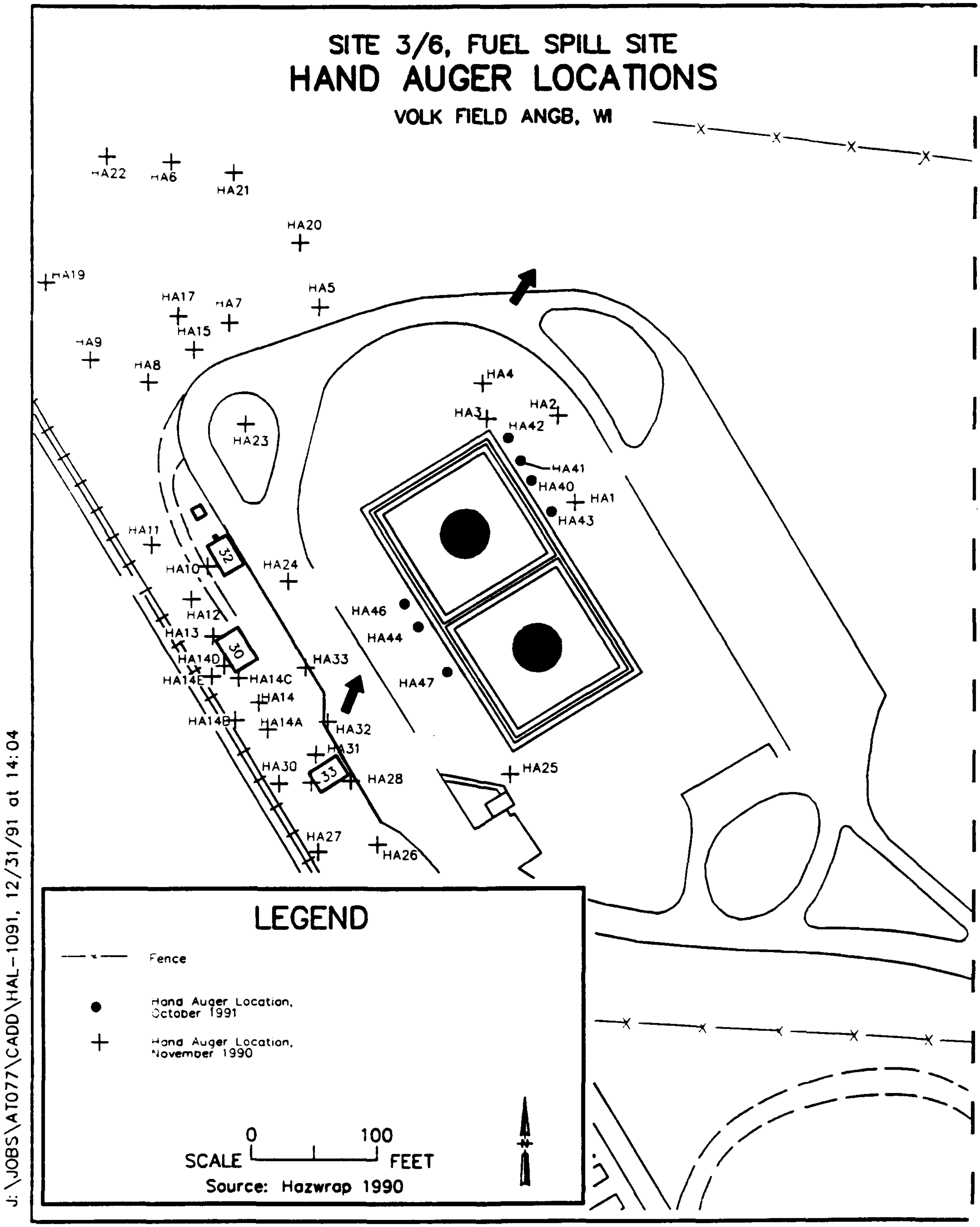

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TABLE B.3
SITE 3/6 EXPLORATORY HAND AUGER SUMMARY
VOLK FIELD ANGB, WI

Boring I.D.	Depth (feet)	Headspace Reading (ppm)	Lithology
HA1	0	0	Dark sandy topsoil to 8 inches.
	2.5	0	Light brown sand to 3.5 feet depth.
	5	0	Orange sand at 3.5 to 4 feet.
	6	0	Orange yellow sand at 4 feet.
			Turning more tan, light tan sand at 4.5 feet.
			Hit water at 6 feet.
HA2	0.5	0	Light brown to dark brown from
	2.5	0	approximately 1 to 2.5 feet, orange sand.
	5	0	Orange sand.
			Light brown rust to tan sand, at 4 feet.
			Water at 5 feet.
HA3	0.75	0	Dark brown sand.
	2.5	0	At 3 feet, sandier consistency.
	5	0	Rust color at 4 feet, moist.
	7	0	Water at 7 feet.
HA4	0	0	Dark brown sandy soil with some gravel.
	2.5	0	Lighter and sandier soil at 3 feet.
	5	0	Dark tan sand at 3.5 feet.
	7	0	Light tan sand at 4 feet.
			Some rust colored sand with some medium
			brown clay at 6 feet.
			Wet at 7 feet.
HA5	0	0	Light tan to brown sand becoming progressively
	2.5	26	more brown to 1 foot.
	5	1.8	Orange clay and light yellow sand at 4 feet.
			Orangish sand at 4.5 feet.
			Water at 5.5 feet.
HA6	0	0	Dry brown sand with lots of gravel.
	0.75	40	Dark stained silty sand with fuel odor at 8 inches
	2.5	115	(OVA reading over hole: 6ppm)
	5	15	Red, fine soil at 1 foot.
			Golden mustard orange sand at 3 feet.
			Red clay at 4 feet.
			End of clay at 5 feet, yellow sand layered
			with gold sand, water.

TABLE B.3--Continued
SITE 3/6 EXPLORATORY HAND AUGER SUMMARY
VOLK FIELD ANGB, WI

Boring I.D.	Depth (feet)	Headspace Reading (ppm)	Lithology
HA7	0	0	Dry tan sand.
	2.5	0	Brown, slightly moist sand at 1 foot.
	5	0	Gravel layer at 1.5 feet.
	7	0	Deep, rich brown sand at 2 feet.
			Orangish, rust colored sand at 2.5 feet.
			Tan and orangish sand at 3.5 feet.
			8 inch thick orangish clay layer at 4.5 feet.
			Off white sand at 5 feet.
			Tan/yellow sand and water at 7 feet.
HA8	0	8.3	Light brown sand.
	1	31	Dark, black stained sand from 6 inches to 1 foot,
	2.5	1.3	fuel odor.
	5	3.9	Fine brown sand at 1.5 feet, fuel odor.
	6.5	5.4	Tree root at 2.5 feet.
			Water at 6.5 feet.
HA9	0	0	Black stained looking surface to
	1	0	brown, sandy clay with gravel
	3	0	Black sandy soil at 1 foot, not as black as soil
	5	0	at HA8.
	6.5	0	Orange sand at 1.5 feet.
			Lighter sand shot with orange at 4.5 feet.
			Clay layer at 5 feet.
			Clay, sand and water at 6 feet.
HA10	0	0	Light orange/tan sand at 0-6.5 feet.
	2.5	0	Some dark sand at 6.5 feet.
	5	0.2	
	6.5	0	
HA11	0	0	Dry, sandy, dark soil with coarse gravel.
	2	0	Tan sand at 0.5 feet.
	5	0	Water at 7 feet.
	7	0	
HA12	0	0	Light tan slightly orange sand.
	2.5	0	OVA reading of 0.4ppm over hole at 3 feet.
	5.5	0.3	Water at 7 feet.
	7	110	

TABLE B.3--Continued
SITE 3/6 EXPLORATORY HAND AUGER SUMMARY
VOLK FIELD ANGB, WI

Boring I.D.	Depth (feet)	Headspace Reading (ppm)	Lithology
HA13	0	0	Brown, sandy soil.
	2.5	>1000	Very light tan at 4 feet.
	5	>1000	
HA14	0	0	Light orange/tan sand becoming dark
	2.5	0	brown sand at 2.5 feet.
	5	120	Strong petroleum odor at 5 feet (OVA
			reading over hole: 80ppm).
			Hit concrete at 6 feet.
HA14a	2.5	0	Light orange/tan sand.
	5	10	Dark brown sand beyond 2.5 feet.
	7	10	Damp at 6 feet (fuel odor from samples
			taken at 5 and 7 feet).
			Water and small amounts of reddish
			clay at 7 feet.
HA14b	0	0	Light orange/tan sand, becoming
	2.5	0	brownish at 2.5 feet.
	5	0	Back to tan/orange sand at 5 feet.
	7.5	0	Water at 7.5 feet.
HA14c	0	0	Brown, sandy soil.
	2.5	0	Light orange soil mixed with brown soil at 1 to 1.5 f
	5	0	Light sand at 2.5 feet, back to light brown at 3 feet.
	6	>1000	At 6 feet, OVA reading over hole: 120ppm.
HA14d	0	0	Dry, sandy, brown orange sand at 1 feet.
	2.5	0	Some reddish brown clay at 6 feet.
	5.5	0	Saturated soil at 7 feet with strong fuel odor. OVA
	7	>1000	reading over hole: 24ppm.
HA14e	0	0	Light tan/brown sand.
	2.5	0	Clay and lots of gravel at 1 foot.
	5	0	Orange sand past 1 foot.
	7	0	Tan sand at 1.5 feet.
			Water at 7 feet.

TABLE B.3--Continued
SITE 3/6 EXPLORATORY HAND AUGER SUMMARY
VOLK FIELD ANGB, WI

Boring I.D.	Depth (feet)	Headspace Reading (ppm)	Lithology
HA15	0	10	Gravel and dry, brown sand.
	0.75	47	Black stained soil with fuel odor at 8 inches
	2.5	13	(darker than soil at HA9).
	5	0.8	Orange sand at 2 feet.
			Lighter sand at 2.5 feet.
			Water at 5 feet.
HA16	0	0	Dry, brown sand with gravel.
	1	0	Black stained sand layer at 1 to 1.3 feet.
	2.5	0	Tan sand at 2 feet.
	4.5	0	Water at 4 feet.
HA17	0	0	Dry sandy soil.
	1	0.9	Gravel layer at 0.5 feet.
	3	0.7	About 2 inches of sand followed by black stained
	5	0.1	soil at 1 foot.
			Dark brown, fine, sand at 2 feet.
			Tan sand changing to orange sand at 3 feet.
			Water at 4.5 feet.
HA18	0	0	Very brown, sandy soil with gravel.
	1	0	Dark brown, fine sand at 1 foot.
	2	7.4	Clayey silt at 2 feet.
	4	>1000	Wet with dark staining at 3 feet.
	6	18	Sand at 3.5 feet.
			Fuel odor at 5.5 feet (OVA reading over hole:
			300ppm). Water at 5.5 feet.
HA19	0	0	Brown, sandy soil with some gravel.
			Encountered gravel at 0.5 feet, could
			not penetrate through.
HA20	0	0	Sand at surface.
	1	0	Gravel layer at 0.5 feet.
	2	0	End of gravel layer, hit black stained sandy soil at 1
	5	0	Dark orange brown sand at 1.5 feet.
			Tan sand at 2 feet.
			Lighter sand with gold streaks at 3 feet.
			Gold orange sand at 3.5 feet.
			Light brown beige sand at 4 feet.
			Clay and sand at 5 feet.
			Clay, sand and water at 5.5 feet.

TABLE B.3--Continued
SITE 3/6 EXPLORATORY HAND AUGER SUMMARY
VOLK FIELD ANGB, WI

Boring I.D.	Depth (feet)	Headspace Reading (ppm)	Lithology
HA21	0	0	Brown sand and gravel.
	1	0	End of gravel at 1 foot, 2 to 3 inch layer of light
	2	0	black to dark gray stained looking soil.
	4.5	0	Dark brown sand at 1.5 feet.
			Beige brown sand at 2.5 feet.
			Gold orange sand at 3 feet.
			Light sand, water at 4 feet.
			Clay and water at 4.5 feet.
HA22	0.75	0	Black/gray stained looking soil at 1 inch,
	2.5	0	small gravel layer, dark brown soil at 1foot.
	5	0	Beige/tan sand at 1.5 feet.
			Gold streaks in sand at 2 feet.
			Clay at 4 feet.
			Water and sand at 5 feet.
HA23	0	0	Dark brown sandy soil.
	2	0	Gravel at 1.3 feet.
	5	0	1 to 2 inch layer of black stained, sandy
	7	0	soil at 1.5 feet, then dark brown sand.
	10	0	Dark brown sand then dark brown sand.
			Biege sand at 4 feet.
			Gold stripes in sand at 4.5 feet.
			Gold/orange sand at 5 feet.
			Clay in sand at 6 feet.
			Gold/orange sand at 8 feet.
			Water at 9.5 feet.
HA24	1	0	Dark sandy soil with possible staining from 0 to 1 fo
	4	0	Dark rich brown sand at 2 feet.
	7	1.9	Lighter sand with orangish tint at 4 feet (OVA
	8.5	740	reading over hole: 0.4 ppm).
			Rusty orange sand at 5.5 feet.
			Light tan to white sand at 6 feet.
			Small amount of gray clay in a lense at 6.5 feet.
			Red/brown sand with clay lense of the same color
			at 7.5 feet.
			Tan sand at 8 feet.
			Wet sand with moderate fuel odor at 8.5 feet.

TABLE B.3--Continued
SITE 3/6 EXPLORATORY HAND AUGER SUMMARY
VOLK FIELD ANGB, WI

Boring I.D.	Depth (feet)	Headspace Reading (ppm)	Lithology
HA25	1	0	Dark sandy soil from 0 to 1 foot.
	4	0	Brown sand at 2 feet.
	7	0	Light orange sand at 3.5 feet.
			Light tan sand at 4 feet.
			Orange gold sand at 5.5 feet.
HA26	1	0	Brown/black, sandy soil at 0 to 0.5 feet.
	4	0	Fine, brown sand becoming progressively more ora
	6.5	0	and light brown at 0.5 feet.
			Light orange/tan sand at 3 feet.
			Tan at 4 feet.
			Light tan/off white sand at 4.5 feet.
			Wet sand 6.5 feet.
HA27	1	0	Light brown gravel and soil at 0 to 1 foot.
	4	0	Light tan sand at 1.5 to 4 feet.
	7	0	Light gray sand at 4.5 feet.
			Tan sand at 5 feet.
			White/light tan sand at 6 feet.
HA28	1	0	Blackish, dark brown soil from 0 to 0.5 feet.
	4	0	Brown, sandy soil with small grave' from 0.5 to 1 fo
	6	>1000	Brown sand from 1 to 2 feet.
			Light brown to light tan sand at 2 feet.
			Light tan to white sand at 5 feet.
			Light brown/gray sand (very strong odor) at 5.5 fe
			Strong fuel odor (OVA reading 100ppm over hole)
			Wet sand at 7 feet.
HA29	1	1	Brown, sandy gravel from 0 to 1 foot.
	4	400	Tan soil at 2 feet.
	6	>1000	Light gray sand, strong odor at 4.5 feet.
			Red clay at 5 feet.
			Gray/white sand at 6 feet.
			Water at 7.5 feet, strong odor.
HA30	1	0	Brown and sandy becoming lighter with depth.
	4	0	Small amounts of red/brown clay at 4 feet.
			Impenetrable layer at 4+ feet.
HA31	1	0	Brown sand soil from 0 to 1 foot.
	4	0	Fuel odor at 3 feet.

TABLE B.3--Continued
SITE 3/6 EXPLORATORY HAND AUGER SUMMARY
VOLK FIELD ANGB, WI

Boring I.D.	Depth (feet)	Headspace Reading (ppm)	Lithology
	6	>1000	Abrupt change in color to light brown/tan at 4.5 feet Gray with strong odor at 5 feet. Dark gray with strong odor at 6 feet.
HA32	1	0	Normal sand and soil.
	4	0	
	7	0	
HA33	1	11	Normal sand and soil.
	4	18	
	7	14	
HA-40	3	6	Black organic clay with sand to .5 feet.
	6	250	Dark brown fine sand with gravel, moist to 7 feet
	9	300	Slight fuel odor 2 to 7 feet. Yellow-white fine sand, wet, strong fuel odor 7 to 9 feet
HA-41	3	140	Black organics, gravel with fine sand,
	5	95	some silt, wet to 2.5 feet.
	9	700	Light brown fine sand with little gravel, moist, slight fuel odor to 5 feet. Gray clay and sand, moist, slight fuel odor to 7 feet. Tan sand saturated to 9 feet.
HA-42	3	0	Black organic. Gravel with fine sand, some
	6	0	silt and clay to 2.5 feet.
	9	1	Dark brown to black fine sand with gravel, some silt banding, moist to 4 feet. Light brown fine sand with silt banding to 7 feet. Yellow-white fine sand, wet to 9 feet.
HA-43	3	0	Black organics clay with sand to .5 feet.
	6	0	Dark brown fine sand with silt bands,
	9	1	moist to 3 feet.

TABLE B.3--Continued
SITE 3/6 EXPLORATORY HAND AUGER SUMMARY
VOLK FIELD ANGB, WI

Boring I.D.	Depth (feet)	Headspace Reading (ppm)	Lithology
			Light brown fine sand, little gravel. some silt bands, moist to 7 feet. Yellow-white fine sand, little silt, wet to 9 feet.
HA-44	2.5	0	Black organic, orange brown fine sand wet to 2.5 feet.
	7	0	Greyish white fine sand with clay layers, moist to 7.5 feet.
	9	0	Orangish brown fine sand saturated to 9 feet.
HA-46	3	0	Black organics to .5 feet.
	8.5	0	Orange brown fine sand, little silt, wet to 3 feet. Yellow white fine sand, little silt to 5 feet. Orange fine sand with reddish brown clay bands, moist to 7 feet. Reddish brown clay, saturated to 8.5 feet.
HA-47	3	0	Black organic. Orangish brown fine sand moist to one foot
	7	0	Gravel to 1.5 feet.
	8	2.5	Orangish brown fine sand, some silt moist to 3 feet Whitish yellow fine sand moist to 8 feet then saturated.

MONITORING WELL LOGS

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

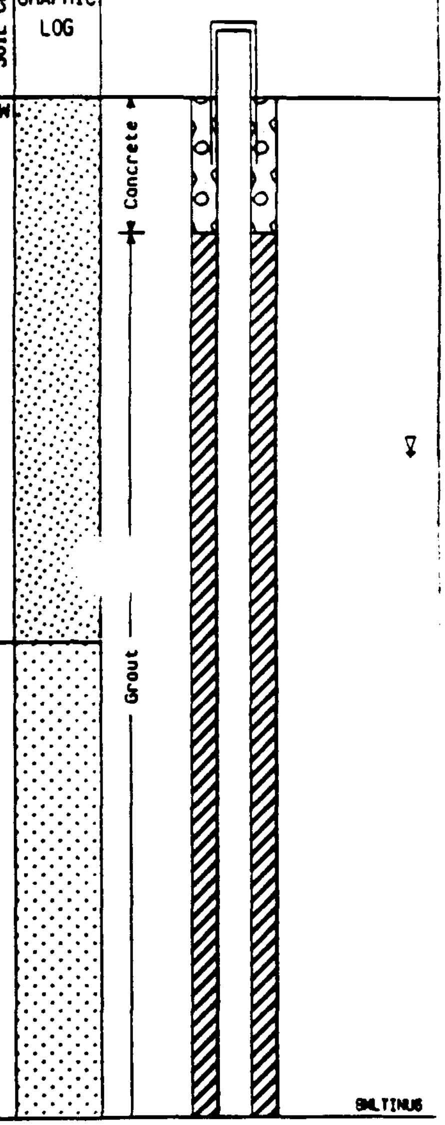
Client Volk Field ANGB
Site 1
Boring I.D. MW5
Geologist/Engineer K. S. Charick
Drilling Method Mud Rotary
Sampling Method Split-Spoon/Grab
Date Started 10-19-89
Date Completed 10-19-89
Driller North Star
Borehole Diameter (in) 10
Depth Drilled (ft) 117
Ground Elevation (ft) 911.3
Depth to Water (ft) 10.44
Date Measured 11-13-90

Project I.D. AT077
Well I.D. VF1 MW5
Date Installed 10-19-89
Date Grouted 10-19-89
Casing Material 4" PVC sch 40
Screen Material 4" 0.010" ww PVC
Casing Interval (ft) -2 - 98
Screened Interval (ft) 98 - 108
Sump Installed? Yes
Well Depth (ft) 110.5
TOC Elevation (ft) 912.99 (11-30-90)
Water Level (ft) 902.55
Date Measured 11-13-90

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS
0	X		70	3.5	SAND, trace silt, moderate brown to moderate yellow brown, very fine to medium grained, rounded to subrounded.	SW
5	X		30	1.8	SAND, trace silt, pale yellowish orange, very fine to medium grained, rounded to subrounded, saturated.	
10	X		50	0.8	As above.	
15	X		30	0.9	SANDSTONE, dark yellowish orange, very weathered, fine to medium grained, rounded.	
20	X		30	0.6	As above.	
25	X			0.6	As above except pale yellowish orange to grayish orange.	

GRAPHIC LOG

WELL DIAGRAM



ENGINEERING - SCIENCE

SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB
Site 1
Boring I.D. MW5
Geologist K. S. Charick

Project I.D. AT077
Well I.D. VF1 MW5
Date Installed 10-19-89

DEPTH (feet)	SAMPLE	BLOWS/6 IN	%REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
30				0.7	As above.			
35				0.8	As above.			
40				0.9	As above except pale yellowish orange.			
45				1.6	As above.			Grout
50				0.1	As above.			
55				0.1	As above except white, yellow, black, brown granules in sandstone, drillers smelled paint.			
60				0.2	As above.			
65								

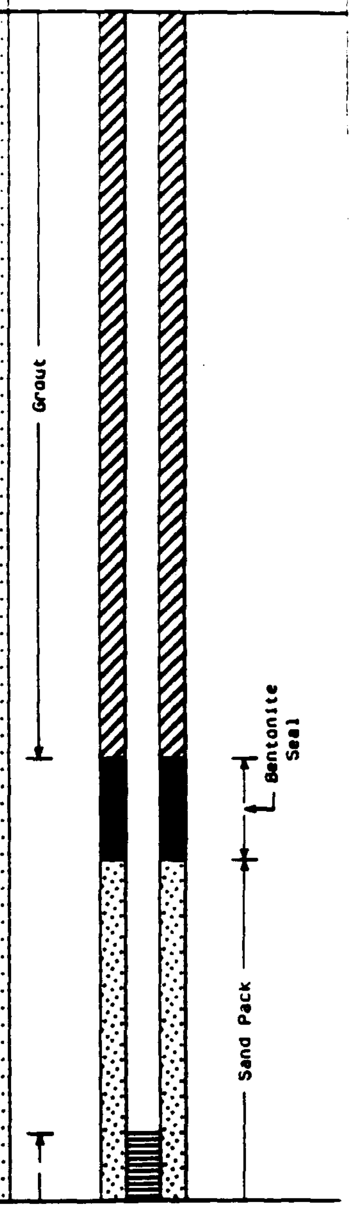
ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB
Site 1
Boring I.D. MW5
Geologist K. S. Charick

Project I.D. AT077
Well I.D. VF1 MW5
Date Installed 10-19-89

DEPTH (feet)	SAMPLE	BLOWS/6 IN	%REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG
65							
	☒			0.6	As above.		
70							
	☒			0.4	As above.		
75							
	☒			0.9	As above.		
80							
	☒			0.3	As above.		
85							
	☒			0.1	As above.		
90							
	☒			0.1	As above.		
95							
	☒			0.2	As above.		
100							

WELL DIAGRAM



BALTINUS

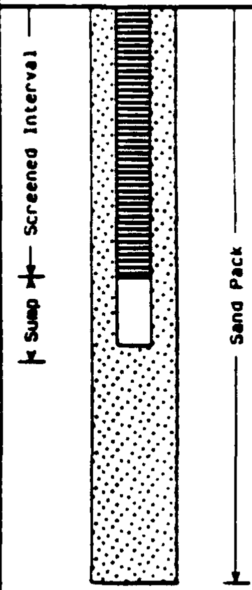
ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB
Site 1
Boring I.D. MW5
Geologist K. S. Charick

Project I.D. AT077
Well I.D. VF1 MW5
Date Installed 10-19-89

DEPTH (feet)	SAMPLE	BLOWS/6 IN	%REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG
100							
	☒			0.2	As above.		
105							
	☒			0.8	As above.		
110							
	☒			0.2	As above except gray orange to dark yellowish orange sandstone.		
115							
	☒			0.1	As above.		
120							
125							
130							
135							

WELL DIAGRAM

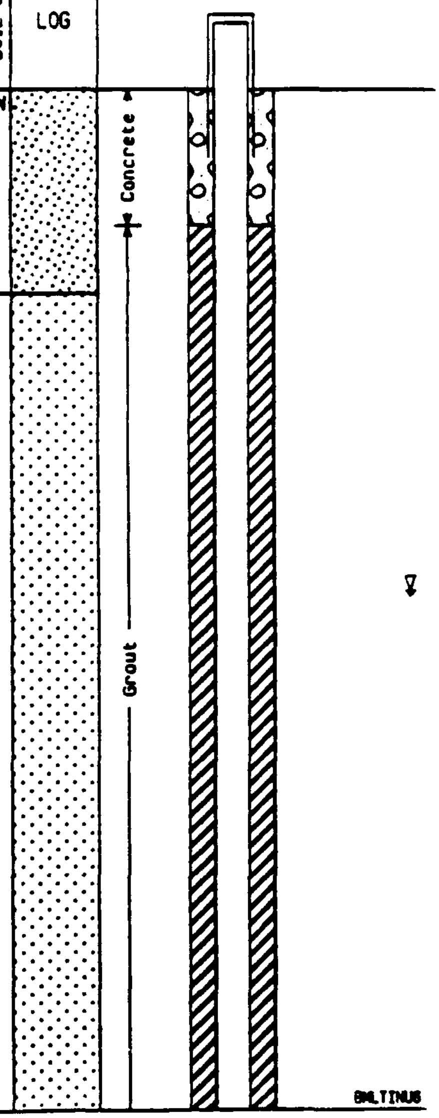


ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 1	Well I.D. VF1 MW6
Boring I.D. MW6	Date Installed 10-19-89
Geologist/Engineer K. S. Charick	Date Grouted 10-19-89
Drilling Method Mud Rotary	Casing Material 2" PVC sch 40
Sampling Method Split-Spoon/Grab	Screen Material 2" 0.010" ww PVC
Date Started 10-19-89	Casing Interval (ft) -2 - 47.5
Date Completed 10-19-89	Screened Interval (ft) 47.5 - 57.5
Driller North Star	Sump Installed? Yes
Borehole Diameter (in) 10	Well Depth (ft) 60
Depth Drilled (ft) 60	TOC Elevation (ft) 914.73 (11-29-89)
Ground Elevation (ft) 912.5	Water Level (ft) 899.97
Depth to Water (ft) 14.76	Date Measured 11-13-90
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS
0	X		70	1.2	SAND, some rock fragments, very pale orange to moderate brown, fine to medium, rounded to subrounded, moderate sorting.	SW
5	X		2	0	SANDSTONE, very pale orange, very weathered, friable, fine to medium.	
10	X			0	As above with orange mottling.	
15	X			0	As above except no orange mottling and small cobbles.	
20	X			0	As above except orange mottling.	
25	X			0	As above except rock fragments are pebbles.	

GRAPHIC LOG / WELL DIAGRAM



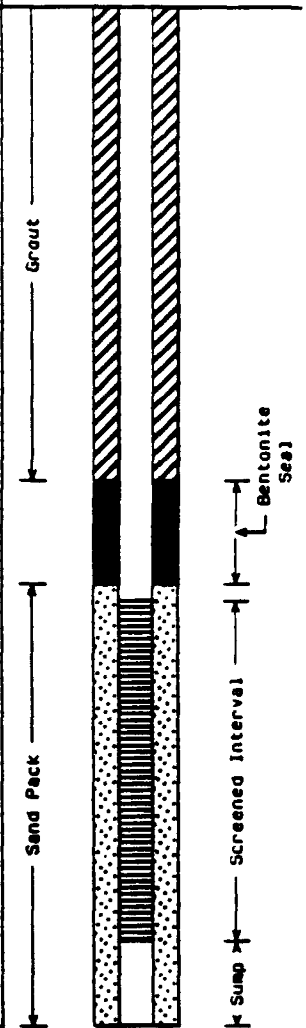
ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGF
Site 1
Boring I.D. MW6
Geologist K. S. Charick

Project I.D. AI077
Well I.D. VF1 MW6
Date Installed 10-19-89

DEPTH (feet)	SAMPLE	BLOWS/6 IN	%REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG
30	X			0	As above with black sandstone fragments.		
35	X			0	As above with white, brown, and black sandstone fragments (granules).		
40	X			0	As above.		
45	X			1	As above.		
50	X			0.9	As above.		
55	X			0.6	As above except black, white, brown sandstone granules.		
60	X			0.8	SANDSTONE, medium to coarse, dark yellowish orange to light brown, rounded to subrounded, moderate to poor sorting.		
65							

WELL DIAGRAM

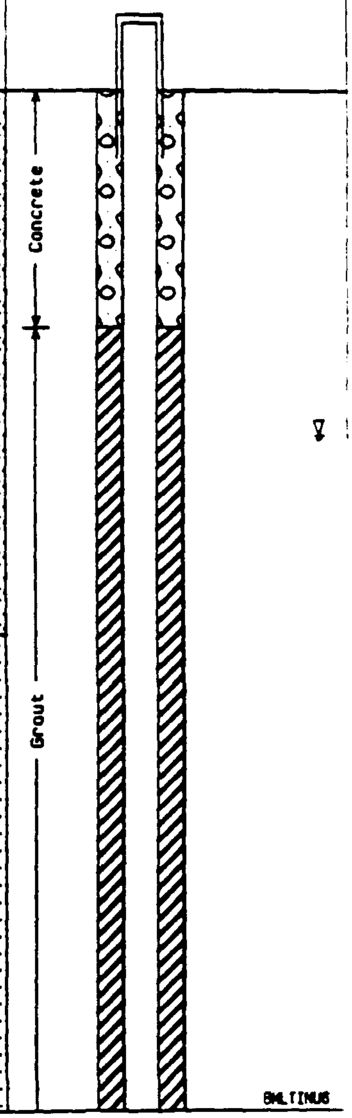


ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 1	Well I.D. VF1 MW7
Boring I.D. MW7	Date Installed 10-20-89
Geologist/Engineer K. S. Charick	Date Grouted 10-20-89
Drilling Method Mud Rotary	Casing Material 2" PVC sch 40
Sampling Method Split-Spoon/Grab	Screen Material 2" 0.010" ww PVC
Date Started 10-20-89	Casing Interval (ft) -2 - 50
Date Completed 10-20-89	Screened Interval (ft) 50 - 60
Driller North Star	Sump Installed? Yes
Borehole Diameter (in) 10	Well Depth (ft) 62.5
Depth Drilled (ft) 63	TOC Elevation (ft) 912.10 (11-29-89)
Ground Elevation (ft) 910.4	Water Level (ft) 901.94
Depth to Water (ft) 10.16	Date Measured 11-13-90
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG
0	X			0	SAND, yellowish brown with brown, black, orange, white sandstone granules, very fine to coarse grained, subrounded to subangular, poorly sorted.	SW	
5	X			0	SAND, moderate brown, very fine to medium, rounded to subrounded, poorly sorted.		
10	X			0	As above except small rock fragments (granules).		
15	X			0	As above.		
20	X			0	SANDSTONE, dark yellowish orange, very weathered, medium to coarse, rounded to subrounded, moderate to well sorted.		
25	X			0	As above except moderate sorting and grayish orange.		

WELL DIAGRAM



BHLTINUS

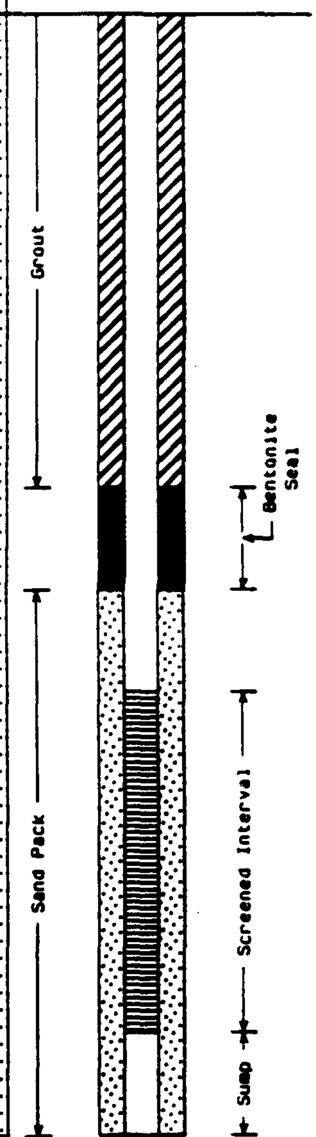
ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB
Site 1
Boring I.D. MW7
Geologist K. S. Charick

Project I.D. AT077
Well I.D. VF1 MW7
Date Installed 10-20-89

DEPTH (feet)	SAMPLE	BLOWS/6 IN	%REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG
30	☒			0	As above except fine to medium, some black sandstone granules, poor to moderate sorting.		
35	☒			0	As above.		
40	☒			0	As above.		
45	☒			0	As above.		
50	☒			0	As above except grayish orange to pale yellowish orange.		
55	☒			0	As above.		
60	☒			0	As above except medium to coarse.		
65							

WELL DIAGRAM



ENGINEERING - SCIENCE

SOIL BORING LOG AND WELL CONSTRUCTION RECORD

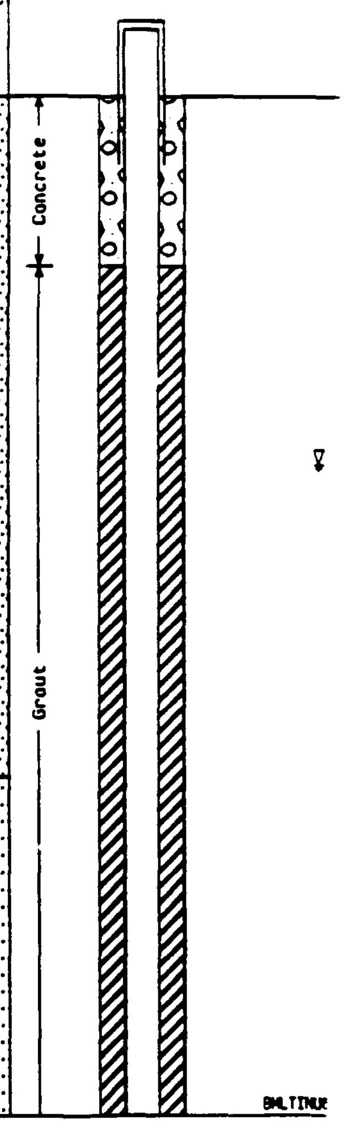
Client Volk Field ANGB
Site 1
Boring I.D. MW8
Geologist/Engineer K. S. Charick
Drilling Method Mud Rotary
Sampling Method Split-Spoon/Grab
Date Started 10-25-89
Date Completed 10-25-89
Driller North Star
Borehole Diameter (in) 10
Depth Drilled (ft) 64
Ground Elevation (ft) 910.9
Depth to Water (ft) 10.88
Date Measured 11-13-90

Project I.D. AT077
Well I.D. VF1 MW8
Date Installed 10-25-89
Date Grouted 10-25-90
Casing Material 2" PVC sch 40
Screen Material 2" 0.010" ww PVC
Casing Interval (ft) -2 - 50
Screened Interval (ft) 50 - 60
Sump Installed? Yes
Well Depth (ft) 62.5
TOC Elevation (ft) 913.00 (11-29-89
Water Level (ft) 902.12
Date Measured 11-13-90

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS
0	X		95	0	TOPSOIL, SAND, black to 5 inches, fine to medium. SAND, moderate brown to dark yellowish orange to 2 feet, fine to medium, rounded to subrounded, moderately sorted.	SW
5	X		30	0	SAND, grayish orange to dark yellowish orange, fine to slightly coarse, rounded to subrounded, moderately sorted.	
10	X		25	0	SAND, dark yellowish orange, little black sandstone granules, very fine to fine, well sorted.	
15	X			0	As above except moderate yellowish brown.	
20	X		10	0	SANDSTONE, grayish orange, very weathered, friable, very fine to medium (black, brown, yellow, red sandstone granules), well sorted.	
25	X		0	0	SANDSTONE, same as above except pale yellowish orange, very fine to medium.	

GRAPHIC LOG

WELL DIAGRAM



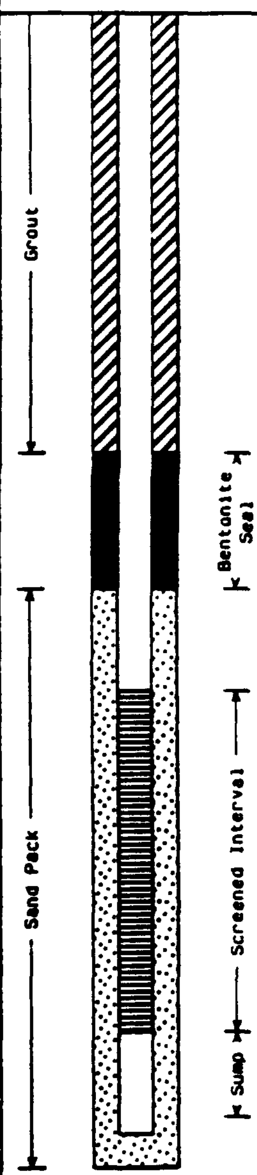
ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB
Site 1
Boring I.D. MW8
Geologist K. S. Charick

Project I.D. AT077
Well I.D. VF1 MW8
Date Installed 10-25-89

DEPTH (feet)	SAMPLE	BLOWS/6 IN	%REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG
30	X			0	As above except fine to slightly coarse.		
35	X			0	As above.		
40	X			0	Same as above except medium to coarse.		
45	X			0.1	As above.		
50	X			0.2	SANDSTONE, same as above except dark yellowish orange, very fine to medium.		
55	X			0.2	As above.		
60	X			0.1	As above except medium to coarse.		
	X			0.2	As above.		
65							

WELL DIAGRAM



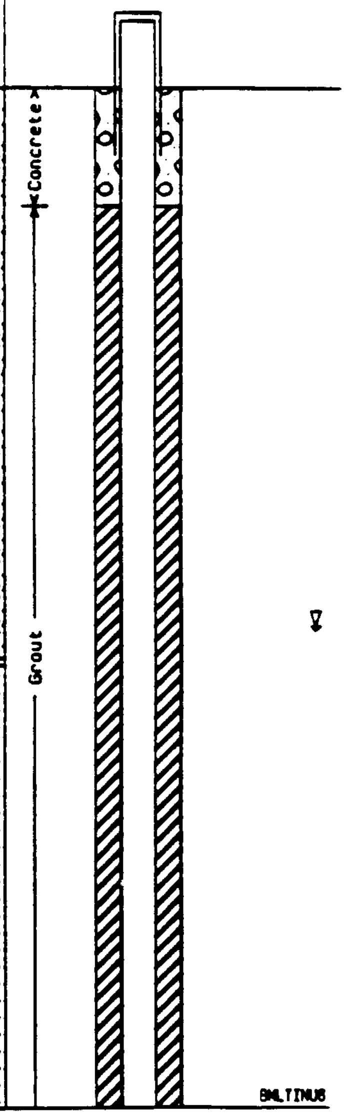
BMLT 6

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 1	Well I.D. VF1 MW9
Boring I.D. MW9	Date Installed 10-1-90
Geologist/Engineer Julie Burgin	Date Grouted 10-1-90
Drilling Method 6.25" Mud Rotary	Casing Material 2" PVC sch. 40
Sampling Method Split-Spoon/Grab	Screen Material 2" .010" ww PVC
Date Started 10-1-90	Casing Interval (ft) -2 - 60
Date Completed 10-1-90	Screened Interval (ft) 60 - 70
Driller North Star	Sump Installed? Yes
Borehole Diameter (in) 11	Well Depth (ft) 72.5
Depth Drilled (ft) 72.5	TOC Elevation (ft) 916.69 (11-30-90)
Ground Elevation (ft) 915.1	Water Level (ft) 900.83
Depth to Water (ft) 15.86	Date Measured 11-13-90
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNU/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS
0	X		90	0	TOPSOIL. SAND, dark yellowish brown and dusky brown (mottled), fine to medium grained, moderately sorted, compacted, damp.	SW
5	X		70	0		
10	X		40	0	SAND, moderate yellowish brown, fine to medium, subrounded, sorted, wet.	
15	X		25	0		
					CLAY, 2-inch layer. As above except medium to coarse. SANDSTONE, moderate yellowish brown, very weathered, friable, fine to coarse, subrounded, moderate to poorly sorted.	CL
20						
	X		NA	0	As above.	
25						
	X				As above.	

WELL DIAGRAM



BALTINUS

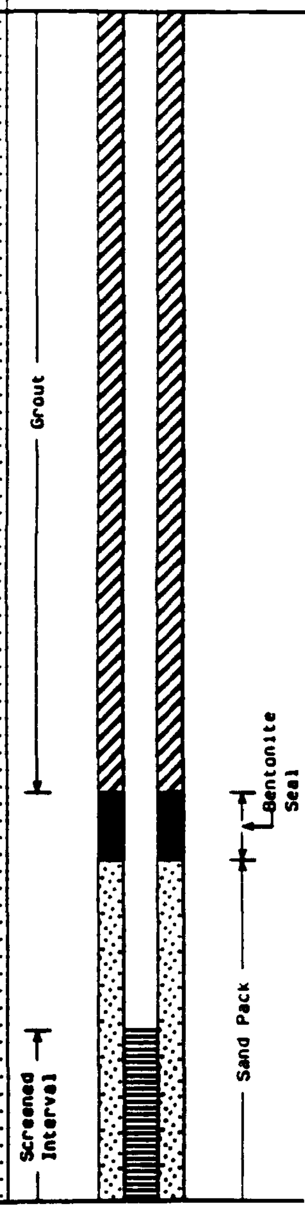
ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB
Site 1
Boring I.D. MW9
Geologist Julie Burgin

Project I.D. AT077
Well I.D. VF1 MW9
Date Installed 10-1-90

DEPTH (feet)	SAMPLE	BLOWS/6 IN	%REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG
30			NA	0	As above.		
35			NA	0	As above.		
40			NA	0	SANDSTONE, grayish orange, medium to coarse, subrounded, moderately sorted.		
45			NA	0	As above.		
50					As above.		
55					As above.		
60					As above.		
65							

WELL DIAGRAM



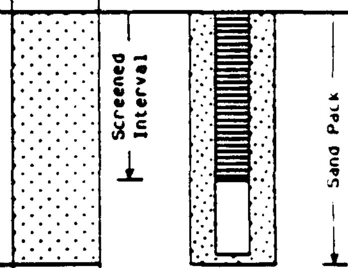
BMLTI 3

ENGINEERING - SCIENCE

SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Page 3 of 3
Site 1	Project I.D. AT077
Boring I.D. MW9	Well I.D. VF1 MW9
Geologist Julie Burgin	Date Installed 10-1-90

DEPTH (feet)	SAMPLE	BLOWS/6 IN	%REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
65	X				SANDSTONE, grayish orange, fine to medium, subrounded, moderately sorted.			
70								
75								
80								
85								
90								
95								
100								



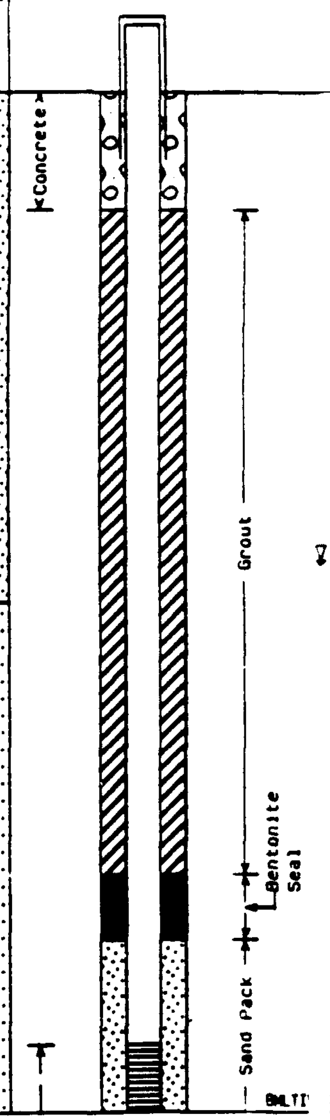
SMLTINUS

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Page 1 of 2
Site 1	Project I.D. AT077
Boring I.D. MW10	Well I.D. VF1 MW10
Geologist/Engineer Julie Burgin	Date Installed 9-27-90
Drilling Method 6.25" Mud Rotary	Date Grouted 9-27-90
Sampling Method Split-Spoon/Grab	Casing Material 2" PVC sch. 40
Date Started 9-27-90	Screen Material 2" .010" ww PVC
Date Completed 9-27-90	Casing Interval (ft) -2 - 28
Driller North Star	Screened Interval (ft) 28 - 38
Borehole Diameter (in) 11	Sump Installed? Yes
Depth Drilled (ft) 43	Well Depth (ft) 40.5
Ground Elevation (ft) 915.1	TOC Elevation (ft) 916.71 (11-30-9
Depth to Water (ft) 13.78	Water Level (ft) 902.93
Date Measured 11-13-90	Date Measured 11-13-90

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG
0	X		95	0	TOPSOIL, black, fine to medium sand, damp, depth to 6".	SW	
5	X		100	0	SAND, yellowish brown with little black staining, mostly fine grained, well sorted, few rock fragments (2-inch).		
10	X		100	0	SAND, yellow, mostly fine grained, subangular, well sorted, saturated.		
15	X		100	0.5	SAND, mostly medium to coarse, SANDSTONE at 15 feet, pale beige, very weathered, friable.		
20	X		10	0	SANDSTONE, pale beige with trace black fragments, very weathered, friable, medium to coarse, subrounded, poorly to moderately sorted.		
25	X		NA		Same as above		

WELL DIAGRAM

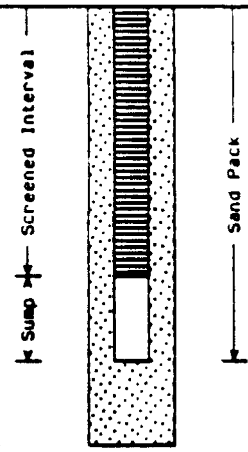


ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB
Site :
Boring I.D. MW10
Geologist Julie Burgin

Project I.D. AT077
Well I.D. VF1 MW10
Date Installed 9-27-90

DEPTH (feet)	SAMPLE	BLOWS/6 IN	%REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
30	X		NA		Same as above but moderately sorted.			
35	X		NA		As above.			
40	X		NA		As above.			
45								
50								
55								
60								
65								



BMLTINUS

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

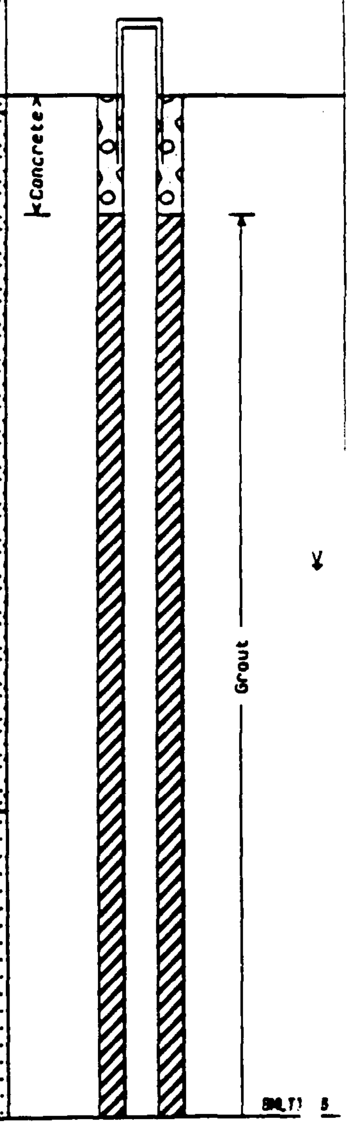
Client Volk Field ANGB
Site 1
Boring I.D. MW11
Geologist/Engineer Julie Burgin
Drilling Method 6.25" Mud Rotary
Sampling Method Split-Spoon/Grab
Date Started 9-28-90
Date Completed 9-28-90
Driller North Star
Borehole Diameter (in) 11
Depth Drilled (ft) 78.5
Ground Elevation (ft) 915.1
Depth to Water (ft) 13.78
Date Measured 11-13-90

Project I.D. AT077
Well I.D. VF1 MW11
Date Installed 9-28-90
Date Grouted 9-28-90
Casing Material 2" PVC sch. 40
Screen Material 2" .010" ww PVC
Casing Interval (ft) -2 - 62.5
Screened Interval (ft) 62.5 - 72.5
Sump Installed? Yes
Well Depth (ft) 75
TOC Elevation (ft) 916.71 (11-30-9
Water Level (ft) 902.93
Date Measured 11-13-90

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS
0	X		100	0	TOPSOIL and fine, silty, brown SAND.	SM SW
5	X		40	0	SAND, yellowish brown, fine to medium, subrounded, *well sorted*, *slightly* damp, (grading to lighter yellow with trace black staining), wet.	
10	X		40	0	Same as above, except medium yellowish brown, saturated.	
15	X		30	0	As above, but trace pebbles (black).	
20	X		40	0	As above.	
					Sandstone, yellowish brown, very weathered, friable, fine to medium, subrounded, moderately sorted.	
25	X				As above.	
	X			0	As above.	

GRAPHIC LOG

WELL DIAGRAM



SMLT! 5

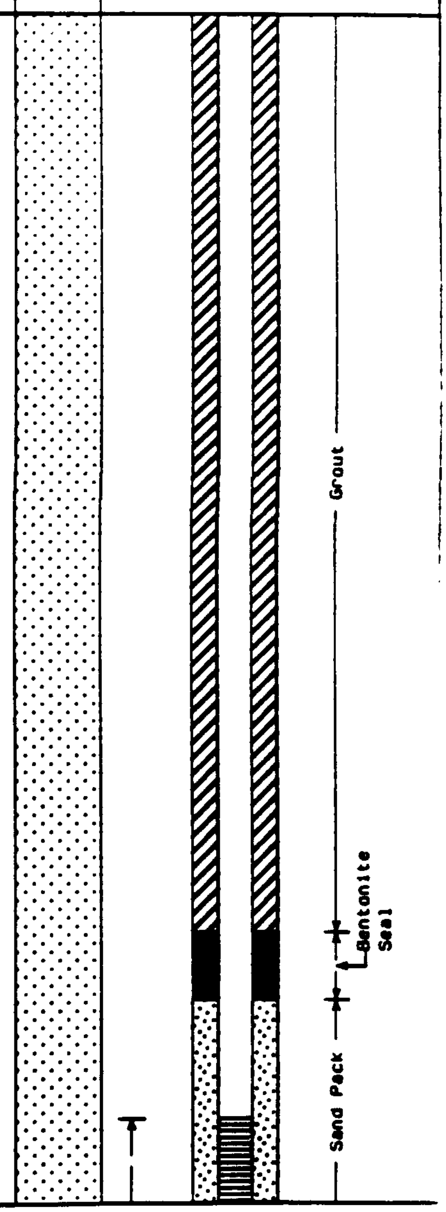
ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB
Site 1
Boring I.D. MW11
Geologist Julie Burgin

Project I.D. AT077
Well I.D. VF1 MW11
Date Installed 9-28-90

DEPTH (feet)	SAMPLE	BLOWS/6 IN	%REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS
30						
35					As above.	
40					As above.	
45				0	As above.	
50				0	As above.	
55				0	As above.	
60				0	As above.	
65						

GRAPHIC LOG / WELL DIAGRAM



BHLTINUS

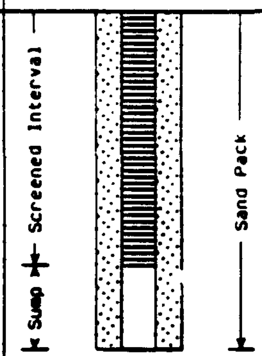
ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANG3
Site 1
Boring I.D. MW11
Geologist Julie Burgin

Project I.D. AT077
Well I.D. VF1 MW11
Date Installed 9-28-90

DEPTH (feet)	SAMPLE	BLOWS/6 IN	%REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG
65	X			0	As above, except fine.		
70	X			0	As above.		
75	X			0	As above.		
80							
85							
90							
95							
100							

WELL DIAGRAM



BKLT 6

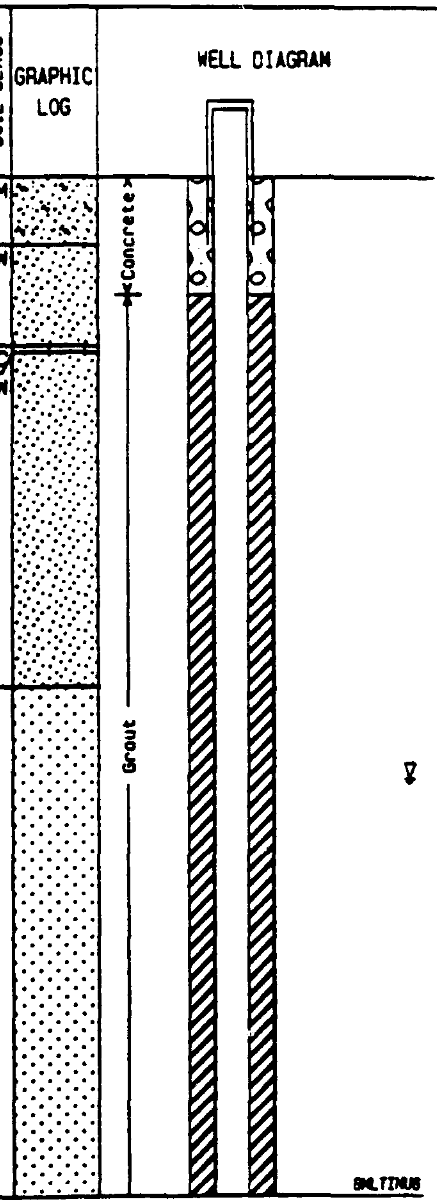
ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 1	Well I.D. VF1 MW12
Boring I.D. MW12	Date Installed 10-9-90
Geologist/Engineer Julie Burgin	Date Grouted 10-9-90
Drilling Method 6.25" Mud Rotary	Casing Material 2" PVC sch. 40
Sampling Method Split-Spoon/Grab	Screen Material 2" .010" ww PVC
Date Started 10-9-90	Casing Interval (ft) -2 - 58
Date Completed 10-9-90	Screened Interval (ft) 70 - 60
Driller North Star	Sump Installed? Yes
Borehole Diameter (in) 11	Well Depth (ft) 70.5
Depth Drilled (ft) 72	TOC Elevation (ft) 917.87 (11-30-90)
Ground Elevation (ft) 916.0	Water Level (ft) 900.13
Depth to Water (ft) 17.74	Date Measured 11-13-90
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS
0	X		98	0	SAND and SILT, orange dusky brown to pale yellowish brown, fine to medium, subrounded, moderately sorted, damp to very moist, strong odor.	SM
						SW
5	X		90	0	SAND, pale yellowish brown, fine to medium, moderately sorted, moist. SANDY CLAY, moderate brown, 2 inch layer at 5 feet.	SC / SW
10	X		90	0	SAND, grayish orange, fine to medium, subrounded, moderately sorted, wet.	
15	X		60	0	SANDSTONE, grayish orange with some white streaking, very weathered, friable, trace black minerals, fine to coarse, rounded, moderate to poorly sorted, fossiliferous.	
20	X		NA	0	As above.	
25	X		NA	0	As above, except medium to coarse.	

GRAPHIC LOG

WELL DIAGRAM

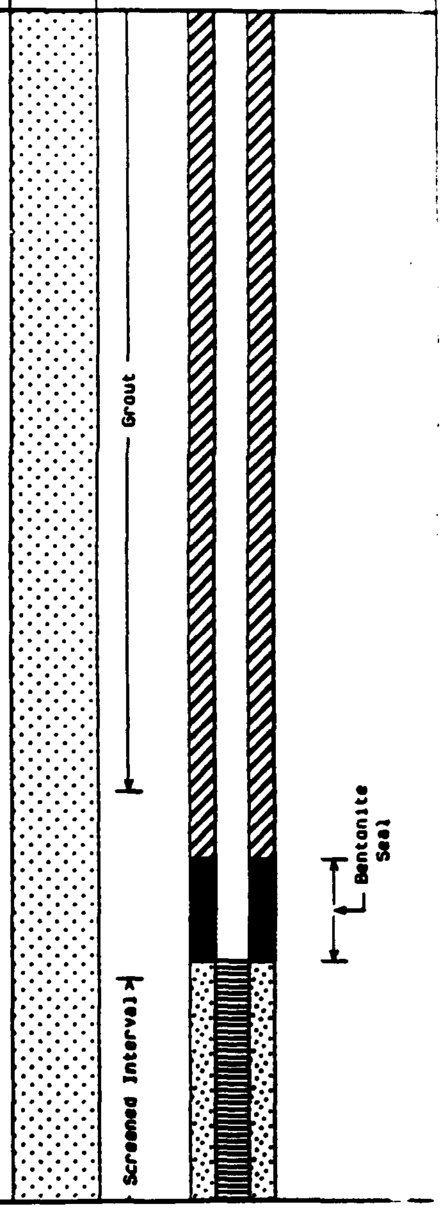


ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB
Site 1
Boring I.D. MW12
Geologist Julie Burgin

Project I.D. AT077
Well I.D. VF1 MW12
Date Installed 10-9-90

DEPTH (feet)	SAMPLE	BLOWS/6 IN	%REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
30	X		NA	0	As above.			
35	X		NA	0	As above.			
40	X				SANDSTONE (as above).			
45	X				As above.			
50	X				As above.			
55	X				As above.			
60					As above.			
65	X							



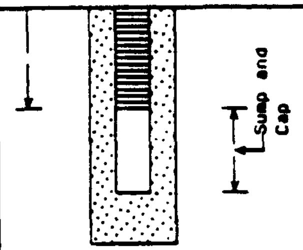
BNLT 8

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB
Site 1
Boring I.D. MW12
Geologist Julie Burgin

Project I.D. AT077
Well I.D. VF1 MW12
Date Installed 10-9-90

DEPTH (feet)	SAMPLE	BLOWS/6 IN	%REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
65	X				SANDSTONE, grayish orange, medium to coarse, rounded, moderately to poorly sorted, fossiliferous.			
70	X				As above.			
75								
80								
85								
90								
95								
100								



BALTIMUS

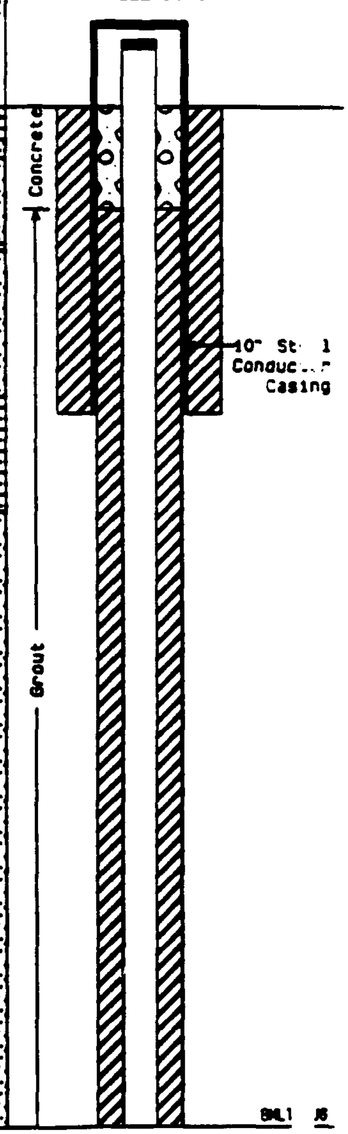
ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Page 1 of

Client Volk Field ANGB	Project I.D. AT077
Site 2	Well I.D. VF2 MW5
Boring I.D. MW5	Date Installed 10-23-89
Geologist/Engineer K. S. Charick	Date Grouted 10-23-89
Drilling Method Mud Rotary	Casing Material 4" PVC sch 40
Sampling Method Split-Spoon/Grab	Screen Material 4" 0.010" ww PVC
Date Started 10-23-89	Casing Interval (ft) -2 - 49.5
Date Completed 10-23-89	Screened Interval (ft) 49.5 - 59.5
Driller North Star	Sump Installed? Yes
Borehole Diameter (in) 10	Well Depth (ft) 62
Depth Drilled (ft) 65	TOC Elevation (ft) 899.57 (11-29-[illegible])
Ground Elevation (ft) 897.2	Water Level (ft) 897.92
Depth to Water (ft) 1.65	Date Measured 11-13-90
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS
0	X		95	1	TOPSOIL, some CLAY, trace sand, black, fine to 1.5 feet.	SC
					SAND, pale yellowish brown to dark yellowish brown, fine to medium, rounded to subrounded, moderate sorting.	SW
					SILT, from swamp to 4.2 feet.	ML
5	X		30	1.4	SAND, dark yellowish brown to brownish gray to 6 feet, black, orange, brown, yellow sandstone granules, fine to medium, subrounded to rounded, well sorted to moderately sorted.	SW
					CLAY, at 8.5 feet, trace sand, fine, trace silt, pale brown (varved) to 11.9 feet.	CL
10	X		100	0.2	SAND, pale brown, fine to medium, subrounded to rounded, well sorted to 12 feet.	
					SAND, yellowish brown, fine to medium, at 13 feet.	SW
15	X				SAND, yellowish brown, fine to medium, moderately sorted.	
20	X		40	0.1	As above.	
25	X		25	0.6	SAND, moderate brown to dark yellowish orange, white, orange, yellow, black sandstone granules, fine to medium, firm, clumps of silt (light brown).	

WELL DIAGRAM



ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

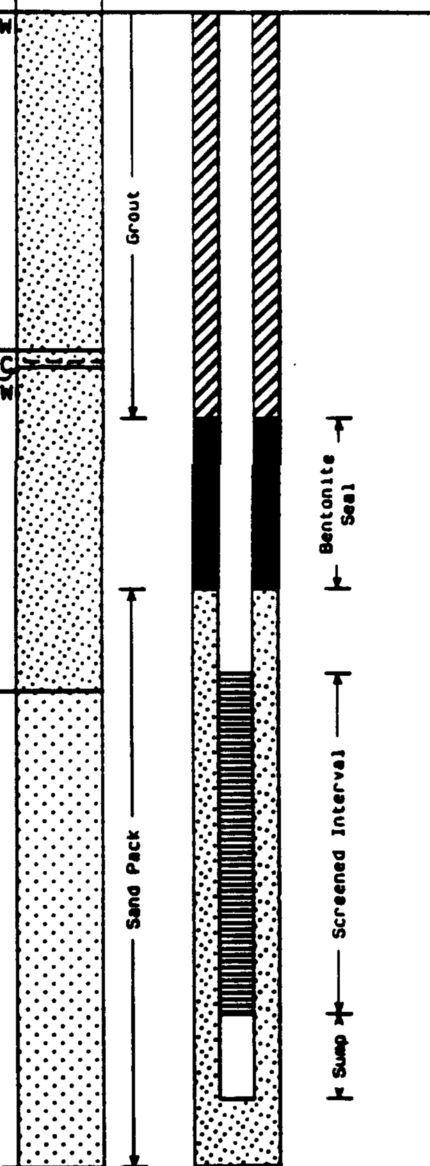
Client Volk Field ANGB
Site 2
Boring I.D. MW5
Geologist K. S. Charick

Project I.D. AT077
Well I.D. VF2 MW5
Date Installed 10-23-89

DEPTH (feet)	SAMPLE	BLOWS/6 IN	%REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS
30	X		15	1.9	As above.	SW
35	X		20		As above except more rock fragments. (pebbles).	
40	X		90		CLAY, moderate brown, and SAND, dark orange, very fine to coarse to 40.5 feet. SAND, moderate brown, very fine to fine to 41 feet. SAND, yellowish brown, medium to slightly coarse to 42 feet.	SC / SW
45	X		60		As above.	
50	X				SANDSTONE, moderate yellowish brown, weathered, orange, black, white, brown sandstone granules, medium to coarse grained, moderately to poorly sorted, firm.	
55	X				SANDSTONE, dark yellowish brown, weathered, black, white, red sandstone granules, clumps of clay and silt, medium to coarse grained to 55.25 feet. As above except black, white, brown sandstone granules and yellowish brown to 57 feet. As above except pale yellowish brown and fine to medium. As above.	
60	X					
65						

GRAPHIC LOG

WELL DIAGRAM



BHLTINUS

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

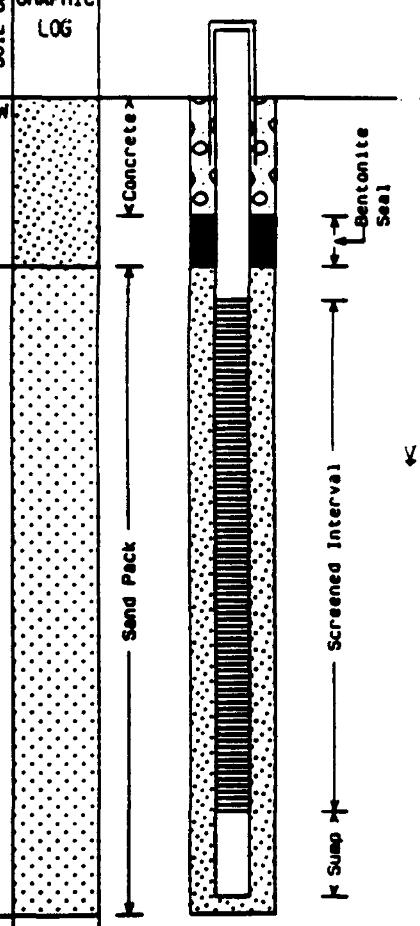
Client Volk Field ANGB
Site 3/6
Boring I.D. MW2
Geologist/Engineer K. S. Charick
Drilling Method Mud Rotary
Sampling Method Split-Spoon/Grab
Date Started 10-20-89
Date Completed 10-20-89
Driller North Star
Borehole Diameter (in) 10
Depth Drilled (ft) 23.5
Ground Elevation (ft) 921.2
Depth to Water (ft) 10.69
Date Measured 11-13-90

Project I.D. AT077
Well I.D. VF3/6 MW2
Date Installed 10-20-89
Date Grouted 10-20-89
Casing Material 2" PVC sch 40
Screen Material 2" 0.010" ww PVC
Casing Interval (ft) -2 - 6
Screened Interval (ft) 6 - 21
Sump Installed? Yes
Well Depth (ft) 23.5
TOC Elevation (ft) 923.27 (11-29-8
Water Level (ft) 912.58
Date Measured 11-13-90

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS
0	X		70	2.6	SAND and some SILT, brownish black to dark orange, very fine to medium, subangular to subrounded, poor to moderate sorting.	SW
5	X		5	2.2	SANDSTONE, pale yellowish brown, brown, black, white and orange granules, very weathered, friable, medium to coarse, rounded to subrounded, moderate to well sorted.	
10	X			2	As above.	
15	X			2	As above.	
20	X			2	As above.	
25				2	As above except larger black sandstone granules (pebbles).	

GRAPHIC LOG

WELL DIAGRAM



BML US

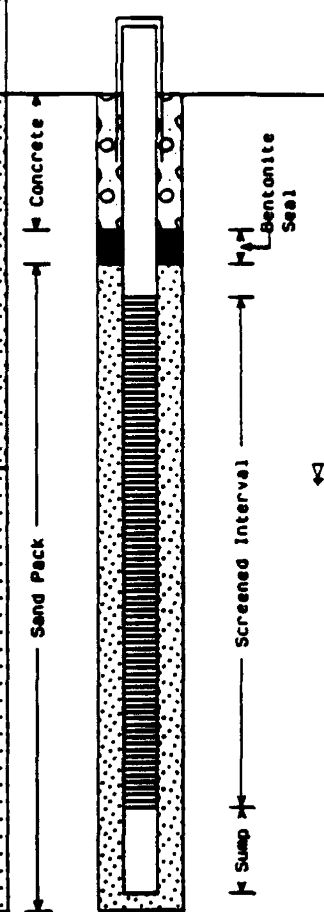
ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AI077
Site 3/6	Well I.D. VF3/6 MW3
Boring I.D. MW3	Date Installed 10-20-89
Geologist/Engineer K. S. Charick	Date Grouted 10-20-89
Drilling Method MUD Rotary	Casing Material 2" PVC sch 40
Sampling Method Split-Spoon/Grab	Screen Material 2" 0.010" ww PVC
Date Started 10-20-89	Casing Interval (ft) -2 - 6
Date Completed 10-20-89	Screened Interval (ft) 6 - 21
Driller North Star	Sump Installed? Yes
Borehole Diameter (in) 11	Well Depth (ft) 23.5
Depth Drilled (ft) 24	TOC Elevation (ft) 923.44 (11-30-90)
Ground Elevation (ft) 921.5	Water Level (ft) 912.14
Depth to Water (ft) 11.35	Date Measured 11-13-90
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS
0	X		70	5	SAND, moderate brown to light brown, very fine to medium, subrounded to subangular, moderate sorting to poor sorting.	SW
5	X		25	2	SAND, light brown, medium to coarse, rounded to subrounded, moderate sorting.	
10	X			2.2	As above except grayish orange.	
15	X			2.2	SANDSTONE, pale yellowish orange, very weathered, friable, black and orange sandstone granules, medium to coarse grained, rounded to subrounded, moderate sorting.	
20	X			1.9	As above except very pale orange.	
	X			2	As above.	
25						

GRAPHIC LOG

WELL DIAGRAM



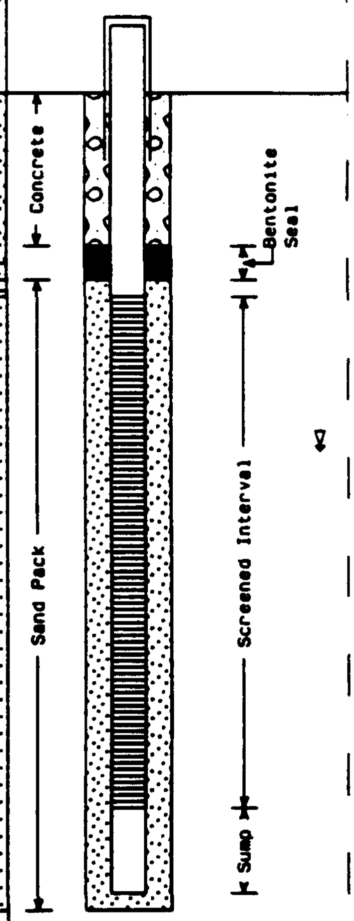
BALTINUS

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AI077
Site 3/6	Well I.D. VF3/6 MW4
Boring I.D. MW4	Date Installed 10-21-89
Geologist/Engineer K. S. Charick	Date Grouted 10-21-89
Drilling Method Mud Rotary	Casing Material 2" PVC sch 40
Sampling Method Split-Spoon/Grab	Screen Material 2" 0.010" ww PVC
Date Started 10-21-89	Casing Interval (ft) -2 - 6
Date Completed 10-21-89	Screened Interval (ft) 6 - 21
Driller North Star	Sump Installed? Yes
Borehole Diameter (in) 10	Well Depth (ft) 23.5
Depth Drilled (ft) 24	TOC Elevation (ft) 924.77 (11-29-89
Ground Elevation (ft) 922.6	Water Level (ft) 914.41
Depth to Water (ft) 10.36	Date Measured 11-13-90
Date Measured 11-3-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG
0	X		100	1.2	TOPSOIL, sand, fine, trace silt, brownish black, some clay, rock fragments (shale) to 1.5 feet. SAND, 1.5 feet to 2.5 feet, light brown to moderate brown, fine to slightly coarse, subrounded to rounded, moderately to poorly sorted.	SW	
5	X		30	1.2	SANDSTONE, yellowish brown, medium to coarse, rounded to subrounded, moderately sorted to 5.5 feet. CLAY, some sand, fine trace silt, varved, moderate brown and very light gray to 6 feet.	CL	
10	X			1.2	SANDSTONE, little clay, moderate yellowish brown, weathered, small black rock fragments, granular sized, black sandstone granules, medium to coarse, rounded to subrounded, poorly sorted.		
15	X			1.2	As above.		
20	X			1.2	As above except larger sandstone granules.		
	X			0.8	As above.		
25							

WELL DIAGRAM



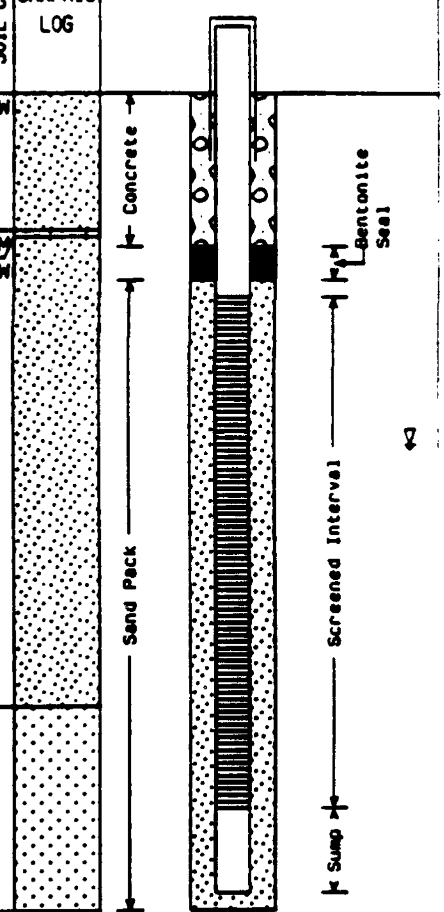
ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 3/6	Well I.D. VF3/6 MW5
Boring I.D. MW5	Date Installed 10-25-89
Geologist/Engineer K. S. Charick	Date Grouted 10-25-89
Drilling Method Mud Rotary	Casing Material 2" PVC sch 40
Sampling Method Split-Spoon/Grab	Screen Material 2" 0.010" ww PVC
Date Started 10-25-89	Casing Interval (ft) -2 - 6
Date Completed 10-25-89	Screened Interval (ft) 6 - 21
Driller North Star	Sump Installed? Yes
Borehole Diameter (in) 11	Well Depth (ft) 23.5
Depth Drilled (ft) 24	TOC Elevation (ft) 924.17 (11-29-89)
Ground Elevation (ft) 922.0	Water Level (ft) 913.85
Depth to Water (ft) 10.32	Date Measured 11-13-90
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS
0	X			0	TOPSOIL to 3 feet. SAND, dark yellowish orange to moderate brown, fine to medium to 4 feet.	SW
5	X		50	0	SILT, SAND, fine, black, to 4 feet 2 inches. SAND, moderate yellowish brown, fine to medium.	SM / SW
10	X		25	0	SAND, very fine to medium. Same as above except 3 inches of clay, moderate brown and very light gray, rock fragments (pebbles).	
15	X				SAND, moderate yellowish brown, fine to medium, well sorted, rock fragments, pebbles.	
20	X		30	0.2	SANDSTONE, pale yellowish orange, weathered, medium to coarse, small clumps of silt, rock fragments (pebbles).	
25	X			0.1	SANDSTONE, grayish orange, some brown, black, red, yellow sandstone granules, medium to coarse.	

GRAPHIC LOG

WELL DIAGRAM



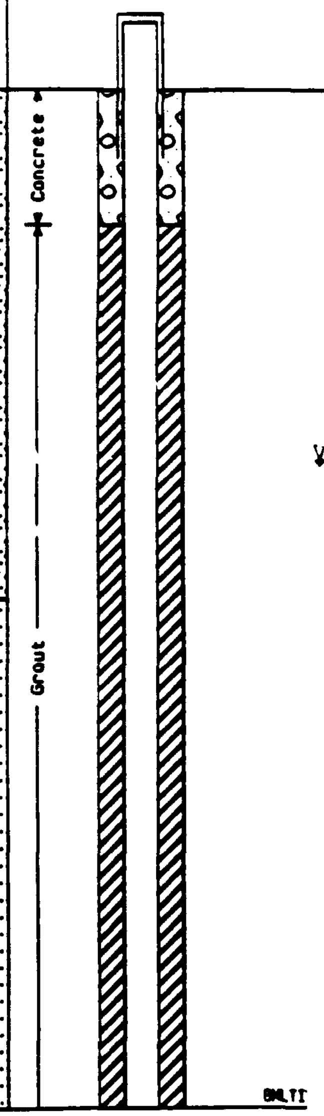
BALTINUS

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 3/6	Well I.D. VF3/6 MW6
Boring I.D. MW6	Date Installed 10-26-89
Geologist/Engineer K. S. Charick	Date Grouted 10-26-89
Drilling Method Mud Rotary	Casing Material 2" PVC sch 40
Sampling Method Split-Spoon/Grab	Screen Material 2" 0.010" ww PVC
Date Started 10-26-89	Casing Interval (ft) -2 - 50
Date Completed 10-26-89	Screened Interval (ft) 50 - 60
Driller North Star	Sump Installed? Yes
Borehole Diameter (in) 11	Well Depth (ft) 62.5
Depth Drilled (ft) 64	TOC Elevation (ft) 922.96 (11-30-9
Ground Elevation (ft) 921.2	Water Level (ft) 912.09
Depth to Water (ft) 10.92	Date Measured 11-13-90
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG
0	X		80	10.8	TOPSOIL, sand, moderate brown, fine to 2 inches. SAND, light brown, fine, well sorted.	SW	
5	X		30	0	As above except dark yellowish brown and moderate brown alternating with black sandstone granules.		
10	X			0.3	SAND, some clumps of silt, pale yellowish orange, black and brown sandstone granules, fine to medium, moderate sorting.		
15	X			0	SANDSTONE, very pale yellowish orange, weathered, black, brown, yellow, orange, white, sandstone granules, medium to coarse, moderate sorting.		
20	X			0	As above except dark brown sandstone (pebbles).		
25	X			0.1	As above.		

WELL DIAGRAM



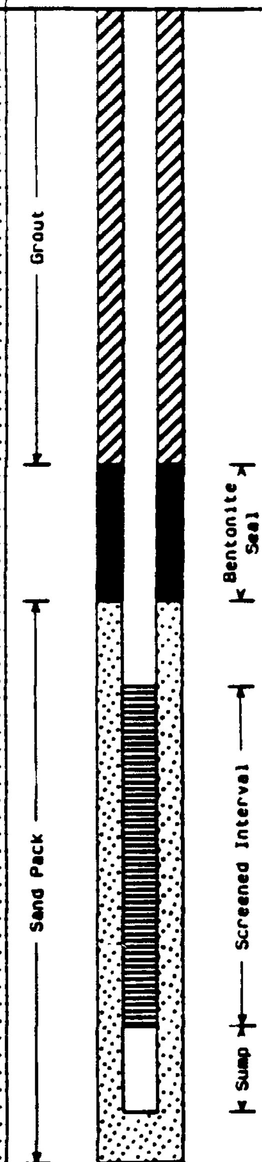
ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB
Site 3/6
Boring I.D. MW6
Geologist K. S. Charick

Project I.D. AT077
Well I.D. VF3/6 MW6
Date Installed 10-25-89

DEPTH (feet)	SAMPLE	BLOWS/6 IN	%REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG
30	☒			0	As above except fine to coarse.		
35	☒			0	As above except sandstone granules (size).		
40	☒			0	As above except larger dark brown sandstone granules, pale yellowish orange.		
45	☒			0	As above except slightly darker yellowish orenge, medium to slightly coarse.		
50	☒			0	As above except fine to slightly coarse.		
55	☒			0	As above except dark yellowish orange and fine to medium.		
60	☒			0	As above except grayish orange, very fine to medium, some light brown clumps of sand.		
65	☒			0	As above except dark yellowish orange and very fine to medium.		

WELL DIAGRAM



BALTINUS

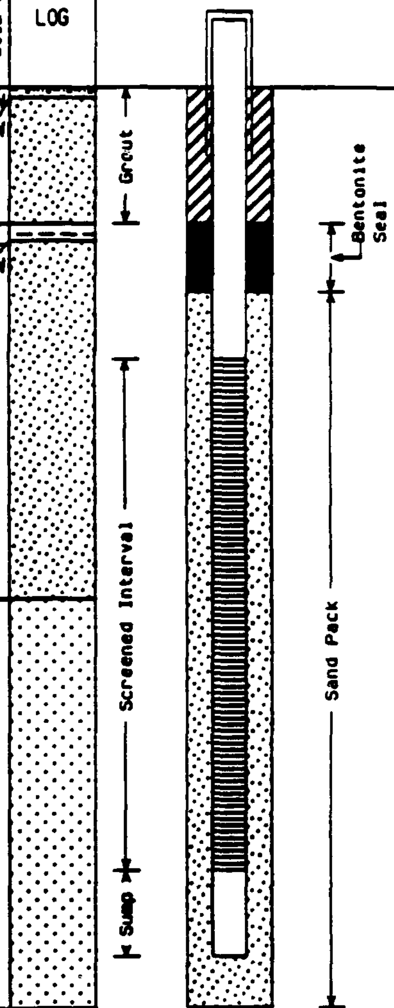
ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 3/6	Well I.D. VF3/6 MW7
Boring I.D. MW7	Date Installed 10-10-90
Geologist/Engineer Julie Burgin	Date Grouted 10-10-90
Drilling Method 6.25" Mud Rotary	Casing Material 2" PVC
Sampling Method Split-Spoon/Grab	Screen Material 2" .010" ww PVC
Date Started 10-10-90	Casing Interval (ft) -2 - 8
Date Completed 10-10-90	Screened Interval (ft) 8 - 23
Driller North Star	Sump Installed? Yes
Borehole Diameter (in) 11	Well Depth (ft) 25.5
Depth Drilled (ft) 27	TOC Elevation (ft) 922.40 (11-29-89
Ground Elevation (ft) 920.50	Water Level (ft) 913.62
Depth to Water (ft) 15	Date Measured 11-13-90
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS
0	X		95	0	TOPSOIL and PEBBLES. SAND, moderate yellowish brown, fine to medium, subrounded, moderately sorted, slightly damp.	GW SW
					CLAY, mottled grey and red, approximately 6 inches thick, slight sheen in clay.	CL
5	X		95	0	SAND, moderate yellowish brown, fine to medium, moderately sorted, moist.	SW
10	X		50	0	SAND, moderate yellowish brown to medium light gray, very faint mottling, fine to medium, subrounded, well sorted, moist.	
15	X		30	0	As above, except SANDSTONE at 15 feet, moderate yellowish brown, very weathered, friable, fine to coarse, subrounded, moderately to poorly sorted.	
20			NA		As above.	
25			NA		As above.	

GRAPHIC LOG

WELL DIAGRAM



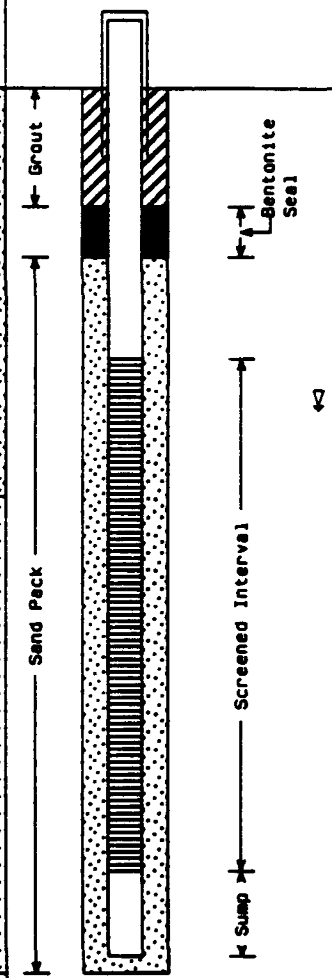
BMLTIN

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 3/6	Well I.D. VF3/6 MW8
Boring I.D. MW8	Date Installed 10-11-90
Geologist/Engineer Julie Burgin	Date Grouted 10-11-90
Drilling Method 6.25" Mud Rotary	Casing Material 2" PVC sch. 40
Sampling Method Split-Spoon/Grab	Screen Material 2" .010" ww PVC
Date Started 10-11-90	Casing Interval (ft) -2 - 8
Date Completed 10-11-90	Screened Interval (ft) 8 - 23
Driller North Star	Sump Installed? Yes
Borehole Diameter (in) 11	Well Depth (ft) 25.5
Depth Drilled (ft) 26	TOC Elevation (ft) 923.38 (11-30-90)
Ground Elevation (ft) 921.2	Water Level (ft) 914.02
Depth to Water (ft) 9.36	Date Measured 11-13-90
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG
0	X		80	0	TOPSOIL, dusky brown, trace SAND. SAND, mottled dusky brown to moderate yellowish brown, rounded to subrounded, fine to medium, moderate to well sorted, damp.	SW	
5	X		80	0	SAND, moderate yellowish brown with some olive gray staining, subrounded, fine to medium, moderately sorted, moist.		
10	X		30	0	As above with fuel odor and wet.		
15	X				SANDSTONE, moderate yellowish brown to grayish orange, very weathered, friable, subrounded, medium to coarse, moderately sorted.		
20	X				As above.		
25	X				As above.		

WELL DIAGRAM



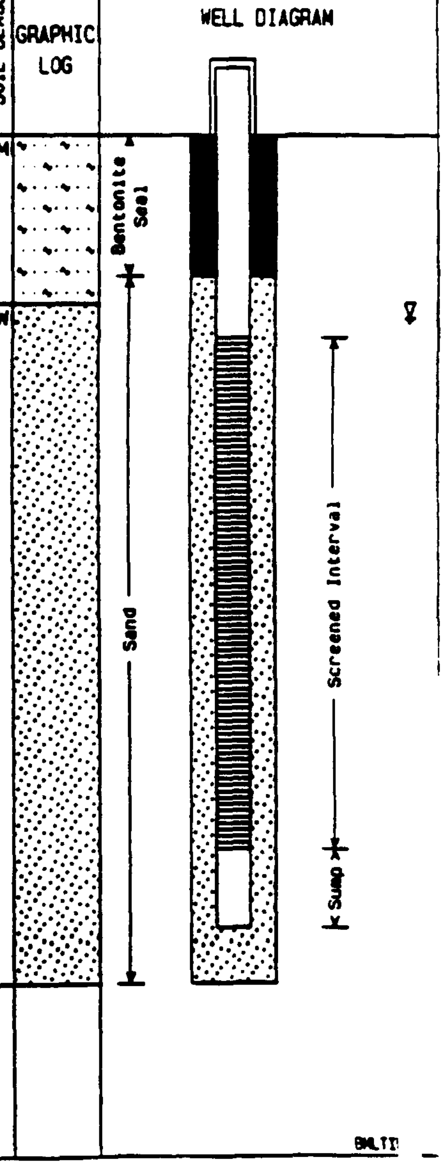
BMLTINUS

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB
Site 5
Boring I.D. MW1
Geologist/Engineer K. S. Charick
Drilling Method 6.25" Mud Rotary
Sampling Method Split Spoon
Date Started 11-4-89
Date Completed 11-5-89
Driller North Star
Borehole Diameter (in) 9
Depth Drilled (ft) 24.9
Ground Elevation (ft) 901.8
Depth to Water (ft) 5.44
Date Measured 11-13-90

Project I.D. AI077
Well I.D. VF5 MW1
Date Installed 11-5-89
Date Grouted 11-5-89
Casing Material 2" PVC sch 40
Screen Material 2" 0.010 ww PVC
Casing Interval (ft) -2 - 6
Screened Interval (ft) 6 - 21
Sump Installed? Yes
Well Depth (ft) 23.3
TOC Elevation (ft) 903.76
Water Level (ft) 898.32
Date Measured 11-13-90

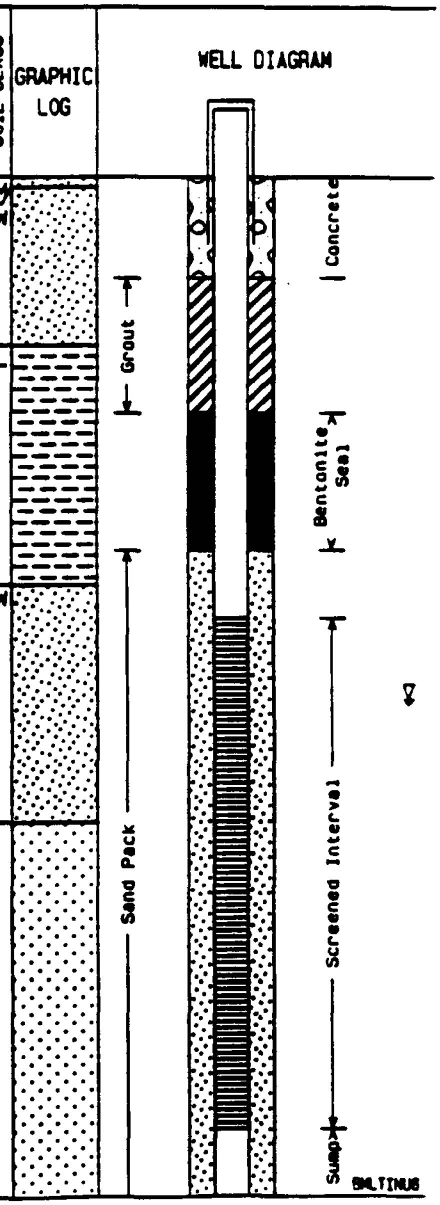
DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS
0	X		100		SILT, little sand, trace clay, black to light brown, fine to coarse.	SM
5	X		40		SAND, pinkish gray, fine to medium.	SW
10	X				As above, no recovery.	
15	X		70		SAND, pale yellowish orange, fine to medium, rounded.	
20	X		60		As above.	
25						



ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 7	Well I.D. VF7 MW4
Boring I.D. MW4	Date Installed 10-21-89
Geologist/Engineer K. S. Charick	Date Grouted 10-21-89
Drilling Method Mud Rotary	Casing Material 2" PVC sch 40
Sampling Method Split-Spoon/Grab	Screen Material 2" 0.010" ww PVC
Date Started 10-21-89	Casing Interval (ft) -2 - 13
Date Completed 10-21-89	Screened Interval (ft) 13 - 28
Driller North Star	Sump Installed? Yes
Borehole Diameter (in) 11	Well Depth (ft) 30.5
Depth Drilled (ft) 34	TOC Elevation (ft) 914.92 (11-29-89)
Ground Elevation (ft) 912.5	Water Level (ft) 899.51
Depth to Water (ft) 15.41	Date Measured 11-13-90
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS
0	X		100	0	TOPSOIL, SAND, fine, some SILT, 0-4 inches, subangular to subrounded, well sorted. SAND, little silt, moderate yellowish brown, fine, damp.	SM / SW
5	X		100	0	CLAY, trace silt, trace sand, moderate brown, layers of slightly darker matter 1/4 inch thick, varved, fine.	CL
10	X		100	0	SAND, trace silt, moderate yellowish brown to dark yellowish orange, fine to very fine.	SW
15	X		20	0	SANDSTONE, pale orange grading to grayish orange at depth, very weathered, friable, black, brown sandstone granules, fine to slightly coarse, rounded to subrounded, subangular, moderately sorted.	
20	X		0	0	As above.	
25	X			0	As above.	



ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Page 2 of 2
Site 7	Project I.D. AT077
Boring I.D. MW4	Well I.D. VF7 MW4
Geologist K. S. Charick	Date Installed 10-21-89

DEPTH (feet)	SAMPLE	BLOWS/6 IN	%REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
30								
	⊠			0	As above.			
35								
40								
45								
50								
55								
60								
65								

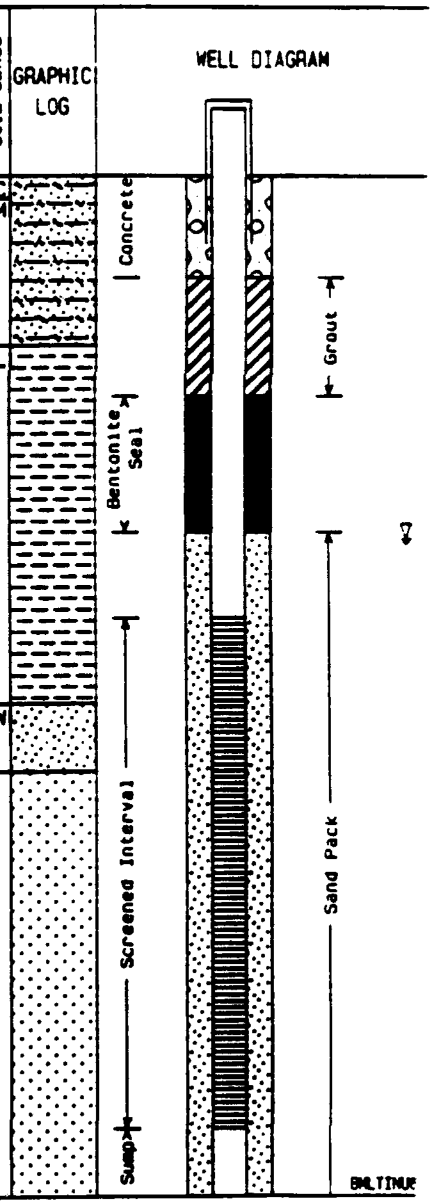
BMLTI

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk F eld ANGB	Project I.D. AT077
Site 7	Well I.D. VF7 MW5
Boring I.D. MW5	Date Installed 10-21-89
Geologist/Engineer K. S. Charick	Date Grouted 10-21-89
Drilling Method Mud Rotary	Casing Material 2" PVC sch 40
Sampling Method Split-Spoon/Grab	Screen Material 2" 0.010" ww PVC
Date Started 10-21-89	Casing Interval (ft) -2 - 13
Date Completed 10-21-89	Screened Interval (ft) 13 - 28
Driller North Star	Sump Installed? Yes
Borehole Diameter (in) 11	Well Depth (ft) 30.5
Depth Drilled (ft) 32	TOC Elevation (ft) 909.75 (11-29-89
Ground Elevation (ft) 908.1	Water Level (ft) 899.04
Depth to Water (ft) 10.71	Date Measured 11-13-90
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS
0	X		80	0.3	TOPSOIL, 0-4 inches, SAND, some silt, little clay, pale yellowish brown to grayish orange with orange mottling, fine, subangular to subrounded, well sorted to 2 feet.	SC SM
5	X		95	0.25	CLAY, trace silt, trace sand, moderate brown and very pale orange, *(varved)*, fine.	CL
10	X		100	0.8	As above to 11.5 feet, bottom 5 inches moderate brown and dark yellowish brown varved clay.	
15	X		100	0.6	As above to 15.5 feet, then SAND, some silt, moderate yellowish brown, rounded to subrounded, well sorted.	SW
20	X		0	0.7	SANDSTONE, moderate brown, very weathered, fine to slightly coarse, moderate sorting.	
25	X			0.6	SANDSTONE, some sand, trace silt, moderate brown, fine to slightly coarse, moderate to poor sorting.	

GRAPHIC LOG / WELL DIAGRAM



ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANG?
Site 7
Boring I.D. MW5
Geologist K. S. Charick

Project I.D. AT077
Well I.D. VF7 MW5
Date Installed 10-21-89

DEPTH (feet)	SAMPLE	BLOWS/6 IN	%REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
30	X			0.5	SANDSTONE, some clay, trace silt, moderate yellowish brown, medium to coarse, subrounded to rounded, moderately sorted.			
35								
40								
45								
50								
55								
60								
65								

BKL1

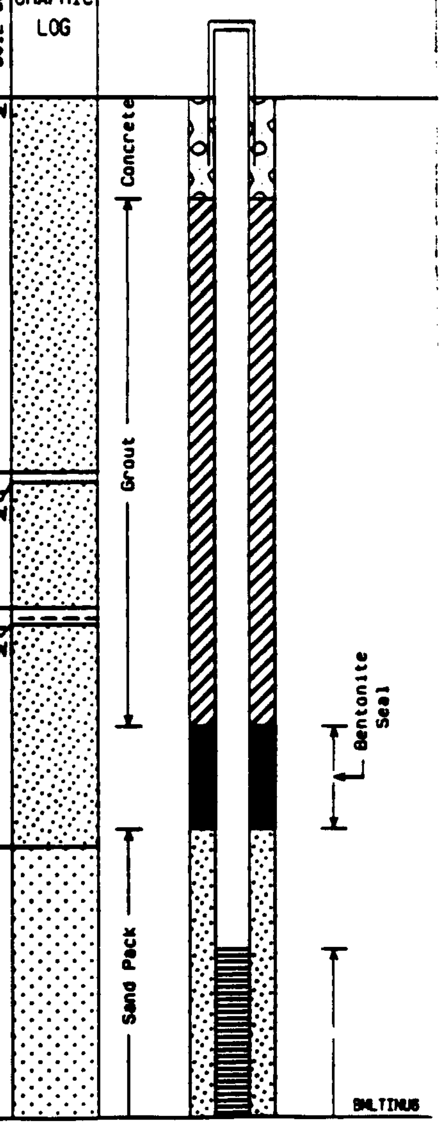
ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 7	Well I.D. VF7 MW6
Boring I.D. MW6	Date Installed 10-24-89
Geologist/Engineer K. S. Charick	Date Grouted 10-24-89
Drilling Method Mud Rotary	Casing Material 2" PVC sch 40
Sampling Method Split-Spoon	Screen Material 2" 0.010" ww PVC
Date Started 10-24-89	Casing Interval (ft) -2 - 25
Date Completed 10-24-89	Screened Interval (ft) 25 - 40
Driller North Star	Sump Installed? Yes
Borehole Diameter (in) 11	Well Depth (ft) 42.5
Depth Drilled (ft) 43	TOC Elevation (ft) 937.07 (11-29-89)
Ground Elevation (ft) 935.1	Water Level (ft) 902.04
Depth to Water (ft) 35.03	Date Measured 11-13-90
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS
0	X		100	1	TOPSOIL and SAND, fine, to 4 inches. SAND, dark yellowish orange, fine to medium, rounded to subrounded, moderately sorted to 2 feet.	SW
5	X		30	0.4	SAND, dark yellowish orange, small black sandstone sandstone granules, medium to coarse, rounded to subrounded, moderately sorted.	
10	X		30	0.1	SAND, dark yellowish brown, black sandstone granules, fine to medium, rounded to subrounded, well sorted to 11 feet. CLAY, some sand, fine, trace silt, moderate brown to 11.3 feet. SAND, dark yellowish brown, black sandstone granules, fine to medium, rounded to subrounded, well sorted. to 12 feet.	CL SW
15	X		40	0.6	CLAY, some sand, fine, trace silt, moderate brown to 15.5 feet. SAND, dark yellowish orange to 17 feet, black sandstone granules to 12 feet, fine to medium, rounded to subrounded, well sorted.	CL SW
20	X		50		SAND, little clumps of silt (moderate brown), moderate yellowish orange, some black sandstone granules, medium to slightly coarse. SANDSTONE, dark yellowish orange, very weathered, medium to coarse, subrounded to rounded, moderate sorting.	
25	X			1.3	SANDSTONE, dark yellowish orange, brown, black, orange sandstone granules, fine to medium, moderately sorted.	

GRAPHIC LOG

WELL DIAGRAM



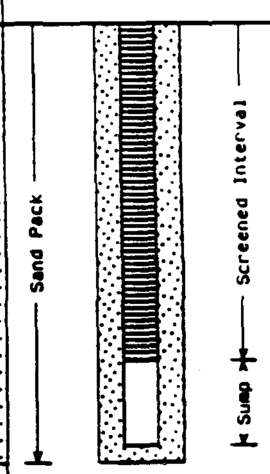
ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB
Site 7
Boring I.D. MW6
Geologist K. S. Charick

Project I.D. AT077
Well I.D. VF7 MW6
Date Installed 10-24-89

DEPTH (feet)	SAMPLE	BLOWS/6 IN	%REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG
30	X			0	SANDSTONE, clumps of silt (moderate brown), dark yellowish orange, very fine to medium, rounded to subrounded, moderate sorting.		
35	X			0	SANDSTONE, dark yellowish brown, red, brown, black, yellow, orange sandstone granules, very fine to fine, well sorted.		
40	X			0	SANDSTONE, pale yellowish orange, black, brown, red, yellow sandstone granules, fine to medium, well sorted.		
	X			0			
45							
50							
55							
60							
65							

WELL DIAGRAM



BMLTI

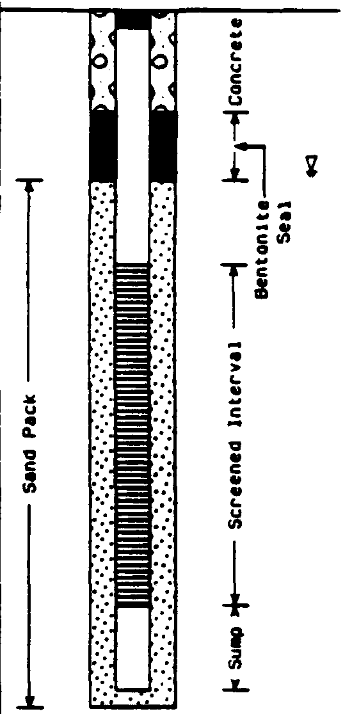
ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 8	Well I.D. VF8 MW1
Boring I.D. MW1	Date Installed 10-8-90
Geologist/Engineer Julie Burgin	Date Grouted 10-8-90
Drilling Method 6.25" H.S.A.	Casing Material 2" PVC sch. 40
Sampling Method Split-Spoon/Grab	Screen Material 2" .010" ww PVC
Date Started 10-8-90	Casing Interval (ft) 0 - 7.5
Date Completed 10-8-90	Screened Interval (ft) 7.5 - 17.5
Driller North Star	Sump Installed? Yes
Borehole Diameter (in) 11	Well Depth (ft) 20
Depth Drilled (ft) 20.5	TOC Elevation (ft) 908.96 (11-30-90)
Ground Elevation (ft) 909.0	Water Level (ft) 903.99
Depth to Water (ft) 4.75	Date Measured 11-13-90
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS
0	X		80	0	TOPSOIL, some SAND, some SILT, dark brown.	SM/SW
					CLAY, 3-inch thick lens, some black staining.	CL/SW
					SAND, moderate yellowish brown, fine to medium, subrounded, moderately sorted, damp.	
5	X		70	0	CLAY, 3-inch thick lens at 5.5 feet, some black staining.	CL/SW
10	X		70	0	SAND, moderate yellowish brown with some black staining, fine to medium, subrounded, moderately sorted, wet.	
15	X		70	0	As above.	
20	X				As above.	
25						

GRAPHIC LOG

WELL DIAGRAM

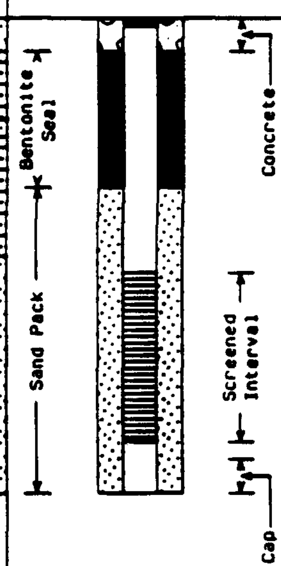


ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 8	Well I.D. VF8 PZ1
Boring I.D. PZ1	Date Installed 9-30-90
Geologist/Engineer Julie Burgin	Date Grouted 9-30-90
Drilling Method 6.25" H.S.A.	Casing Material 1" PVC sch. 40
Sampling Method Split-Spoon	Screen Material 1" .010" ww PVC
Date Started 9-30-90	Casing Interval (ft) 0 - 7.5
Date Completed 9-30-90	Screened Interval (ft) 7.5 - 12.5
Driller North Star	Sump Installed? No. cap.
Borehole Diameter (in) 11	Well Depth (ft) 13
Depth Drilled (ft) 14	TOC Elevation (ft) 906.86 (11-30-9)
Ground Elevation (ft) 907.2	Water Level (ft) 903.81
Depth to Water (ft) 3.05	Date Measured 10-15-90
Date Measured 10-15-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG
0	X		90	0	TOPSOIL, some SAND, brownish black, damp.	SW	
					CLAY, mottled light brown to medium gray, firm.	CL	
						SW	
					CLAY, mottled light brown to black, wet.	CL	
5	X		75	0			
10	X		75		SAND, moderate brown, fine to coarse, rounded to subrounded, moderately sorted.	SW	
15							
20							
25							

WELL DIAGRAM

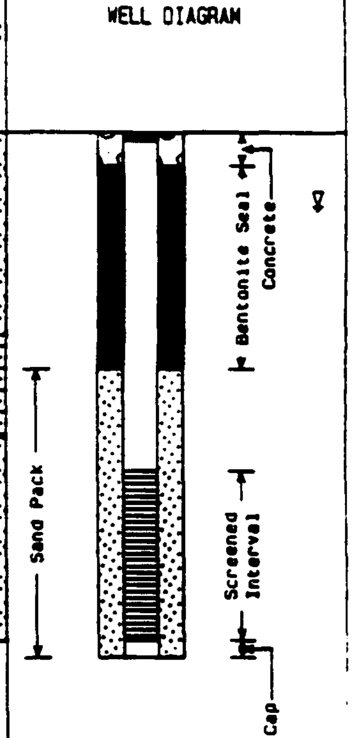


BRLT 5

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AT077
Site 8	Well I.D. VF8 PZ2
Boring I.D. PZ2	Date Installed 9-30-90
Geologist/Engineer Julie Burgin	Date Grouted 9-30-90
Drilling Method 6.25 H.S.A.	Casing Material 1" PVC sch. 40
Sampling Method Split-Spoon	Screen Material 1" .010" ww PVC
Date Started 9-30-90	Casing Interval (ft) 0 - 10
Date Completed 9-30-90	Screened Interval (ft) 10 - 15
Driller North Star	Sump Installed? No. cap.
Borehole Diameter (in) 11	Well Depth (ft) 15
Depth Drilled (ft) 15.5	TOC Elevation (ft) 906.02 (11-30-90)
Ground Elevation (ft) 906.3	Water Level (ft) 903.80
Depth to Water (ft) 2.22	Date Measured 10-15-90
Date Measured 10-15-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS
0	X		100	0	TOPSOIL, some SAND, some CLAY, brownish black, damp.	SW
5	X		100	0	SAND, moderate brown with black staining, fine to medium.	SW
	X				CLAY, mottled medium gray and moderate brown, firm, moist.	CL
					SAND, moderate brown, fine to medium, rounded, moderate to well sorted, wet.	SW
10						
	X		NA	0	As above.	SW
15						
20						
25						



BALTIMUS

ENGINEERING - SCIENCE

SOIL BORING LOG AND WELL CONSTRUCTION RECORD

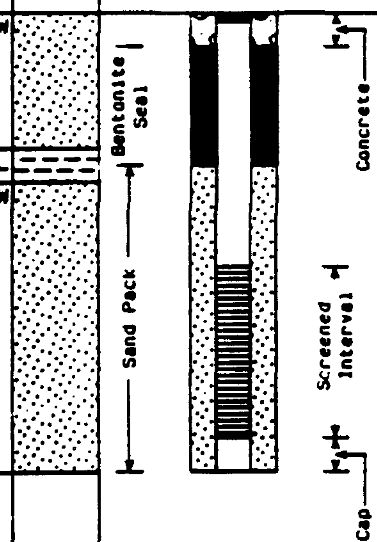
Page 1 of

Client Volk Field ANGB	Project I.D. AT077
Site 8	Well I.D. VF8 PZ3
Boring I.D. PZ3	Date Installed 9-30-90
Geologist/Engineer Julie Burgin	Date Grouted 9-30-90
Drilling Method 6.25" H.S.A.	Casing Material 1" PVC sch. 40
Sampling Method Split-Spoon	Screen Material 1" .010" ww PVC
Date Started 9-30-90	Casing Interval (ft) 0 - 7.5
Date Completed 9-30-90	Screened Interval (ft) 7.5 - 12.5
Driller North Star	Sump Installed? No. cap.
Borehole Diameter (in) 11	Well Depth (ft) 13
Depth Drilled (ft) 13.5	TOC Elevation (ft) 908.65 (11-30-9
Ground Elevation (ft) 908.9	Water Level (ft) 904.90
Depth to Water (ft) 3.75	Date Measured 10-15-90
Date Measured 10-15-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS
0	X		30	0	TOPSOIL, some SILT, dusky brown.	SW
5	X		85	400	CLAY, trace silt, dusky brown, medium soft.	CL
					SAND, trace silt, fine to medium, subrounded, moderately well sorted.	SW
10	X		80		SAND, dusky brown, fine to medium, subrounded, moderately sorted, wet.	
	X				As above.	
15						
20						
25						

GRAPHIC LOG

WELL DIAGRAM



BMLT 6

ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

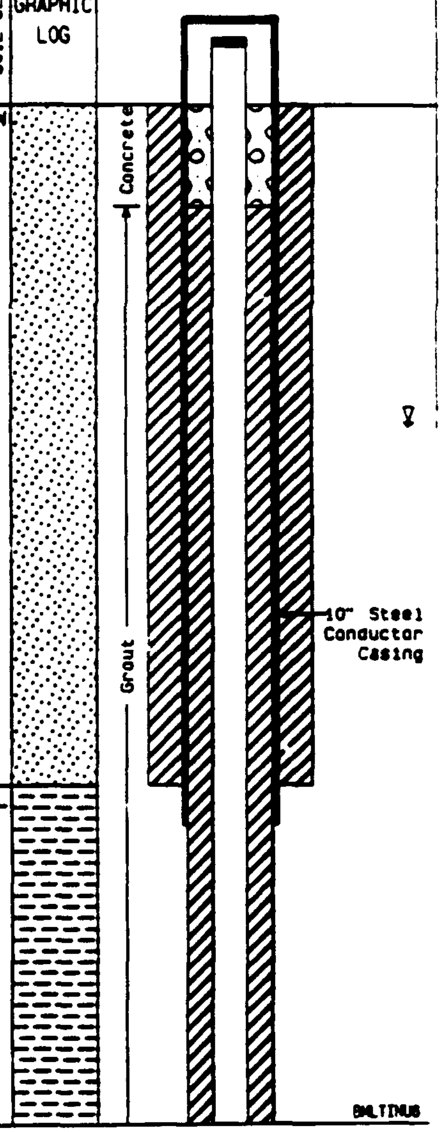
Client Volk Field ANGB
Site 10
Boring I.D. MW5
Geologist/Engineer K. S. Charick
Drilling Method Mud Rotary
Sampling Method Split-Spoon/Grab
Date Started 10-23-89
Date Completed 10-23-89
Driller North Star
Borehole Diameter (in) 9 7/8"
Depth Drilled (ft) 64
Ground Elevation (ft) 957.0
Depth to Water (ft) 9.36
Date Measured 11-13-90

Project I.D. AT077
Well I.D. VF10 MW5
Date Installed 10-23-89
Date Grouted 10-23-89
Casing Material 4" PVC sch 40
Screen Material 4" 0.010" ww PVC
Casing Interval (ft) -2 - 50
Screened Interval (ft) 50 - 60
Sump Installed? Yes
Well Depth (ft) 62.5
TOC Elevation (ft) 959.06 (11-30-90)
Water Level (ft) 949.70
Date Measured 11-13-90

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS
0	X		70	0	TOPSOIL, sand, trace silt, moderate brown to black, fine to coarse. SAND, trace silt, moderate brown, black, brown, red, yellow sandstone granules, fine to coarse, subrounded, poorly sorted.	SW
5	X		40	0	As above except more sandstone granules.	
10	X		30	0	As above except moderate yellowish brown.	
15	X		40	0	SAND, dark yellowish brown to dusky yellowish brown, fine to slightly coarse, poor to moderate sorting.	
20	X		40	0	CLAY, trace sand, trace silt, dusky yellowish brown (varved) to 21 feet. CLAY, some sand, medium trace silt, olive gray to moderate brown (varved) to 23 feet.	CL
			100	0		
25	X		100	0	Same as above except trace sand, fine.	
	X		0			

GRAPHIC LOG

WELL DIAGRAM



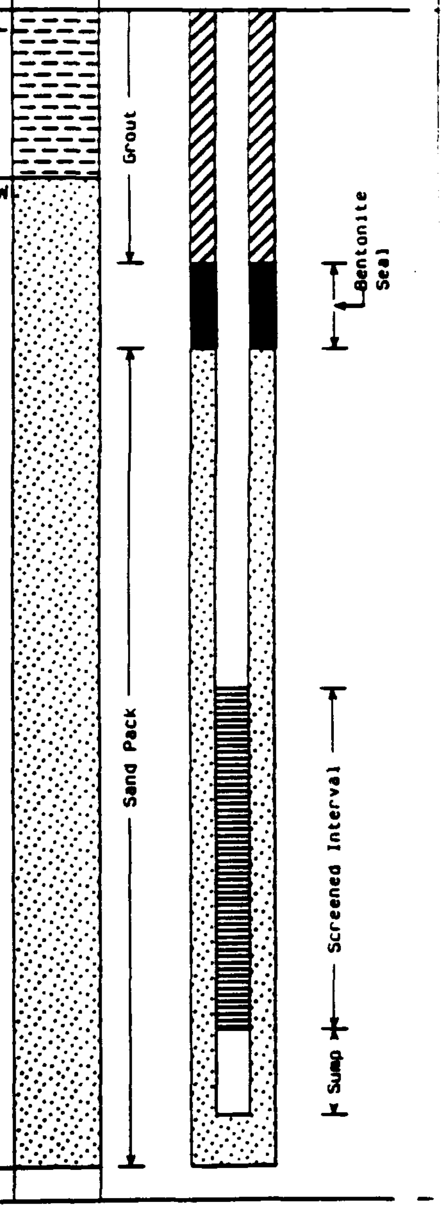
ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB
Site 10
Boring I.D. MW5
Geologist K. S. Charick

Project I.D. AT077
Well I.D. VF10 MW5
Date Installed 10-23-89

DEPTH (feet)	SAMPLE	BLOWS/6 IN	%REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS
30						CL
35	X			0	SAND, moderate brown with orange, brown, and black sandstone granules, fine to medium, rounded to subrounded, moderate to well sorted.	SW
40	X			0	As above except medium grained, (green, white, yellow, orange, brown, black sandstone granules).	
45	X			0	As above	
50	X			0	As above.	
55	X			0	As above.	
60	X			0	As above.	
	X			0	As above.	
65						

GRAPHIC LOG / WELL DIAGRAM



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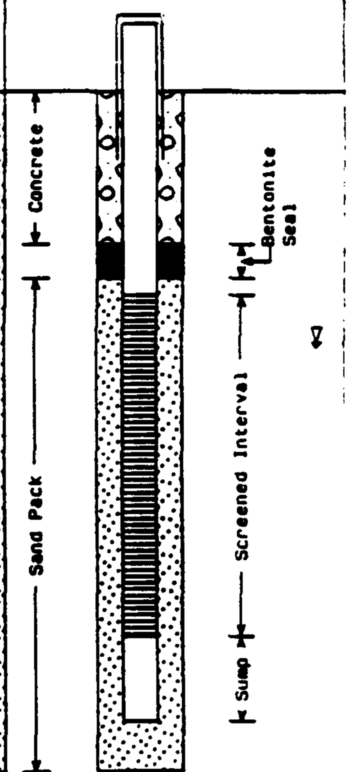
ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGF	Project I.D. AT077
Site 10	Well I.D. VF10 MW6
Boring I.D. MW6	Date Installed 10-22-89
Geologist/Engineer K. S. Charick	Date Grouted 10-22-89
Drilling Method Mud Rotary	Casing Material 2" PVC sch 40
Sampling Method Split-Spoon/Grab	Screen Material 2" 0.010" ww PVC
Date Started 10-22-89	Casing Interval (ft) -2 - 6
Date Completed 10-22-89	Screened Interval (ft) 6 - 16
Driller North Star	Sump Installed? Yes
Borehole Diameter (in) 10	Well Depth (ft) 18.5
Depth Drilled (ft) 20	TOC Elevation (ft) 959.13 (11-29-89)
Ground Elevation (ft) 956.9	Water Level (ft) 951.72
Depth to Water (ft) 7.41	Date Measured 11-13-90
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNU/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG
0	X		30	1.2	TOPSOIL first 4 inches. sand. moderate brown. fine to medium. trace silt. moderately sorted.	SW	
5	X						
10	X			2.1	SAND. trace silt. moderate brown. black. red. yellow. white. orange. sandstone granules. fine to coarse. subrounded to rounded. poorly to moderately sorted.		
15	X				As above.		
20	X			1.4	As above except olive gray and medium to coarse.		
25							

WELL DIAGRAM



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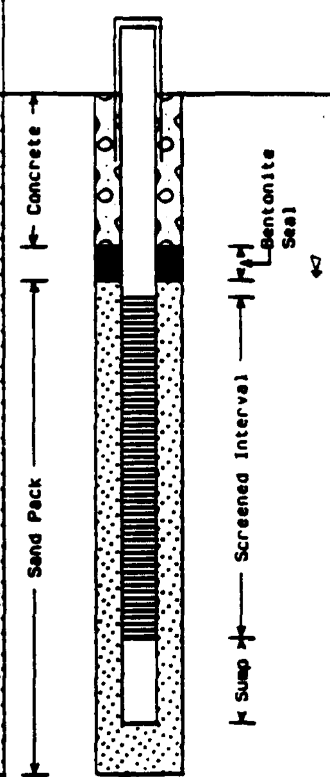
ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AI077
Site 10	Well I.D. VF10 MW7
Boring I.D. MW7	Date Installed 10-22-89
Geologist/Engineer K. S. Charick	Date Grouted 10-22-89
Drilling Method Mud Rotary	Casing Material 2" PVC sch 40
Sampling Method Split-Spoon	Screen Material 2" 0.010" ww PVC
Date Started 10-22-89	Casing Interval (ft) -2 - 6
Date Completed 10-22-89	Screened Interval (ft) 6 - 16
Driller North Star	Sump Installed? Yes
Borehole Diameter (in) 11	Well Depth (ft) 18.5
Depth Drilled (ft) 20	TOC Elevation (ft) 956.86 (11-29-8'
Ground Elevation (ft) 954.8	Water Level (ft) 951.62
Depth to Water (ft) 5.24	Date Measured 11-13-90
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG
0	X		75	2.8	TOPSOIL, sand, moderate brown, medium to coarse to 3 inches. SAND, light brown, medium to coarse, subrounded, poor sorting to 1.5 feet. As above except grayish orange to 2 feet. SAND, moderate yellowish brown, red, yellow, orange, white, black rock fragments, coarse to very coarse, moderate sorting.	SW	
5	X		35	2.2			
10	X		25	2.2	As above.		
15	X			2.2	As above		
20	X			1.9	As above		
25							

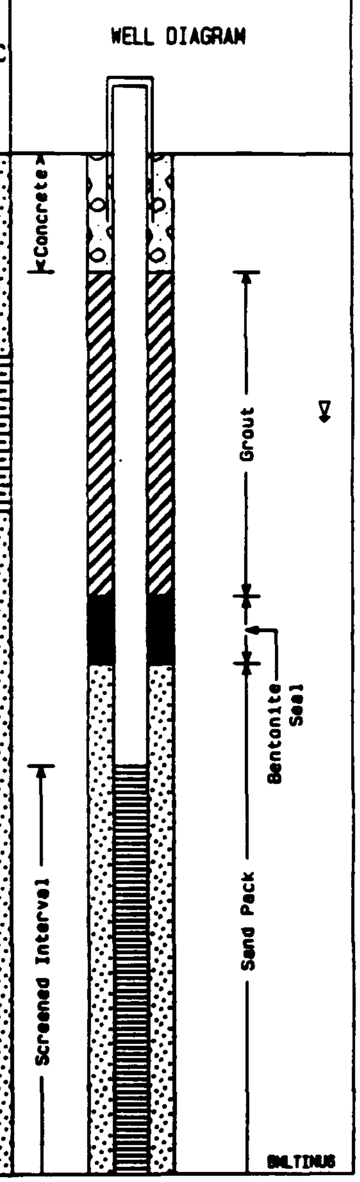
WELL DIAGRAM



ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB	Project I.D. AI077
Site 92	Well I.D. VF92 MW1
Boring I.D. MW1	Date Installed 9-29-90
Geologist/Engineer Julie Burgin	Date Grouted 9-29-90
Drilling Method 6.25" Mud Rotary	Casing Material 2" PVC sch. 40
Sampling Method Split-Spoon/Grab	Screen Material 2" .010" ww PVC
Date Started 9-29-90	Casing Interval (ft) -2 - 18
Date Completed 2-29-90	Screened Interval (ft) 18 - 38
Driller North Star	Sump Installed? Yes
Borehole Diameter (in) 11	Well Depth (ft) 40.5
Depth Drilled (ft) 42	TOC Elevation (ft) 901.66 (11-30-90)
Ground Elevation (ft) 899.9	Water Level (ft) 893.88
Depth to Water (ft) 7.78	Date Measured 11-13-90
Date Measured 11-13-90	

DEPTH (feet)	SAMPLE	BLOWS/6 IN	% REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS
0	X		100	0	TOPSOIL, some silt, trace sand, dark brown.	SW
5	X		90		SAND, light brown, fine to medium, subrounded, moderately sorted, wet.	
					CLAY, (at 6 feet), pale brown, damp, firm.	CL
10	X		100	0		
					SAND, pale yellowish brown, fine to medium, subrounded, moderately sorted, wet.	SW
15	X		100	0	SAND, pale yellowish brown, fine to medium grained, subrounded, moderately sorted.	
20	X		40	0	As above.	
25	X			0	As above.	

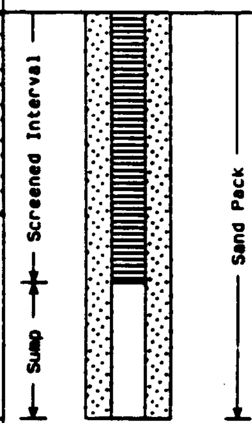


ENGINEERING - SCIENCE
SOIL BORING LOG AND WELL CONSTRUCTION RECORD

Client Volk Field ANGB
Site 92
Boring I.D. MW1
Geologist Julie Burgin

Project I.D. AT077
Well I.D. VF92 MW1
Date Installed 9-29-90

DEPTH (feet)	SAMPLE	BLOWS/6 IN	%REC.	HNu/OVA (ppm)	LITHOLOGIC DESCRIPTION	SOIL CLASS	GRAPHIC LOG	WELL DIAGRAM
30	X			0	As above.	SW		
35	X				As above.			
					SANDSTONE, pale yellowish brown, very weathered, friable, fine to coarse, subrounded, moderately sorted.			
40								
45								
50								
55								
60								
65								



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GROUNDWATER LEVEL SUMMARY

TABLE B.4
WELL CONSTRUCTION DETAILS
VOLK FIELD ANGB, WI

Well No.	Date Installed	Approximate Land Surface Elevation (ft)(1)	Top of Security Riser Elevation (ft)(1)	Top of Casing Elevation (ft)(1)	Borehole Depth(2) (ft)	Well Screen Interval (ft)(2)	Depth to Water from Top of Casing (ft)(3)	Water Elevation (ft)	Approximate Bedrock Depth(2) (ft)	Approximate Bedrock Elevation (ft)(6)
WW-1	5/09/85	915.1	none	917.12	23.7	13-23	14.09	903.03	11	904
WW-2	9/14/85	917.3	none	919.27	30.1	15-30	15.91	903.36	11	906
WW-3	9/10/85	915.6	none	917.56	30	15-30	14.25	903.31	11	905
WW-4	9/11/85	915.4	none	917.19	30	15-30	13.95	903.24	20	895
WW-5	9/11/85	916.2	none	918.14	30	15-30	14.92	903.22	12	904
WW-6	9/12/85	916.8	none	919.13	30.4	15-30	16.79	902.34	12	905
ET-1	5/07/85	920.8	922.48	922.45	25	19-23.5	18.25	904.20	9	912
ET-2	5/07/85	917.1	919.51	919.40	25	18-22.5	16.00	903.40	13	904
ET-3	5/07/85	915.7	917.62	917.52	25	10-19	14.43	903.09	11	905
ET-4	5/08/85	915.3	917.50	917.31	25	11-21	14.07	903.24	15	900
ET-5	5/08/85	916.6	918.93	918.77	25	10.5-19.5	15.50	903.27	13	904
ET-6 (5)	5/09/85	912.8	915.31	915.06	40	20-25,35-40(7	11.91	903.15	14	899
ET-7 (5)	5/09/85	913.6	none	915.83	20	8-18	12.78	903.05	18	896
VF1 MW-1 (5)	12/22/87	911.0	912.54	912.37	23.5	6-21	9.76	902.61	20	891
VF1 MW-2 (5)	1/31/88	913.2	912.58	915.38	84	21-31	12.22	903.16	11	902
VF1 MW-3 (5)	2/01/88	913.1	915.23	914.87	44	33-43	11.86	903.01	12	901
VF1 MW-4 (5)	2/02/88	910.9	912.97	912.81	44	32.5-42.5	10.26	902.55	17	894
VF1 MW-5 (5)	10/19/89	911.3	913.18	912.99	117	98-108	10.44	902.55	16	895

3E/AT077/911J162

TABLE B.4--Continued
WELL CONSTRUCTION DETAILS
VOLK FIELD ANGB, WI

Well No.	Date Installed	Approximate Land Surface Elevation (ft)(1)	Top of Security Riser Elevation (ft)(1)	Top of Casing Elevation (ft)(1)	Borehole Depth(2) (ft)	Well Screen Interval (ft)(2)	Depth to Water from Top of Casing (ft)(3)	Water Elevation (ft)	Approximate Bedrock Depth(2) (ft)	Approximate Bedrock Elevation (ft)(6)
VF1 MW-6	10/19/89	912.5	914.56	914.73	60	47.5-57.5	14.76	899.97	6	907
VF1 MW-7	10/20/89	910.4	911.87	912.10	63	50-60	10.16	901.94	16	894
VF1 MW-8	10/25/89	910.9	912.83	913.00	64	50-60	10.88	902.12	17	894
VF1 MW-9 (4)	10/1/90	915.1	916.57	916.69	72.5	60-70	15.86	900.83	17	898
VF1 MW-10 (4)	9/27/90	915.1	916.65	916.71	43	28-38	13.78	902.93	15	900
VF1 MW-11 (4)	9/28/90	913.4	915.63	915.73	78.5	62.5-72.5	13.58	902.15	21	892
VF1 MW-12 (4)	10/9/90	916.0	917.70	917.87	72	60-70	17.74	900.13	15	901
VF1 PW1	2/13/88	917.6	919.83	919.64	37	19-34	16.19	903.45	9	909
VF2 MW-1	1/12/88	899.9	901.72	901.50	22	6-21	2.71	898.79	--	<878
VF2 MW-2	1/14/88	896.3	898.13	897.74	22	6.5-16.5	-0.10	897.84	--	<875
VF2 MW-3 (5)	1/15/88	896.7	899.13	898.75	17.5	6.5-16.5	0.99	897.76	--	<880.5
VF2 MW-4	1/18/88	896.2	898.64	898.42	17.5	6-16	0.60	897.82	--	<880
VF2 MW-5 (5)	10/24/89	897.2	899.73	899.57	65	49.5-59.5	1.65	897.92	47	850
VF 3/6 MW-1	2/12/88	920.7	922.56	922.38	24	6.5-21.5	8.95	913.43	14	907
VF 3/6 MW-2	10/20/89	921.2	923.13	923.27	23.5	6-21	10.69	912.58	7	914
VF 3/6 MW-3 (5)	10/20/89	921.5	923.18	923.44	24	6-21	11.35	912.09	13	909
VF 3/6 MW-4	10/21/89	922.6	924.64	924.77	24	6-21	10.36	914.41	7	916
VF 3/6 MW-5	10/25/89	922.0	924.13	924.17	24	6-21	10.32	913.85	18	904

3E/AT077/911J162

TABLE B.4--Continued
WELL CONSTRUCTION DETAILS
VOLK FIELD ANGB, WI

Well No.	Date Installed	Approximate Land Surface Elevation (ft)(1)	Top of Security Riser Elevation (ft)(1)	Top of Casing Elevation (ft)(1)	Borehole Depth(2) (ft)	Well Screen Interval (ft)(2)	Depth to Water from Top of Casing (ft)(3)	Water Elevation (ft)	Approximate Bedrock Depth(2) (ft)	Approximate Bedrock Elevation (ft)(6)
VF 3/6 MW-6 (5)	10/26/89	921.2	922.74	922.96	64	50-60	10.92	912.04	11	910
VF 3/6 MW-7 (4)	10/10/90	920.5	922.26	922.40	27	8-23	8.78	913.62	15	906
VF 3/6 MW-8 (4)	10/11/90	921.2	923.19	923.38	26	8-23	9.36	914.02	12	909
VF5 MW-1	11/05/89	901.8	903.69	903.76	24.9	6-21	5.44	898.32	--	<877
VF7 MW-1	12/08/87	923.3	925.54	924.67	35	16-31	23.86	900.81	--	<888
VF7 MW-2	12/10/87	915.9	917.39	917.21	28	11.5-26.5	17.34	899.87	18	898
VF7 MW-3	12/16/87	913.7	915.59	915.30	27	8.5-23.5	15.70	899.60	--	<886
VF7 MW-4	10/21/89	912.5	914.64	914.92	34	13-28	15.41	899.51	18	894
VF7 MW-5	10/21/89	908.1	909.55	909.75	30.5	13-28	10.71	899.04	18	890
VF7 MW-6	10/24/89	935.1	936.92	937.07	43	25-40	35.03	902.04	22	913
VF8 MW-1 (4)	10/8/90	909.0	908.96	908.74	20.5	7.5 - 17.5	4.75	903.99	--	<889
VF8 PZ-1 (4)	9/30/90	907.2	907.20	906.86	14	7.5-12.5	3.25	903.61	--	
VF8 PZ-2 (4)	9/30/90	906.3	906.31	906.02	15.5	10-15	2.49	903.53	--	
VF8 PZ-3 (4)	9/30/90	908.9	908.95	908.65	13.5	7.5-12.5	3.96	904.69	--	
VF9 MW-1	12/17/87	922.7	924.55	924.27	33.5	13.5-28.5	19.75	904.52	9	914
VF9 MW-2	12/20/87	919.3	920.52	920.41	29	9-24	16.97	903.44	13	906
VF9 MW-3	12/21/87	917.1	918.87	918.55	27.5	9-24	15.14	903.41	12	905

3E/AT077/911J162

TABLE B.4--Continued
WELL CONSTRUCTION DETAILS
VOLK FIELD ANGB, WI

Well No.	Date Installed	Approximate Land Surface Elevation (ft)(1)	Top of Security Riser Elevation (ft)(1)	Top of Casing Elevation (ft)(1)	Borehole Depth(2) (ft)	Well Screen Interval (ft)(2)	Depth to Water from Top of Casing (ft)(3)	Water Elevation (ft)	Approximate Bedrock Depth(2) (ft)	Approximate Bedrock Elevation (ft)(6)
VF92-MW1	9/29/90	899.9	901.56	901.66	42	18-38	7.78	893.88	36	864
VF10 MW-1	1/16/88	955.8	958.15	957.82	16.5	6-16	5.28	952.54	--	<940
VF10 MW-2	1/16/88	953.7	955.80	955.53	16.5	6.5-16.5	3.24	952.29	--	<938
VF10 MW-3	1/16/88	955.6	957.40	957.20	16.5	6.5-16.5	5.08	952.12	--	<940
VF10 MW-4 (5)	1/17/88	956.0	957.92	957.67	17.5	6-16	5.45	952.22	--	<939
VF10 MW-5 (5)	10/23/89	957.0	959.09	959.06	64	50-60	9.36	949.70	--	<893
VF10 MW-6	10/22/89	956.9	958.97	959.13	20	6-16	7.41	951.72	--	<937
VF10 MW-7	10/22/89	954.8	956.68	956.86	20	6-16	5.24	951.62	--	<935

(1) Surveyed on 11/29/89.
(2) Measured to ground surface.
(3) Measured on 11/14/90.
(4) Surveyed on 11/30/90.
(5) Resurveyed on 11/30/90.
(6) < indicates less than.
(7) Multiple screens.

3E/AT077/911J162

TABLE B.5
DEPTH TO GROUNDWATER
VOLK FIELD ANGB, WI

Well Identification	Depth to water from top of casing (feet)										
	Dates										
	3/1/88	4/22/88	5/3/88	7/8/88	4/5/89	7/14/89	12/13/89	10/15/90	11/13/90	7/8/91	10/30/91
VF1 MW-1	10.22	9.93	9.94	11.13	10.82	10.59	11.27	9.42	9.76	10.11	10.88
VF1 MW-2	12.86	12.48	12.47	13.50	13.42	13.18	13.81	11.92	12.22	12.64	13.36
VF1 MW-3	12.50	12.09	12.12	13.12	13.05	12.78	13.45	11.54	11.86	12.26	13.02
VF1 MW-4	10.67	10.40	10.42	11.40	11.35	11.07	11.75	9.91	10.26	10.59	11.36
VF1 MW-5	--	--	--	--	--	--	11.95	10.11	10.44	10.83	11.50
VF1 MW-6	--	--	--	--	--	--	15.78	14.37	14.76	14.67	15.49
VF1 MW-7	--	--	--	--	--	--	11.49	9.80	10.16	10.40	11.04
VF1 MW-8	--	--	--	--	--	--	12.38	10.53	10.88	11.18	12.00
VF1 MW-9	--	--	--	--	--	--	--	15.49	15.86	15.98	16.81
VF1 MW-10	--	--	--	--	--	--	--	13.45	13.78	14.18	15.00
VF1 MW-11	--	--	--	--	--	--	--	13.21	13.58	13.86	14.69
VF1 MW-12	--	--	--	--	--	--	--	17.36	17.74	17.75	18.56
VF1 PW-1	16.97	16.48	16.48	17.52	17.42	17.20	17.82	15.89	16.19	16.64	17.35
VF9 MW-1	20.85	20.25	20.26	21.32	21.36	20.97	21.66	19.47	19.75	20.35	21.15
VF9 MW-2	17.75	17.27	17.28	18.30	18.25	17.99	18.65	16.65	16.97	17.40	18.17
VF9 MW-3	15.95	15.45	15.47	--	16.42	16.14	16.83	14.81	15.14	15.59	16.40
ET-1	19.13	18.55	18.56	19.67	19.6	19.31	20.03	17.96	18.25	18.77	19.54
ET-2	16.20	16.18	16.19	17.22	17.14	16.93	17.63	15.70	16.00	16.44	17.18
ET-3	14.89	14.46	14.46	15.51	15.84	15.69	16.74	14.12	14.43	14.95	15.91
ET-4	14.80	14.28	14.28	15.33	15.23	15.00	15.68	13.78	14.07	14.53	15.23
ET-5	16.08	15.77	15.66	17.76	16.84	16.70	17.82	15.12	15.50	16.22	17.08
ET-6	12.50	12.04	12.11	13.12	13.02	12.82	13.51	11.64	11.91	12.34	13.07
ET-7	13.45	13.05	13.05	14.09	13.98	13.72	14.38	12.49	12.78	13.18	13.98
WW-1	14.60	14.20	14.18	15.21	15.35	15.05	16.35	13.80	14.09	14.49	15.14
WW-2	16.67	16.22	16.21	17.24	17.17	16.98	17.55	15.61	15.91	16.35	17.06
WW-3	14.94	14.50	14.51	15.56	15.45	--	15.86	13.96	14.25	14.69	15.37
WW-4	14.62	14.20	14.20	15.25	15.16	14.91	15.57	13.66	13.95	14.39	15.07
WW-5	15.60	15.20	15.20	16.22	16.16	15.90	16.54	14.60	14.92	15.33	16.07
WW-6	16.50	16.09	16.10	17.11	17.96	17.95	18.53	16.49	16.79	17.20	16.97

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TABLE B.5--Continued
DEPTH TO GROUNDWATER
VOLK FIELD ANGB, WI

Well Identification	Depth to water from top of casing (feet) Date: 3/1/88	4/22/88	5/3/88	7/8/88	4/5/89	7/14/89	12/13/89	10/15/90	11/13/90	7/8/91	10/30/91
VF2 MW-1	2.51	2.54	--	4.00(b)	3.00	--	3.53	2.57	2.71	3.67	3.19
VF2 MW-2	--	-0.45(c)	--	1.12	0.82	0.68	0.54(b)	-0.16	-0.10	0.82	0.40
VF2 MW-3	0.55	0.70	--	2.30	1.20	1.83	1.66(d)	0.91	0.99	1.97	1.49
VF2 MW-4	0.28	0.30	--	1.88	0.85	1.38	--(a)	0.61	0.60	1.50	1.83
VF2 MW-5	--	--	--	--	--	--	2.49	1.54	1.65	2.56	2.15
VF3/6 MW-1	9.75	8.77	--	10.12	9.80	9.08	10.45	8.37	8.95	9.09	10.20
VF3/6 MW-2	--	--	--	--	--	--	12.15	10.20	10.69	10.95	11.93
VF3/6 MW-3	--	--	--	--	--	--	12.73	10.89	11.35	11.68	12.52
VF3/6 MW-4	--	--	--	--	--	--	11.90	9.82	10.36	10.77	11.70
VF3/6 MW-5	--	--	--	--	--	--	11.94	8.75	10.32	10.44	11.70
VF3/6 MW-6	--	--	--	--	--	--	12.28	10.46	10.92	11.29	12.00
VF3/6 MW-7	--	--	--	--	--	--	--	8.23	8.78	9.22	9.94
VF3/6 MW-8	--	--	--	--	--	--	--	8.77	9.36	9.41	10.77
VF5 MW-1	--	--	--	--	--	--	5.91	5.21	5.44	5.84	5.55
VF7 MW-1	24.60	24.06	--	25.02	24.95	24.72	25.42	23.52	23.86	24.23	25.04
VF7 MW-2	17.87	17.41	--	18.24	18.24	18.00	18.58	17.01	17.34	17.50	18.24
VF7 MW-3	16.22	15.71	--	16.84	16.64	18.56	17.03	15.39	15.70	16.12	16.71
VF7 MW-4	--	--	--	--	--	--	16.65	15.11	15.41	15.74	16.35
VF7 MW-5	--	--	--	--	--	--	11.92	10.46	10.71	11.16	11.62
VF7 MW-6	--	--	--	--	--	--	36.83	34.63	35.03	35.53	36.40
VF8 MW-1	--	--	--	--	--	--	--	4.50	4.75	4.90	4.73
VF8 PZ1	--	--	--	--	--	--	--	3.05	3.25		
VF8 PZ2	--	--	--	--	--	--	--	2.22	2.49		
VF8 PZ3	--	--	--	--	--	--	--	3.75	3.96		
VF92 MW-1	--	--	--	--	--	--	--	7.60	7.78	8.52	8.54

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TABLE B.5--Continued
DEPTH TO GROUNDWATER
VOLK FIELD ANGB, WI

Well Identification	Depth to water from top of casing (feet) Dates: 3/1/88	4/22/88	5/3/88	7/8/88	4/5/89	7/14/89	12/13/89	10/15/90	11/13/90	7/8/91	10/30/91
VF10 MW-1	5.12	5.16	--	--	5.71	--	7.59	--	5.28	6.93	6.89
VF10 MW-2	2.96	3.08	--	--	3.65	--	5.53	--	3.24	4.88	4.68
VF10 MW-3	5.06	4.91	--	--	5.45	--	7.26	--	5.88	6.58	6.67
VF10 MW-4	5.23	5.33	--	--	5.86	--	7.71	--	5.45	7.06	6.88
VF10 MW-5	--	--	--	--	--	--	11.32	--	9.36	10.84	10.79
VF10 MW-6	--	--	--	--	--	--	9.61	--	7.41	9.11	8.88
VF10 MW-7	--	--	--	--	--	--	7.47	--	5.24	6.95	6.52

(a) - Cap frozen onto casing.
(b) - Unable to easure accurately.
(c) - Measured above top of casing using an adapter.
(d) - Depth to top of ice.

TABLE B.6
GROUNDWATER ELEVATION MEASUREMENTS
VOLK FIELD ANGB, WI

Well Identification	Top of Casing Elevation -(1)-	Top of Casing Elevation -(2)-	Top of Casing Elevation -(3)-	Water elevation (feet) Date: 3/1/88	4/22/88	5/3/88	7/8/88	4/5/88	7/14/89	12/13/89	10/15/90	11/13/90	7/8/91	10/30/91
VF1 MW-1	912.34	912.32	912.37	902.12	902.41	902.40	901.21	901.52	901.75	901.05	902.95	902.61	902.26	901.49
VF1 MW-2	915.33	915.33	915.38	902.47	902.85	902.86	901.83	901.91	902.15	901.52	903.46	903.16	902.74	902.02
VF1 MW-3	914.85	914.84	914.87	902.35	902.76	902.73	901.73	901.80	902.07	901.35	903.33	903.01	902.61	901.85
VF1 MW-4	912.76	912.75	912.81	902.09	902.36	902.34	901.36	901.41	901.69	901.00	902.90	902.55	902.22	901.45
VF1 MW-5		912.95	912.99	--	--	--	--	--	--	901.00	902.88	902.55	902.16	901.49
VF1 MW-6		914.73		--	--	--	--	--	--	898.95	900.36	899.97	900.06	899.24
VF1 MW-7		912.10		--	--	--	--	--	--	900.61	902.30	901.94	901.70	901.06
VF1 MW-8		913.00		--	--	--	--	--	--	900.62	902.47	902.12	901.82	901.00
VF1 MW-9			916.69	--	--	--	--	--	--	--	901.20	900.83	900.71	899.88
VF1 MW-10			916.71	--	--	--	--	--	--	--	903.26	902.93	902.53	901.71
VF1 MW-11			915.73	--	--	--	--	--	--	--	902.52	902.15	901.87	901.04
VF1 MW-12			917.87	--	--	--	--	--	--	--	900.51	900.13	900.12	899.31
VF1 PW-1	919.64	919.64		902.67	903.16	903.16	902.12	902.22	902.44	901.82	903.75	903.45	903.00	902.29
VF9 MW-1	924.28	924.27		903.43	904.03	904.02	902.96	902.92	903.31	902.61	904.80	904.52	903.92	903.12
VF9 MW-2	920.40	920.41		902.65	903.13	903.12	902.10	902.15	902.41	901.76	903.76	903.44	903.01	902.24
VF9 MW-3	918.56	918.55		902.61	903.11	903.09	--	902.14	902.42	901.72	903.74	903.41	902.96	902.15
ET-1	922.35	922.45		903.22	903.80	903.79	902.68	902.75	903.04	902.42	904.49	904.20	903.68	902.91
ET-2	919.27	919.40		903.07	903.09	903.08	902.05	902.13	902.34	901.77	903.70	903.40	902.96	902.22
ET-3	917.43	917.52		902.54	902.97	902.97	901.92	901.59	901.74	900.78	903.40	903.09	902.57	901.61
ET-4	917.24	917.31		902.44	902.96	902.96	901.91	902.01	902.24	901.63	903.53	903.24	902.78	902.08
ET-5	918.65	918.77		902.57	902.88	902.99	900.89	901.81	901.95	900.95	903.65	903.27	902.55	901.69
ET-6	914.94	915.05	915.06	902.44	902.90	902.83	901.82	901.92	902.12	901.54	903.42	903.15	902.72	901.99
ET-7	915.76	915.79	915.83	902.31	902.71	902.71	901.67	901.78	902.04	901.41	903.34	903.05	902.65	901.85
WW-1	917.12			902.52	902.92	902.94	901.91	901.77	902.07	900.77	903.32	903.03	902.63	901.98
WW-2	919.27			902.60	903.05	903.06	902.03	902.10	902.29	901.72	903.66	903.36	902.92	902.21
WW-3	917.56			902.62	903.06	903.05	902.00	902.11	--	901.70	903.60	903.31	902.87	902.19
WW-4	917.19			902.57	902.99	902.99	901.94	902.03	902.28	901.62	903.53	903.24	902.80	902.12
WW-5	918.14			902.54	902.94	902.94	901.92	901.98	902.24	901.60	903.54	903.22	902.81	902.07
WW-6	919.13			902.63	903.04	903.03	902.02	901.17	901.18	900.60	902.64	902.34	901.93	902.16

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TABLE B.6--Continued
GROUNDWATER ELEVATION MEASUREMENTS
VOLK FIELD ANGB, WI

Well Identification	Top of Casing Elevation -(1)-	Top of Casing Elevation -(2)-	Top of Casing Elevation -(3)-	Water elevation (feet) Date: 3/1/88	4/22/88	5/3/88	7/8/88	4/5/88	7/14/89	12/13/89	10/15/90	11/13/90	7/8/91	10/30/91
VF2 MW-1	901.53	901.50		899.02	898.99	--	897.53	898.53	--	897.97	898.93	898.79	897.83	898.31
VF2 MW-2	897.69	897.74		--	898.14	--	896.57	897.67	897.01	897.20	897.90	897.84	896.92	897.34
VF2 MW-3	898.67	898.73	898.75	898.12	897.97	--	896.37	897.47	896.84	897.07	897.84	897.76	896.78	897.26
VF2 MW-4	898.38	898.42		898.10	898.08	--	896.50	897.53	897.00	--	897.81	897.82	896.92	897.39
VF2 MW-5		899.62	899.57	--	--	--	--	--	--	897.13	898.03	897.92	897.01	897.42
VF3/6 MW-1	922.40	922.38		912.65	913.63	--	912.28	912.60	913.32	911.93	914.01	913.43	913.29	912.18
VF3/6 MW-2		923.27		--	--	--	--	--	--	911.12	913.07	912.58	912.32	911.34
VF3/6 MW-3		923.49	923.44	--	--	--	--	--	--	910.76	912.55	912.09	911.76	910.92
VF3/6 MW-4		924.77		--	--	--	--	--	--	912.87	914.95	914.41	914.00	913.07
VF3/6 MW-5		924.17		--	--	--	--	--	--	912.23	915.42	913.85	913.73	912.47
VF3/6 MW-6		923.01	922.96	--	--	--	--	--	--	910.73	912.50	912.04	911.67	910.96
VF3/6 MW-7			922.40	--	--	--	--	--	--	--	914.17	913.62	913.18	912.46
VF3/6 MW-8			923.38	--	--	--	--	--	--	--	914.61	914.02	913.97	912.61
VF5 MW-1		903.76		--	--	--	--	--	--	897.85	898.55	898.32	897.92	898.21
VF7 MW-1	924.72	924.67		900.12	900.66	--	899.70	899.77	900.00	899.25	901.15	900.81	900.44	899.63
VF7 MW-2	917.26	917.21		899.39	899.85	--	899.02	899.02	899.26	898.63	900.20	899.87	899.71	898.97
VF7 MW-3	915.33	915.30		899.11	899.62	--	898.49	898.69	896.77	898.27	899.91	899.60	899.18	898.59
VF7 MW-4		914.92		--	--	--	--	--	--	898.27	899.81	899.51	899.18	898.57
VF7 MW-5		909.75		--	--	--	--	--	--	897.83	899.29	899.04	898.59	898.13
VF7 MW-6		937.07		--	--	--	--	--	--	900.24	902.44	902.04	901.54	900.67
VF8 MW-1			908.74	--	--	--	--	--	--	--	904.24	903.99	903.84	904.01
VF8 PZ1			906.86	--	--	--	--	--	--	--	903.81	903.61	--	--
VF8 PZ2			906.02	--	--	--	--	--	--	--	903.80	903.53	--	--
VF8 PZ3			908.65	--	--	--	--	--	--	--	904.90	904.69	--	--
VF92 MW-1			901.66	--	--	--	--	--	--	--	894.06	893.88	893.14	893.12

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TABLE B.6--Continued
GROUNDWATER ELEVATION MEASUREMENTS
VOLK FIELD ANGB, WI

Well Identification	Top of Casing Elevation -(1)-	Top of Casing Elevation -(2)-	Top of Casing Elevation -(3)-	Water elevation (feet) Date: 3/1/88	4/22/88	5/3/88	7/8/88	4/5/88	7/14/89	12/13/89	10/15/90	11/13/90	7/8/91	10/30/91
VF10 MW-1	957.85	957.82		952.73	952.69	--	--	952.14	--	950.23	--	952.54	950.89	950.93
VF10 MW-2	955.52	955.53		952.56	952.44	--	--	951.87	--	950.00	--	952.29	950.65	950.85
VF10 MW-3	957.23	957.20		952.17	952.32	--	--	951.78	--	949.94	--	952.12	950.62	950.53
VF10 MW-4	957.59	957.56	957.67	952.36	952.26	--	--	951.73	--	949.85	--	952.22	950.61	950.79
VF10 MW-5		958.95	959.06	--	--	--	--	--	--	947.63	--	949.70	948.22	948.27
VF10 MW-6		959.13		--	--	--	--	--	--	949.52	--	951.72	950.02	950.25
VF10 MW-7		956.86		--	--	--	--	--	--	949.39	--	951.62	949.91	950.34

. (1) - Surveyed in (1) - Surveyed in spring 1988. Used from 3/1/88 to 7/14/89.

(2) - Surveyed in (2) - Surveyed in fall 1989. Used for 12/31/89. Survey data from 1988 was used for wells not surveyed in 1989.

(3) - Surveyed in (3) - Surveyed in fall 1989. Used from 10/15/90 to present. The most recent survey data was used for wells not surveyed in 1990.

-- - Not Measure -- - Not measured.

TABLE B.7
CHANGES IN GROUNDWATER LEVEL MEASUREMENTS
VOLK FIELD ANGB, WI

Well Identification	Water elevation (feet) 3/1/88 to 4/22/88	4/22/88 to 5/3/88	5/3/88 to 7/8/88	7/8/88 to 4/5/88	4/5/88 to 7/14/89	7/14/89 to 12/13/89	12/13/89 to 10/15/90	10/15/90 to 11/13/90	11/13/90 to 7/8/91	7/8/91 to 10/30/91
VF1 MW-1	0.29	-0.01	-1.19	0.31	0.23	-0.70	1.90	-0.34	-0.35	-0.77
VF1 MW-2	0.38	0.01	-1.03	0.08	0.24	-0.63	1.94	-0.30	-0.42	-0.72
VF1 MW-3	0.41	-0.03	-1.00	0.07	0.27	-0.68	1.94	-0.32	-0.40	-0.76
VF1 MW-4	0.27	-0.02	-0.98	0.05	0.28	-0.69	1.90	-0.35	-0.33	-0.77
VF1 MW-5	--	--	--	--	--	--	1.88	-0.33	-0.39	-0.67
VF1 MW-6	--	--	--	--	--	--	1.41	-0.39	0.09	-0.82
VF1 MW-7	--	--	--	--	--	--	1.69	-0.36	-0.24	-0.64
VF1 MW-8	--	--	--	--	--	--	1.85	-0.35	-0.30	-0.82
VF1 MW-9	--	--	--	--	--	--	--	-0.37	-0.12	-0.83
VF1 MW-10	--	--	--	--	--	--	--	-0.33	-0.40	-0.82
VF1 MW-11	--	--	--	--	--	--	--	-0.37	-0.28	-0.83
VF1 MW-12	--	--	--	--	--	--	--	-0.38	-0.01	-0.81
VF1 PW-1	0.49	0.00	-1.04	0.10	0.22	-0.62	1.93	-0.30	-0.45	-0.71
VF9 MW-1	0.60	-0.01	-1.06	-0.04	0.39	-0.70	2.19	-0.28	-0.60	-0.80
VF9 MW-2	0.48	-0.01	-1.02	0.05	0.26	-0.65	2.00	-0.32	-0.43	-0.77
VF9 MW-3	0.50	-0.02	--	--	0.28	-0.70	2.02	-0.33	-0.45	-0.81
ET-1	0.58	-0.01	-1.11	0.07	0.29	-0.62	2.07	-0.29	-0.52	-0.77
ET-2	0.02	-0.01	-1.03	0.08	0.21	-0.57	1.93	-0.30	-0.44	-0.74
ET-3	0.43	0.00	-1.05	-0.33	0.15	-0.96	2.62	-0.31	-0.52	-0.96
ET-4	0.52	0.00	-1.05	0.10	0.23	-0.61	1.90	-0.29	-0.46	-0.70
ET-5	0.31	0.11	-2.10	0.92	0.14	-1.00	2.70	-0.38	-0.72	-0.86
ET-6	0.46	-0.07	-1.01	0.10	0.28	-0.58	1.88	-0.27	-0.43	-0.73
ET-7	0.40	0.00	-1.04	0.11	0.26	-0.63	1.93	-0.29	-0.40	-0.80
WW-1	0.40	0.02	-1.03	-0.14	0.30	-1.30	2.55	-0.29	-0.40	-0.65
WW-2	0.45	0.01	-1.03	0.07	-0.19	-0.57	1.94	-0.30	-0.44	-0.71
WW-3	0.44	-0.01	-1.05	0.11	--	--	1.90	-0.29	-0.44	-0.68
WW-4	0.42	0.00	-1.05	0.09	0.25	-0.66	1.91	-0.29	-0.44	-0.68
WW-5	0.40	0.00	-1.02	0.06	0.26	-0.64	1.94	-0.32	-0.41	-0.74
WW-6	0.41	-0.01	-1.01	-0.85	0.01	-0.58	2.04	-0.30	-0.41	0.23

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TABLE B.7--Continued
CHANGES IN GROUNDWATER LEVEL MEASUREMENTS
VOLK FIELD ANGB, WI

Well Identification	Water elevation (feet)									
	3/1/88 to 4/22/88	4/22/88 to 5/3/88	5/3/88 to 7/8/88	7/8/88 to 4/5/88	4/5/88 to 7/14/89	7/14/89 to 12/13/89	12/13/89 to 10/15/90	10/15/90 to 11/13/90	11/13/90 to 7/8/91	7/8/91 to 10/30/91
VF2 MW-1	-0.03	--	--	1.00	--	--	0.96	-0.14	-0.96	0.48
VF2 MW-2	--	--	--	1.10	-0.66	0.19	0.70	-0.06	-0.92	0.42
VF2 MW-3	-0.15	--	--	1.10	-0.63	0.23	0.77	-0.08	-0.98	0.48
VF2 MW-4	-0.02	--	--	1.03	-0.53	--	--	0.01	-0.90	0.47
VF2 MW-5	--	--	--	--	--	--	0.90	-0.11	-0.91	0.41
VF3/6 MW-1	0.98	--	--	0.32	0.72	-1.39	2.08	-0.58	-0.14	-1.11
VF3/6 MW-2	--	--	--	--	--	--	1.95	-0.49	-0.26	-0.98
VF3/6 MW-3	--	--	--	--	--	--	1.79	-0.46	-0.33	-0.84
VF3/6 MW-4	--	--	--	--	--	--	2.08	-0.54	-0.41	-0.93
VF3/6 MW-5	--	--	--	--	--	--	3.19	-1.57	-0.12	-1.26
VF3/6 MW-6	--	--	--	--	--	--	1.77	-0.46	-0.37	-0.71
VF3/6 MW-7	--	--	--	--	--	--	--	-0.55	-0.44	-0.72
VF3/6 MW-8	--	--	--	--	--	--	--	-0.59	-0.05	-1.36
VF5 MW-1	--	--	--	--	--	--	0.70	-0.23	-0.40	0.29
VF7 MW-1	0.54	--	--	0.07	0.23	-0.75	1.90	-0.34	-0.37	-0.81
VF7 MW-2	0.46	--	--	0.08	0.24	-0.63	1.57	-0.33	-0.16	-0.74
VF7 MW-3	0.51	--	--	0.20	-1.92	1.50	1.64	-0.31	-0.42	-0.59
VF7 MW-4	--	--	--	--	--	--	1.54	-0.30	-0.33	-0.61
VF7 MW-5	--	--	--	--	--	--	1.46	-0.25	-0.45	-0.46
VF7 MW-6	--	--	--	--	--	--	2.20	-0.40	-0.50	-0.87
VF8 MW-1	--	--	--	--	--	--	--	-0.25	-0.15	0.17
VF8 PZ1	--	--	--	--	--	--	--	-0.20	--	--
VF8 PZ2	--	--	--	--	--	--	--	-0.27	--	--
VF8 PZ3	--	--	--	--	--	--	--	-0.21	--	--
VF92 MW-1	--	--	--	--	--	--	--	-0.18	-0.74	-0.02

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TABLE B.7--Continued
CHANGES IN GROUNDWATER LEVEL MEASUREMENTS
VOLK FIELD ANGB, WI

Well Identification	Water elevation (feet) 3/1/88 to 4/22/88	4/22/88 to 5/3/88	5/3/88 to 7/8/88	7/8/88 to 4/5/88	4/5/88 to 7/14/89	7/14/89 to 12/13/89	12/13/89 to 10/15/90	10/15/90 to 11/13/90	11/13/90 to 7/8/91	7/8/91 to 10/30/91
VF10 MW-1	-0.04	--	--	--	--	--	--	--	-1.65	0.04
VF10 MW-2	-0.12	--	--	--	--	--	--	--	-1.64	0.20
VF10 MW-3	0.15	--	--	--	--	--	--	--	-1.50	-0.09
VF10 MW-4	-0.10	--	--	--	--	--	--	--	-1.61	0.18
VF10 MW-5	--	--	--	--	--	--	--	--	-1.48	0.05
VF10 MW-6	--	--	--	--	--	--	--	--	-1.70	0.23
VF10 MW-7	--	--	--	--	--	--	--	--	-1.71	0.43

TABLE B.8
SUMMARY OF HORIZONTAL GRADIENTS (1)
VOLK FIELD ANGB, WI

Upgradient Well	Groundwater Elevation (2) (ft)	Downgradient Well	Groundwater Elevation (3) (ft)	Difference in Elevation (4) (ft)	Distance (5) (ft)	Horizontal Gradient (ft/ft)
Site 1						
ET-1	904.2	MW-6	899.97	4.23	1,400	0.0030
Site 2						
MW-1	898.79	MW-2	897.84	0.95	525	0.0018
MW-1	898.79	MW-3	897.76	1.03	725	0.0014
Site 3/6						
MW-4	914.41	MW-3	912.09	2.32	775	0.0030
MW-8	914.02	MW-3	912.09	1.93	585	0.0033
Site 7						
MW-6	902.04	MW-3	899.6	2.44	1,020	0.0024
MW-6	902.04	MW-5	899.04	3	1,245	0.0024
Site 8						
PZ-3	904.69	PZ-2	903.53	1.16	355	0.0033
Site 9						
MW-1	904.52	MW-2	903.44	1.08	190	0.0057
Site 10						
MW-1	952.54	MW-3	952.12	0.42	290	0.0014
MW-1	952.54	MW-6	951.72	0.82	755	0.0011

(1) Gradients were calculated using November 1990 groundwater data.
(2) Groundwater [illegible] measured in the upgradient well.
(3) Groundwater elevation measured in the downgradient well.
(4) Difference in groundwater elevations measured in the upgradient and downgradient wells.
(5) Horizontal distance between the upgradient and downgradient wells.

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TABLE B.9
SUMMARY OF VERTICAL GRADIENTS (1)
VOLK FIELD ANGB, WI

Shallow Well	Groundwater Elevation (2) (ft)	Deep Well	Groundwater Elevation (3) (ft)	Difference in Elevation (4) (ft)	Distance (5) (ft)	Veritcal Gradient (ft/ft)
Site 1						
MW-1	902.61	MW-4	902.55	0.06	21.8	0.0028
MW-1	902.61	MW-5	902.55	0.06	87.3	0.0007
MW-4	902.55	MW-5	902.55	0.00	65.5	0.0000
Site 2						
MW-3	897.76	MW-5	897.92	-0.16	43	-0.0037
Site 3/6						
MW-3	912.09	MW-6	912.04	0.05	38.6	0.0013
Site 10						
MW-4	952.22	MW-5	949.7	2.52	43.6	0.0578

(1) Gradients were calculated using November 1990 groundwater data. A negative gradient indicates an upward gradient and a positive gradient indicates a downward gradient.
(2) Groundwater elevation measured in the shallow well.
(3) Groundwater elevation measured in the deep well.
(4) Difference in groundwater elevations measured in the shallow and deep wells.
(5) Vertical distance between center of wet screen interval in shallow well and center of wet screen interval in deep well.

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TABLE B.10
SUMMARY OF VERTICAL GRADIENTS (1)
VOLK FIELD ANGB, WI

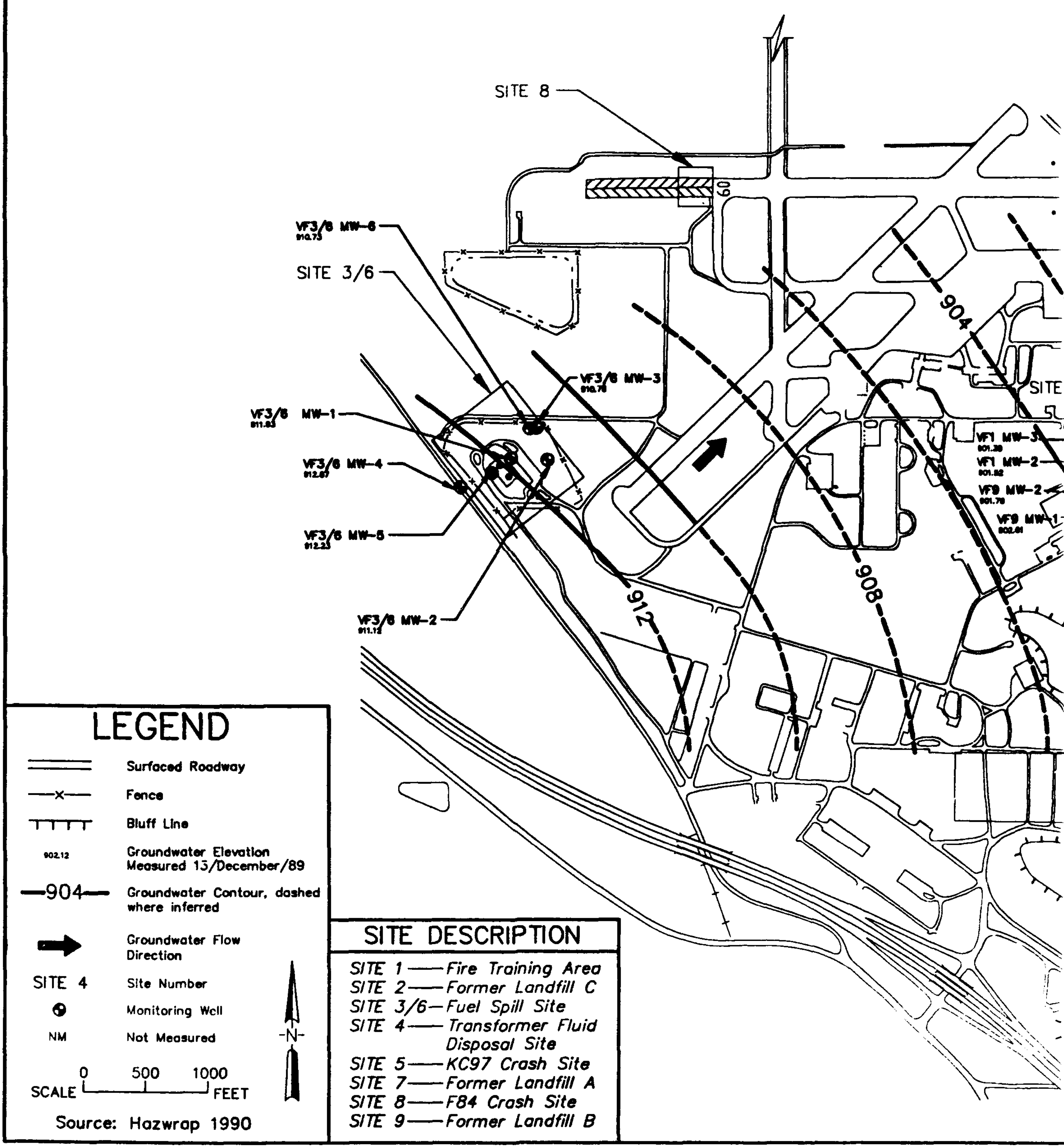
Shallow Well	Deep Well	Veritcal Gradient (ft/ft)				
		Dec. 1989	Oct. 1990	Nov. 1990	July 1991	Oct. 1991
Site 1						
MW-1	MW-4	0.0023	0.0023	0.0028	0.0018	0.0018
MW-1	MW-5	0.0006	0.0008	0.0007	0.0012	0.0000
MW-4	MW-5	0.0000	0.0003	0.0000	0.0009	-0.0006
Site 2						
MW-3	MW-5	-0.0014	-0.0044	-0.0037	-0.0054	-0.0037
Site 3/6						
MW-3	MW-6	0.0008	0.0013	0.0013	0.0023	-0.0010
Site 10						
MW-4	MW-5	0.0509	-- (2)	0.0578	0.0548	0.0578

(1) A negative gradient indicates an upward gradient and a positive gradient indicates a downward gradient.

(2) Water levels not measured at Site 10 in October 1990.

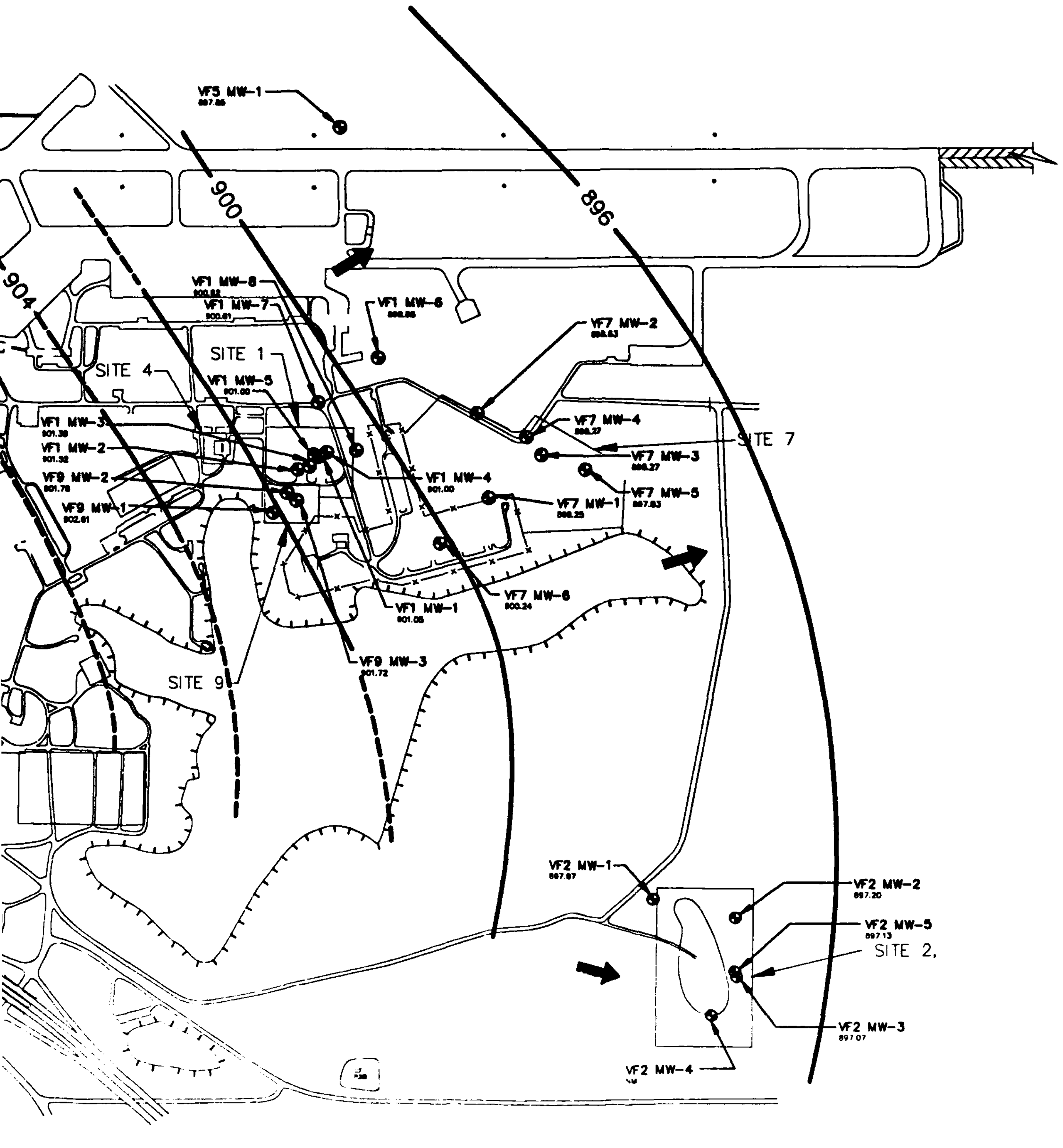
GROUNDWATER CONTOUR MAP FO

VOLK FIELD ANGB,



MAP FOR 13 DECEMBER 1989

ELD ANGB, WI



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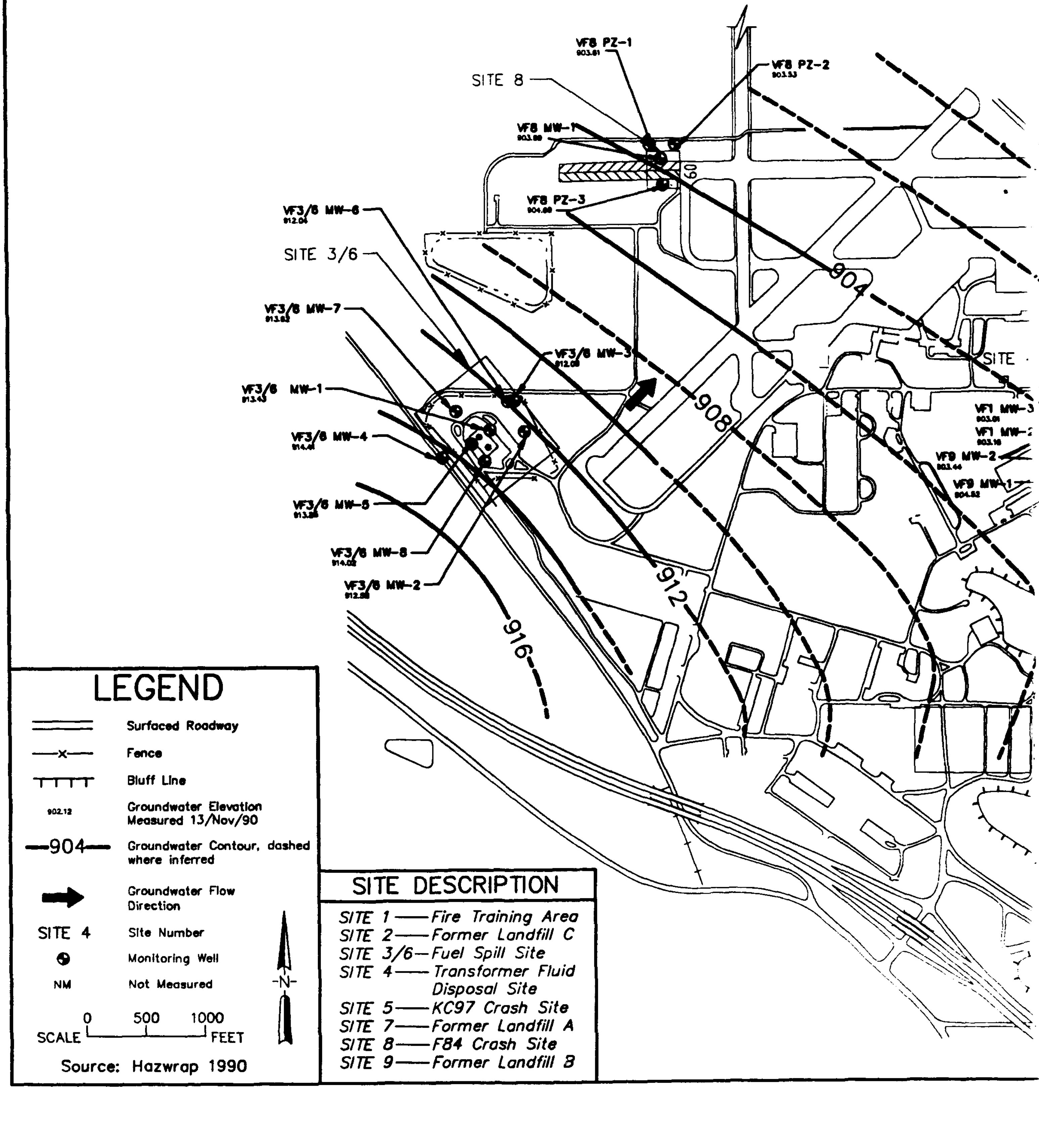
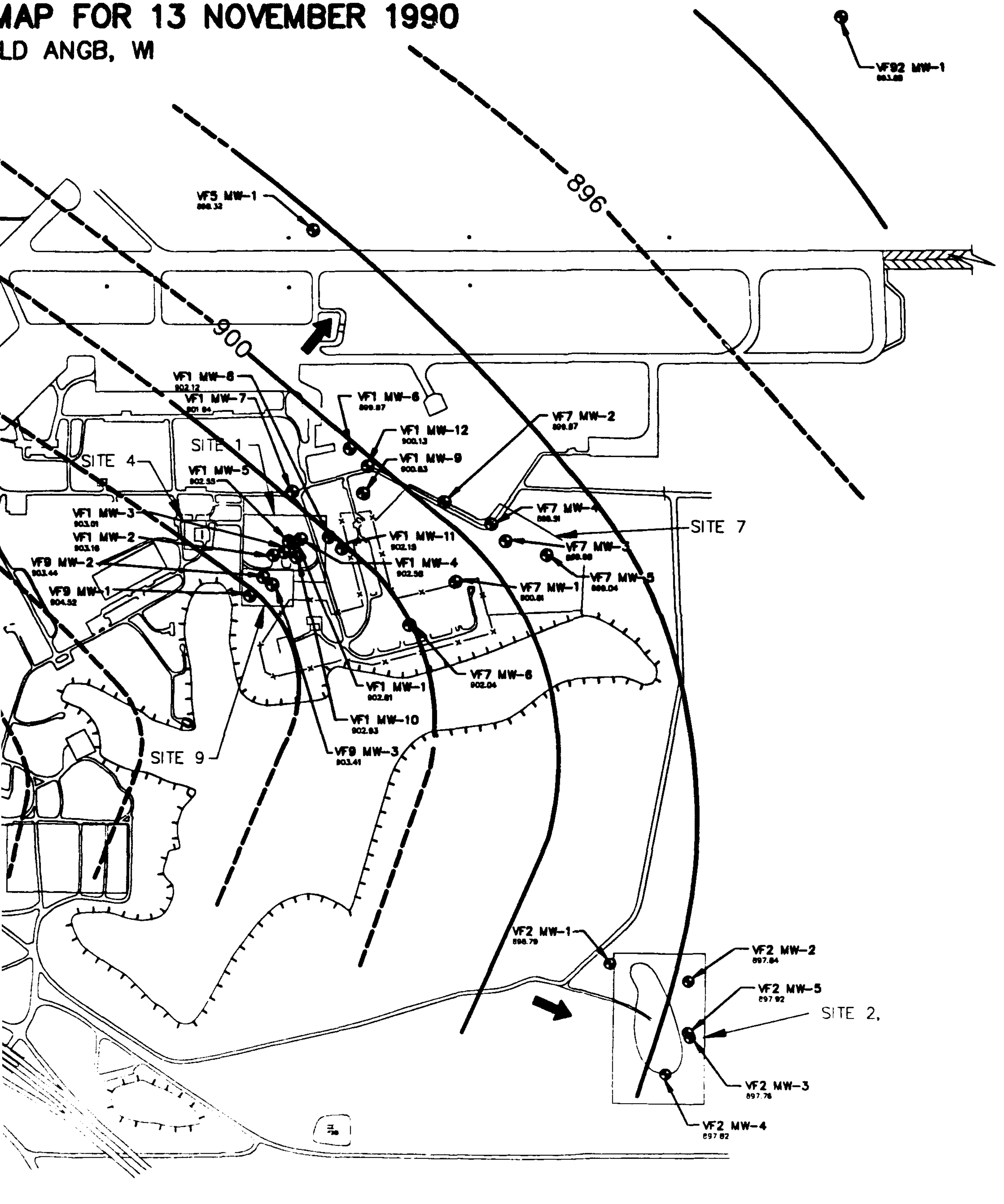
GROUNDWATER CONTOUR MAP FOR

VOLK FIELD ANGB,



MAP FOR 13 NOVEMBER 1990
LD ANGB, WI



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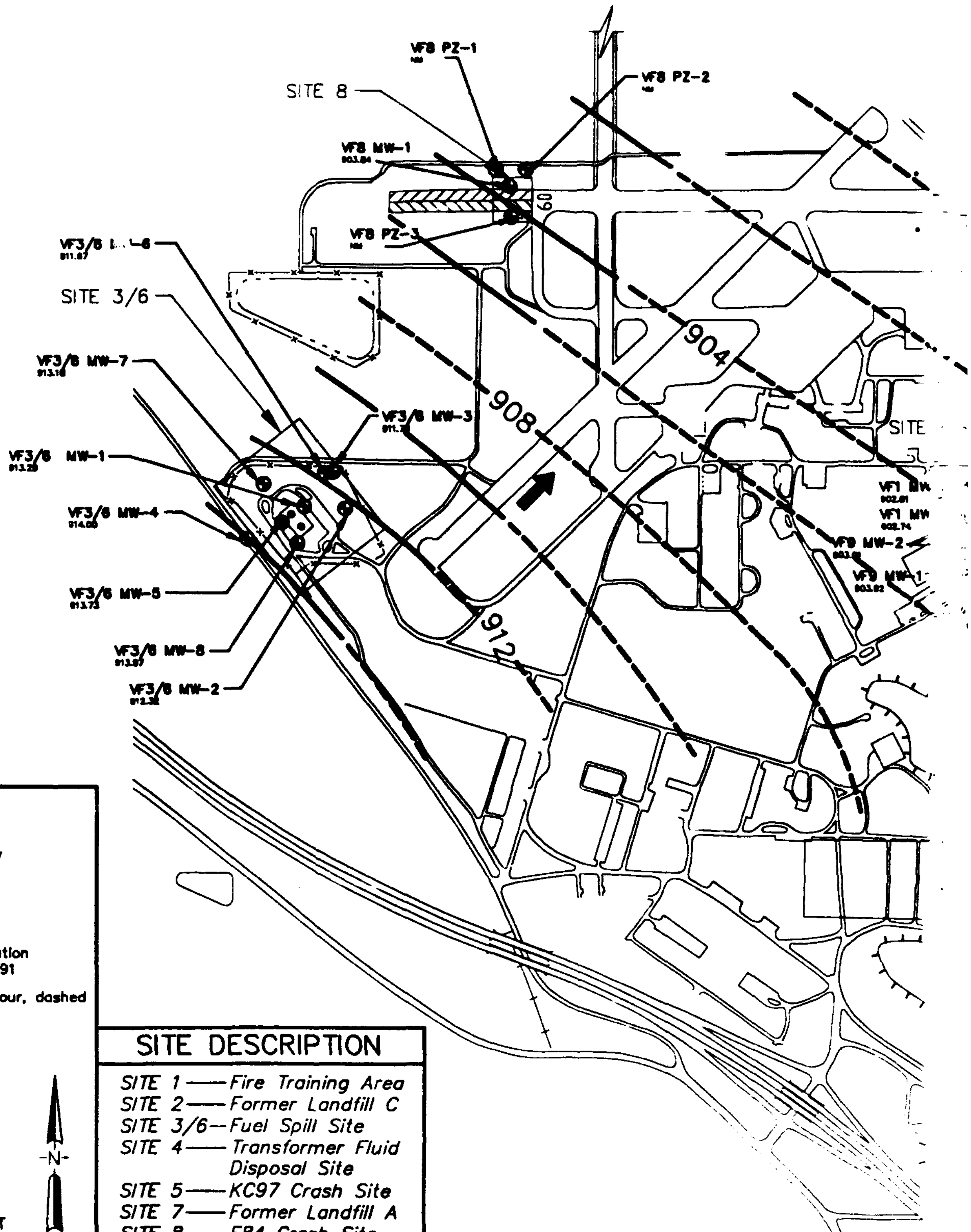
GROUNDWATER CONTOUR MAP

VOLK FIELD ANGB,



LEGEND

	Surfaced Roadway
—x—	Fence
	Bluff Line
902.12	Groundwater Elevation Measured 8/July/91
—904—	Groundwater Contour, dashed where inferred
	Groundwater Flow Direction
SITE 4	Site Number
	Monitoring Well
NM	Not Measured

SCALE 0 500 1000 FEET

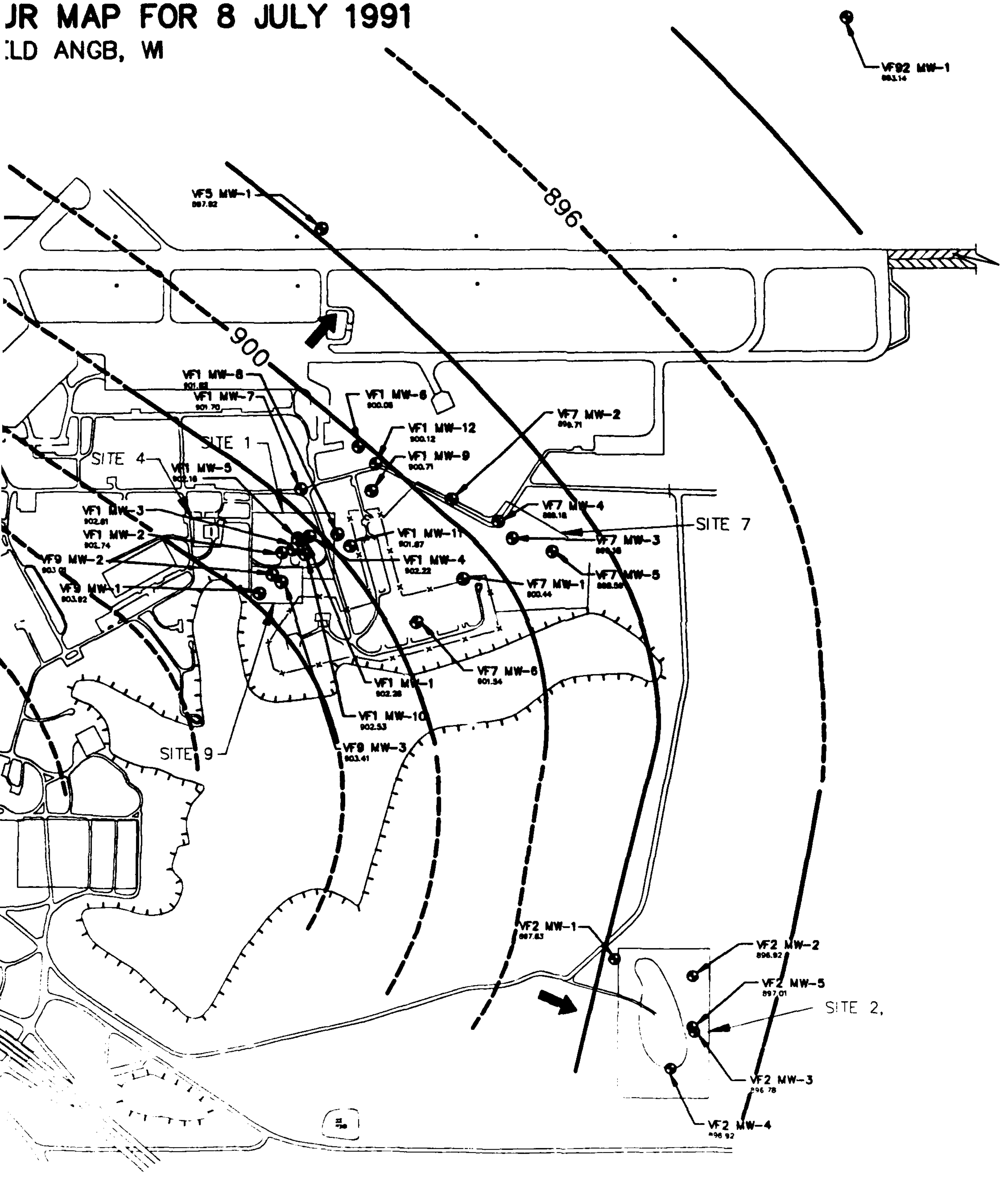
-N-

Source: Hazwrap 1990

SITE DESCRIPTION

SITE 1 —— Fire Training Area
SITE 2 —— Former Landfill C
SITE 3/6 — Fuel Spill Site
SITE 4 —— Transformer Fluid Disposal Site
SITE 5 —— KC97 Crash Site
SITE 7 —— Former Landfill A
SITE 8 —— F84 Crash Site
SITE 9 —— Former Landfill B

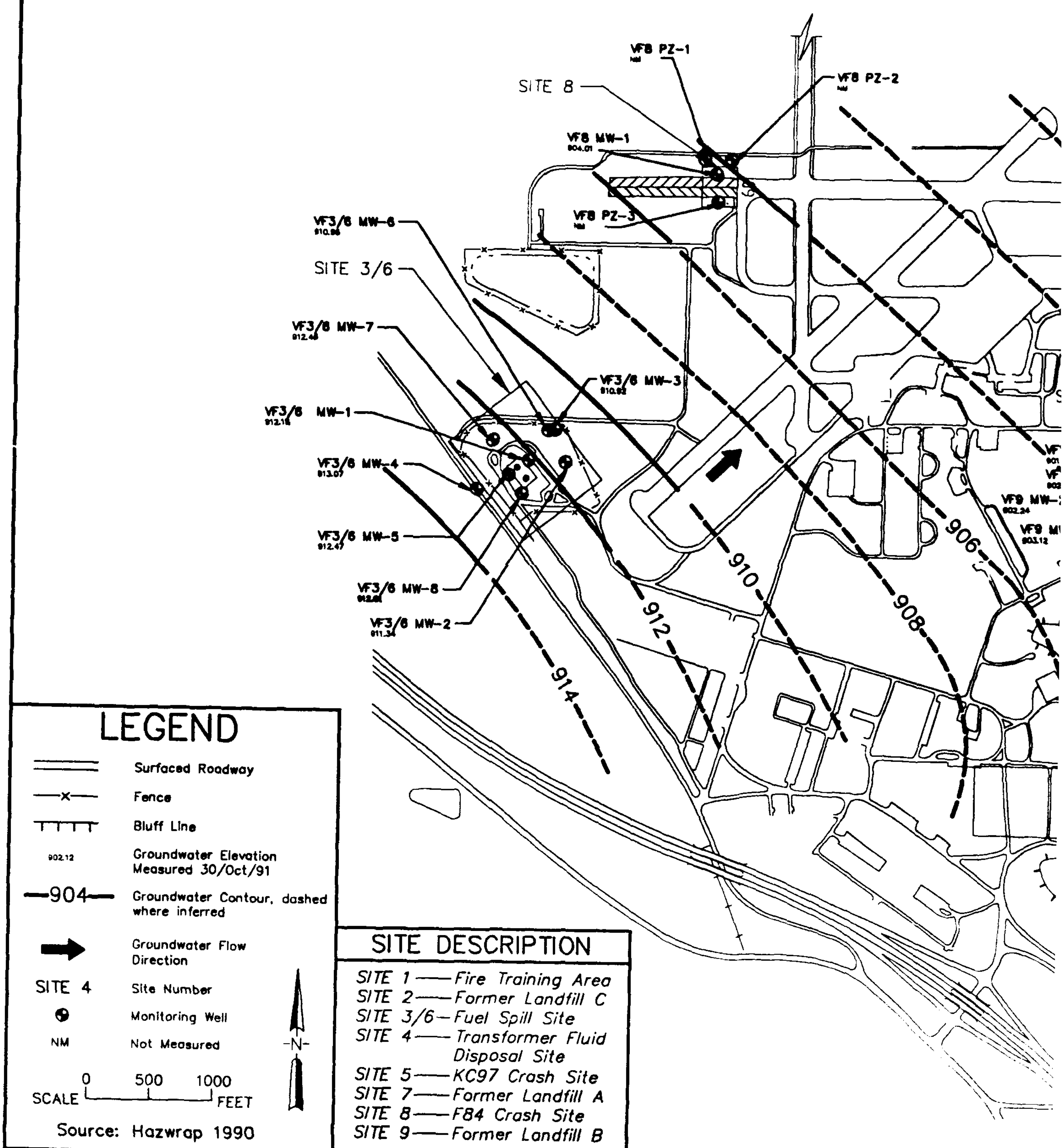
:JR MAP FOR 8 JULY 1991
:LD ANGB, WI



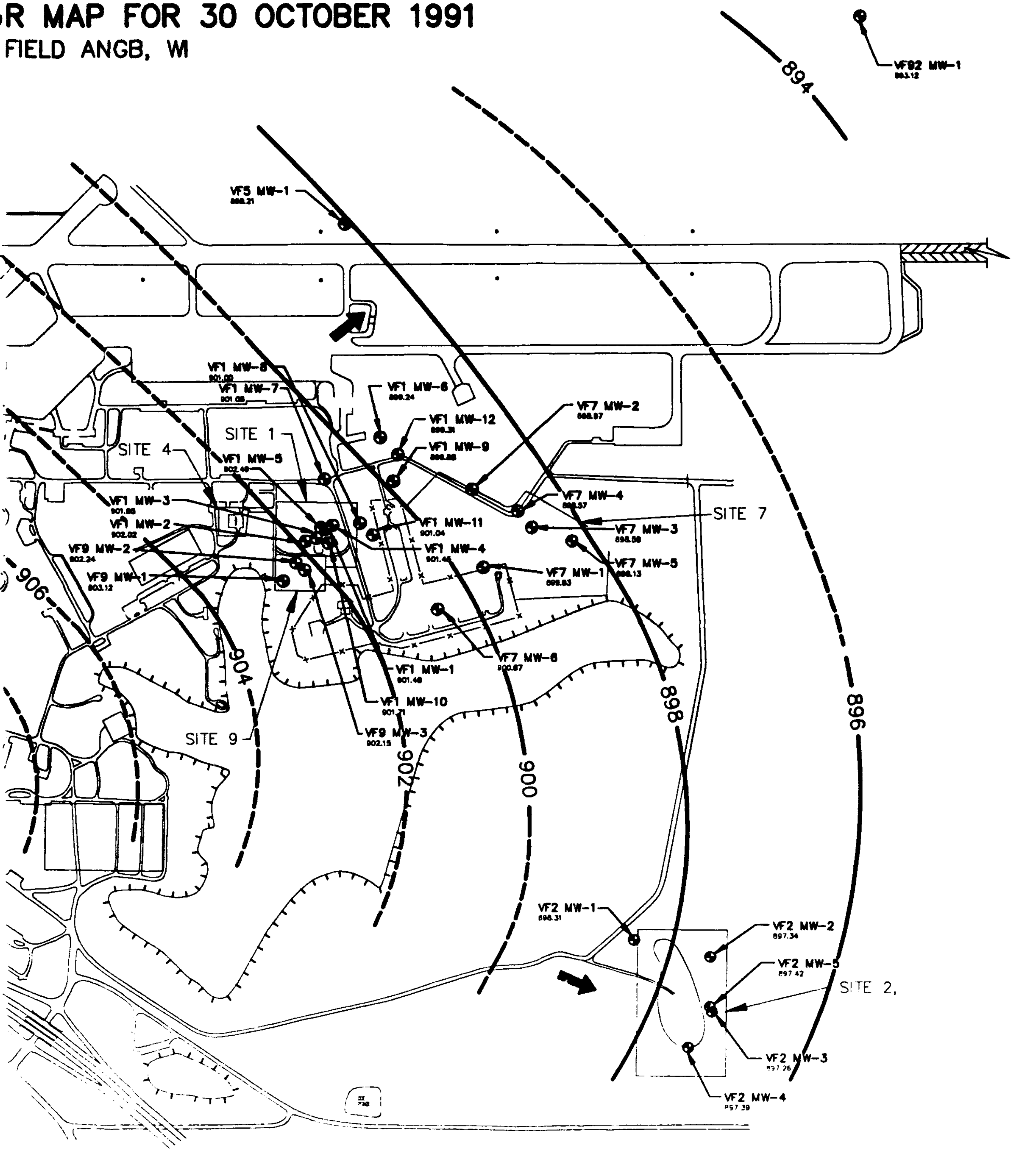
 ES ENGINEERING–SCIENCE

GROUNDWATER CONTOUR MAP

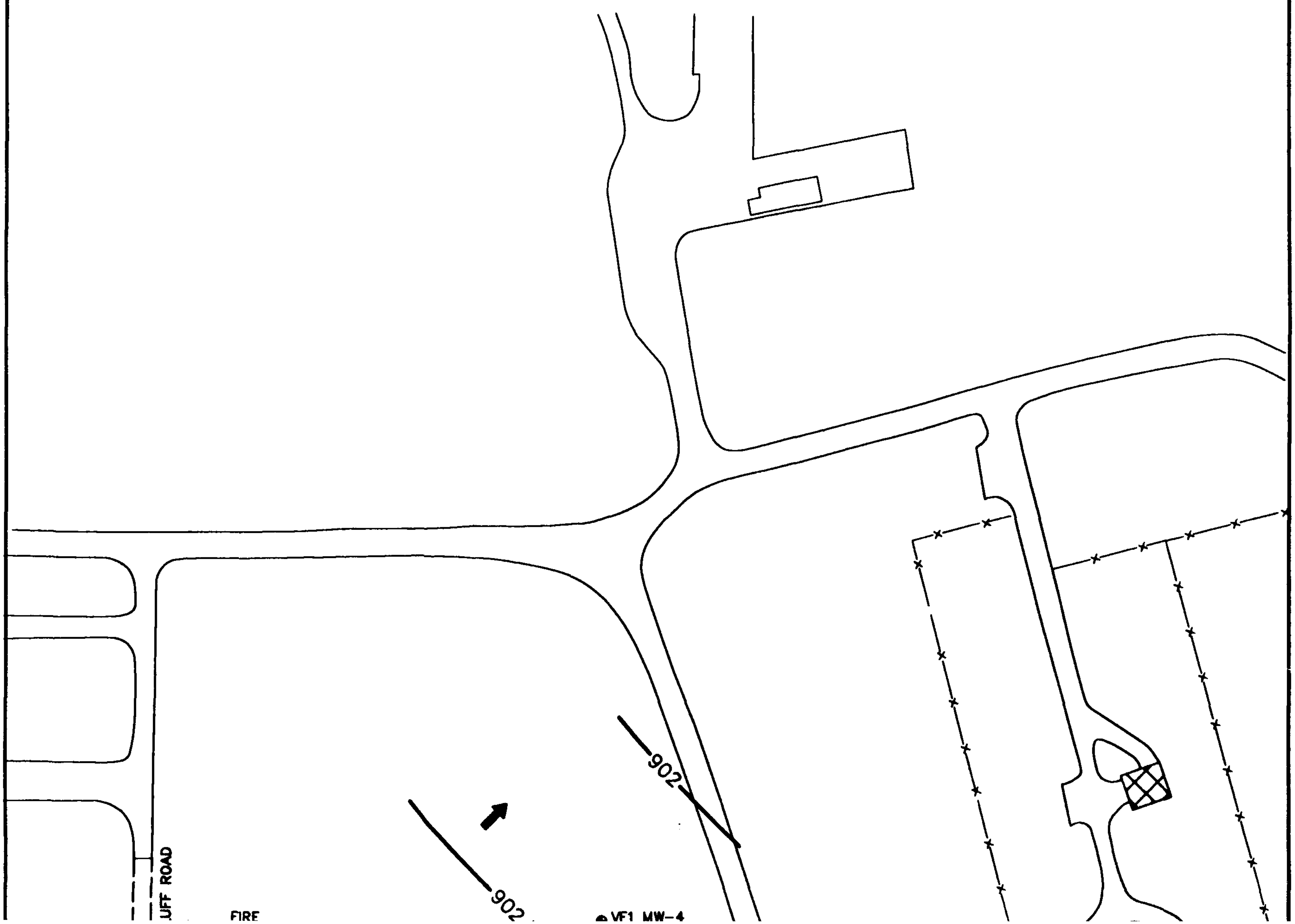
VOLK FIELD AN(

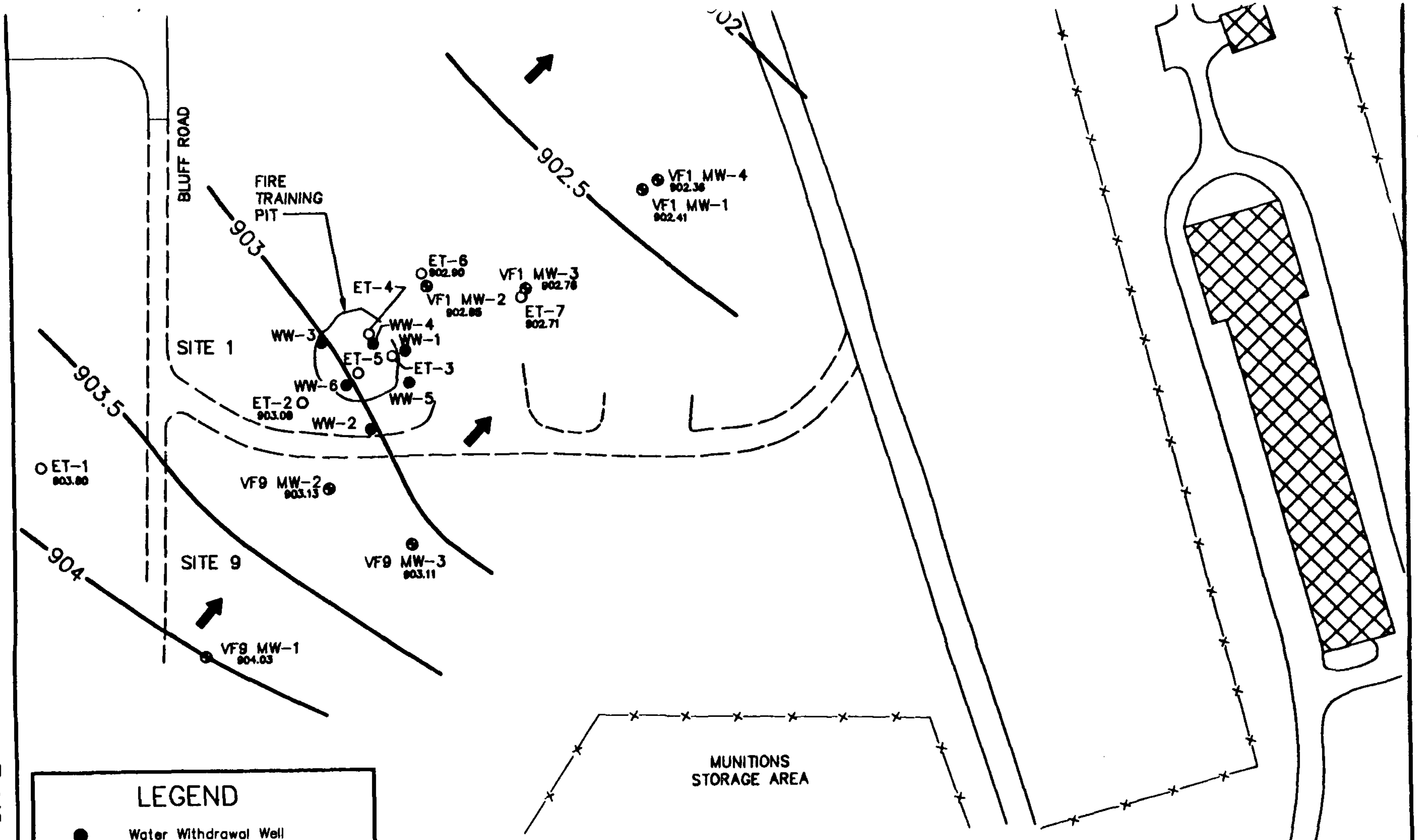


·ᴜR MAP FOR 30 OCTOBER 1991
FIELD ANGB, WI



SITE 1, FIRE TRAINING AREA
GROUNDWATER CONTOUR MAP, 22 APRIL 1988
VOLK FIELD ANGB, WI





LEGEND

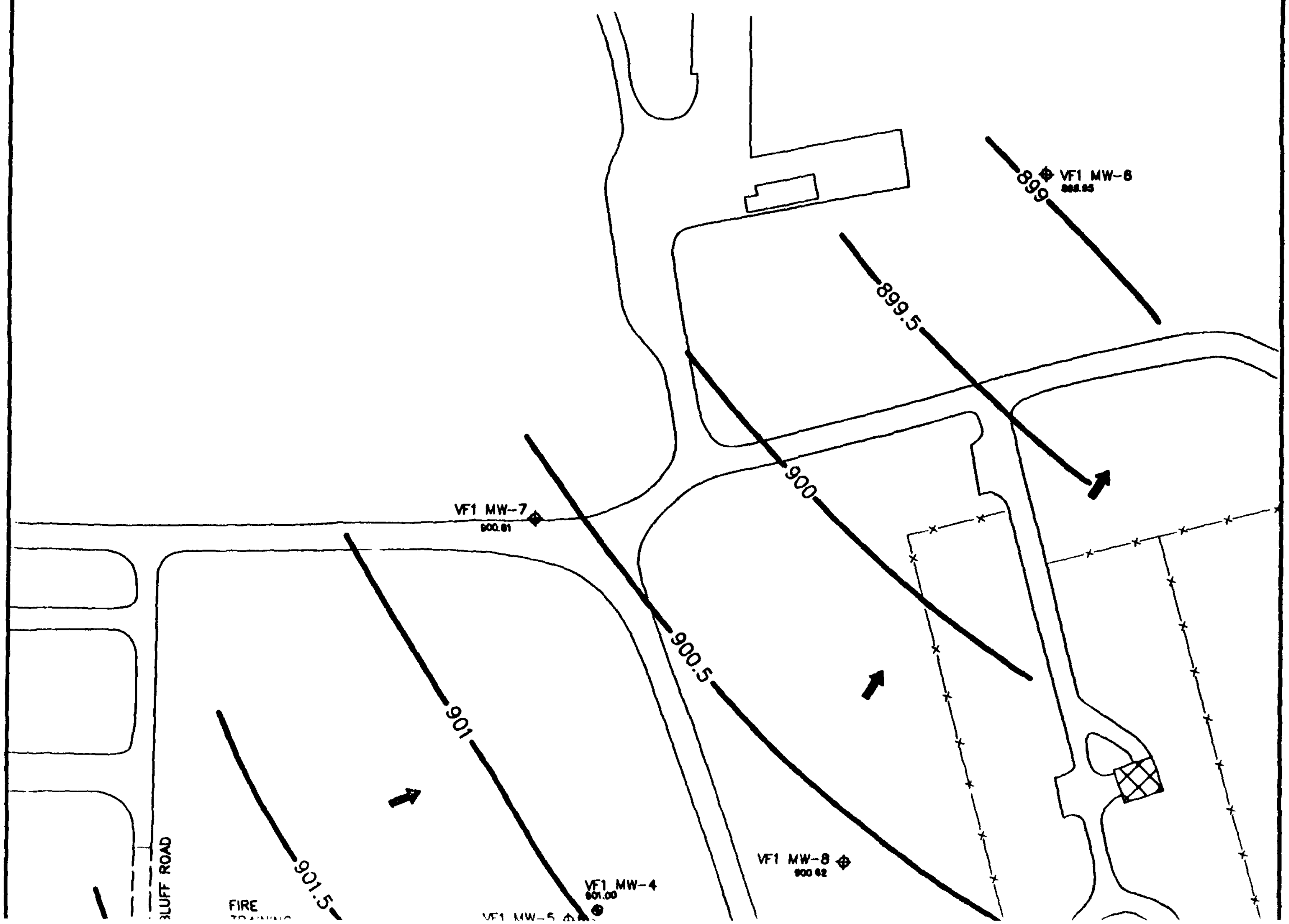
- Water Withdrawal Well
- ET Well Installed in 1985
- Fence
- Monitoring Well Installed in 1987-1988
- 912.04 Groundwater Elevation Measured 22/April/1988
- —913.85— Groundwater Contour
- Groundwater Flow Direction

SCALE 0 — 125 FEET

Source: Hazwrap 1990

WELL I.D.	GROUNDWATER ELEVATION (ABOVE MSL)	WELL I.D.	GROUNDWATER ELEVATION (ABOVE MSL)	WELL I.D.	GROUNDWATER ELEVATION (ABOVE MSL)
VF1 MW-1	902.41	ET-1	903.80	VF9 MW-2	903.13
VF1 MW-2	902.85	ET-2	903.09	VF9 MW-3	903.11
VF1 MW-3	902.76	ET-3	902.97	WW-1	902.92
VF1 MW-4	902.36	ET-4	902.96	WW-2	903.05
		ET-5	902.88	WW-3	903.06
		ET-6	902.90	WW-4	902.99
		ET-7	902.71	WW-5	902.94
		VF9 MW-1	904.03	WW-6	903.04

SITE 1, FIRE TRAINING AREA
GROUNDWATER CONTOUR MAP, 13 DECEMBER 1989
VOLK FIELD ANGB, WI



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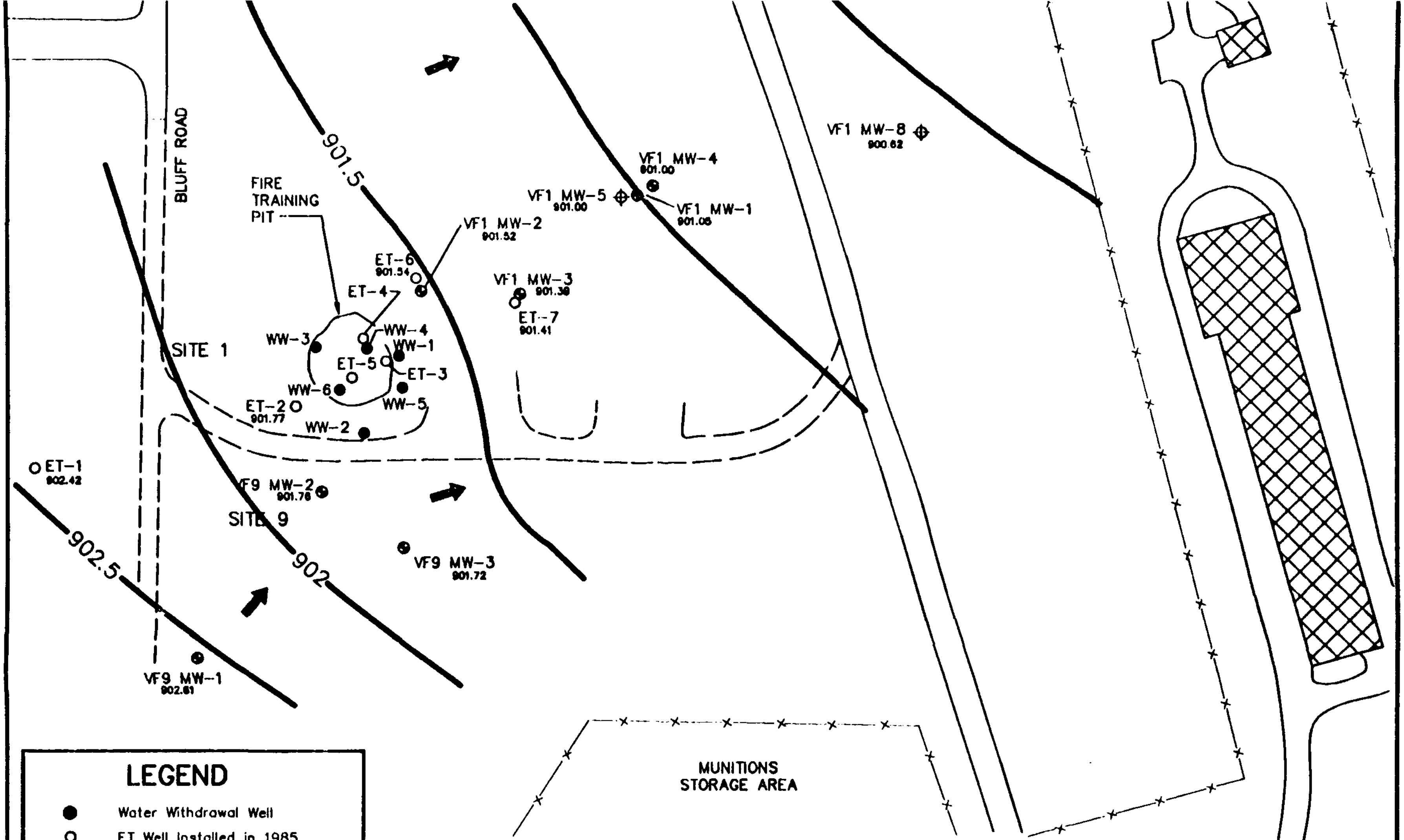


LEGEND

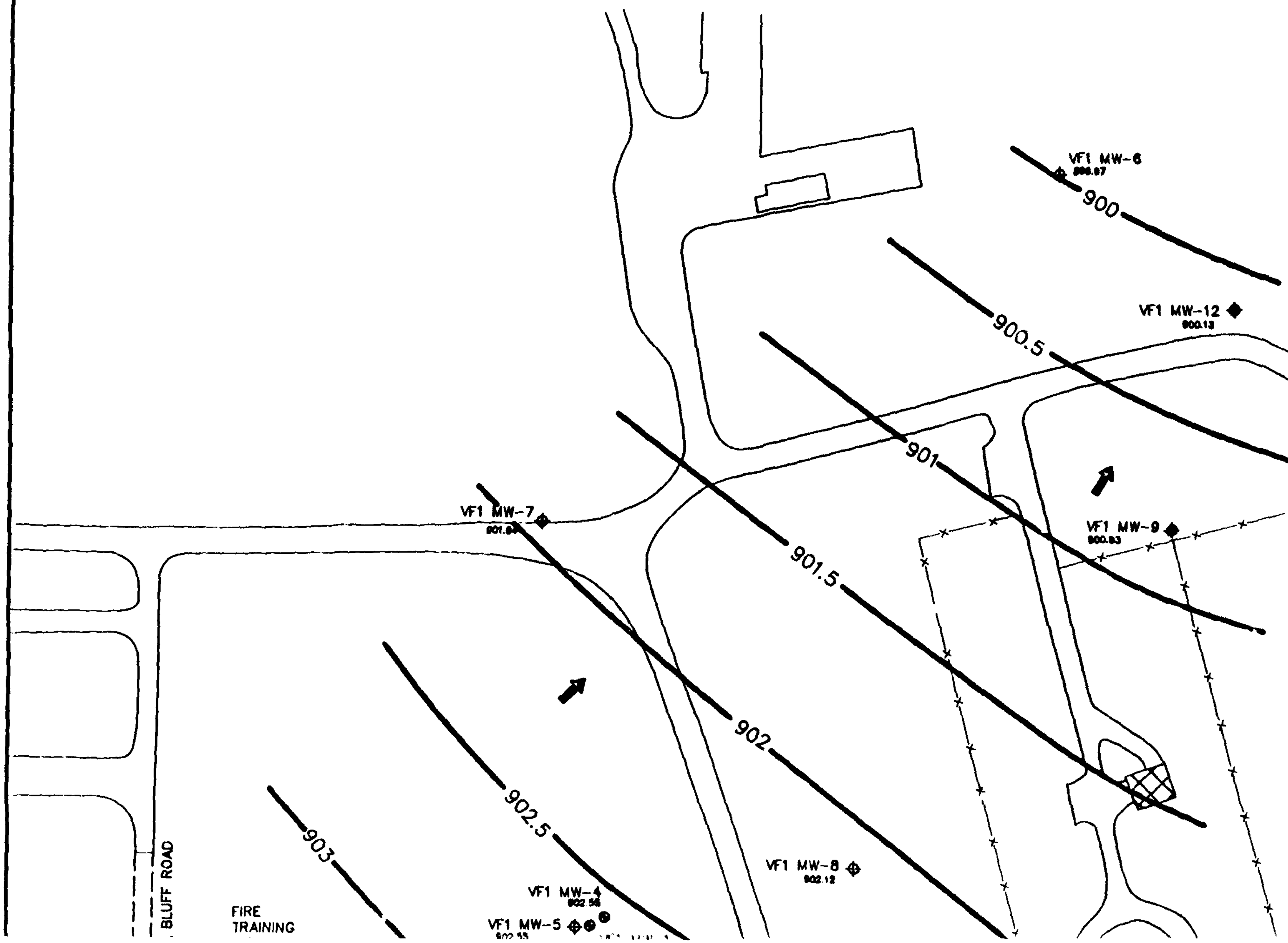
- Water Withdrawal Well
- ET Well Installed in 1985
- Fence
- Monitoring Well Installed in 1987-1988
- Monitoring Well installed in 1989
- Groundwater Elevation Measured 13/Dec/89
- Groundwater Contour
- Groundwater Flow Direction

SCALE 0 — 125 FEET

Source: Hazwrap 1990

WELL I.D.	GROUNDWATER ELEVATION (ABOVE MSL)	WELL I.D.	GROUNDWATER ELEVATION (ABOVE MSL)	WELL I.D.	GROUNDWATER ELEVATION (ABOVE MSL)
VF1 MW-1	901.05	ET-1	902.42	VF9 MW-1	902.61
VF1 MW-2	901.52	ET-2	901.77	VF9 MW-2	901.76
VF1 MW-3	901.39	ET-4	901.63	VF9 MW-3	901.72
VF1 MW-4	901.00	ET-6	901.54	WW-2	901.72
VF1 MW-5	901.00	ET-7	901.41	WW-3	901.70
VF1 MW-6	898.95			WW-4	901.62
VF1 MW-7	900.61			WW-5	901.60
VF1 MW-8	900.62				

SITE 1, FIRE TRAINING AREA
GROUNDWATER CONTOUR MAP, 13 NOVEMBER 1990
VOLK FIELD ANGB, WI



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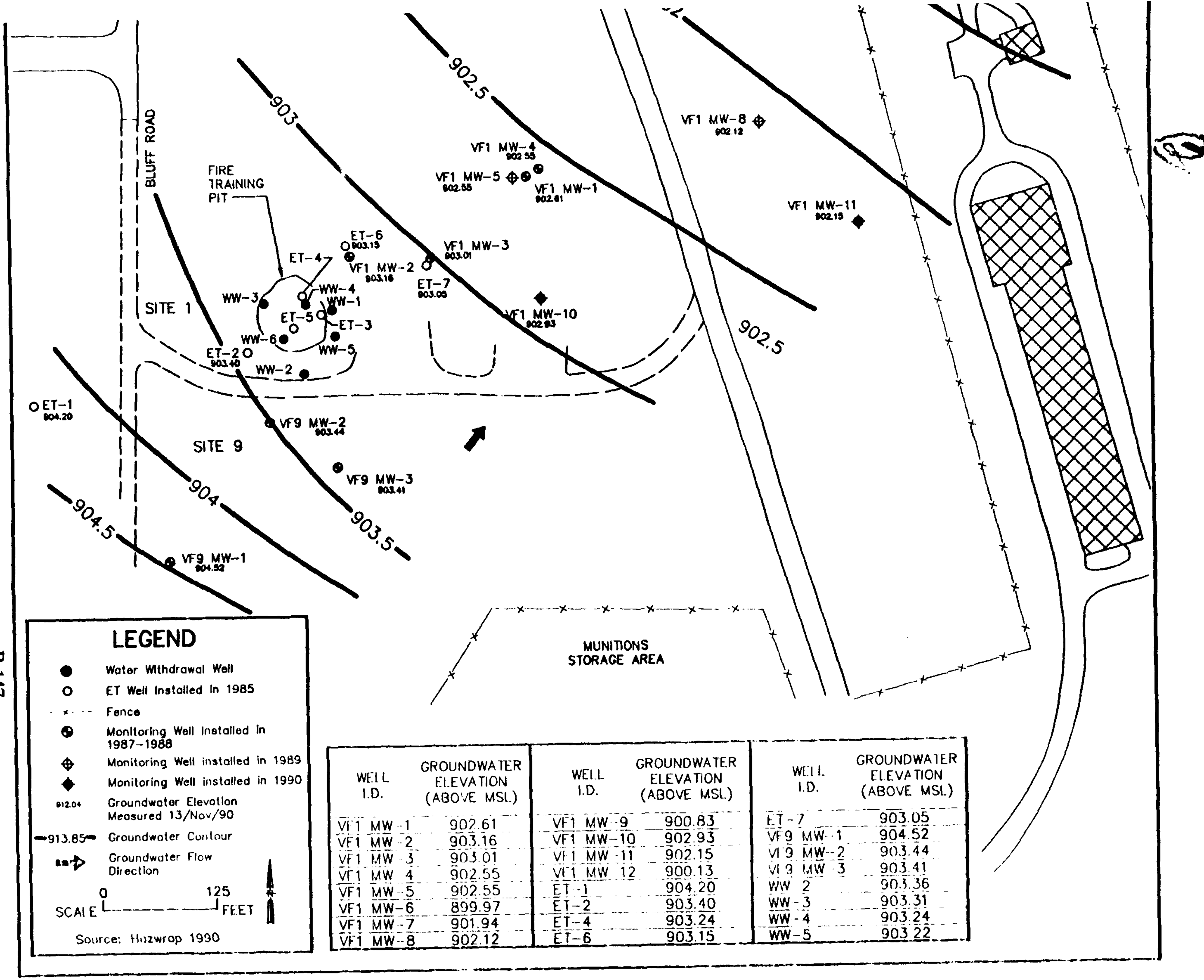

WELL I.D.	GROUNDWATER ELEVATION (ABOVE MSL)	WELL I.D.	GROUNDWATER ELEVATION (ABOVE MSL)	WELL I.D.	GROUNDWATER ELEVATION (ABOVE MSL)
VF1 MW-1	902.61	VF1 MW-9	900.83	ET-7	903.05
VF1 MW-2	903.16	VF1 MW-10	902.93	VF9 MW-1	904.52
VF1 MW-3	903.01	VF1 MW-11	902.15	VF9 MW-2	903.44
VF1 MW-4	902.55	VF1 MW-12	900.13	VF9 MW-3	903.41
VF1 MW-5	902.55	ET-1	904.20	WW-2	903.36
VF1 MW-6	899.97	ET-2	903.40	WW-3	903.31
VF1 MW-7	901.94	ET-4	903.24	WW-4	903.24
VF1 MW-8	902.12	ET-6	903.15	WW-5	903.22

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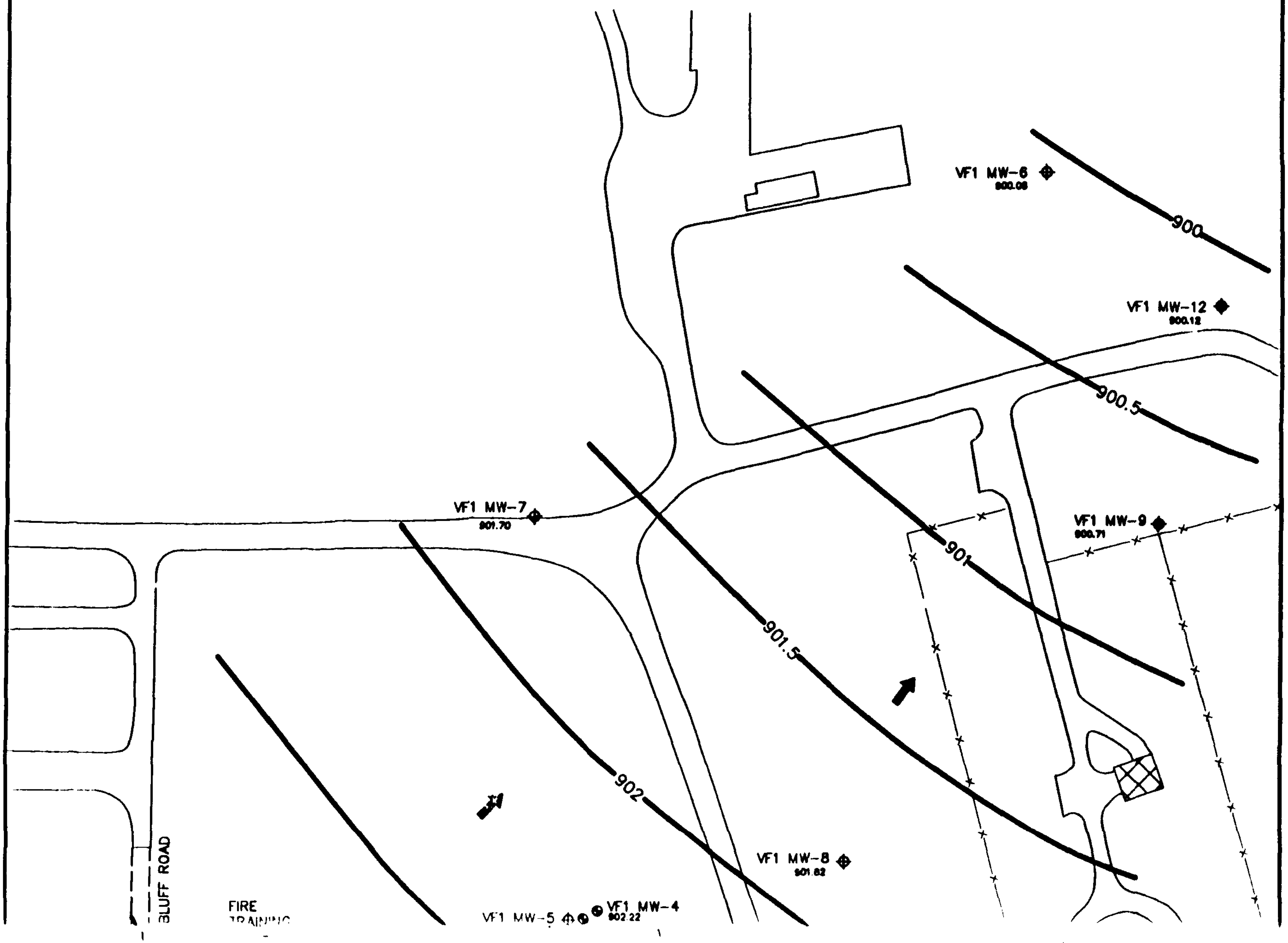
SITE 1, FIRE TRAINING AREA
GROUNDWATER CONTOUR MAP, 8 JULY 1991
VOLK FIELD ANGB, WI



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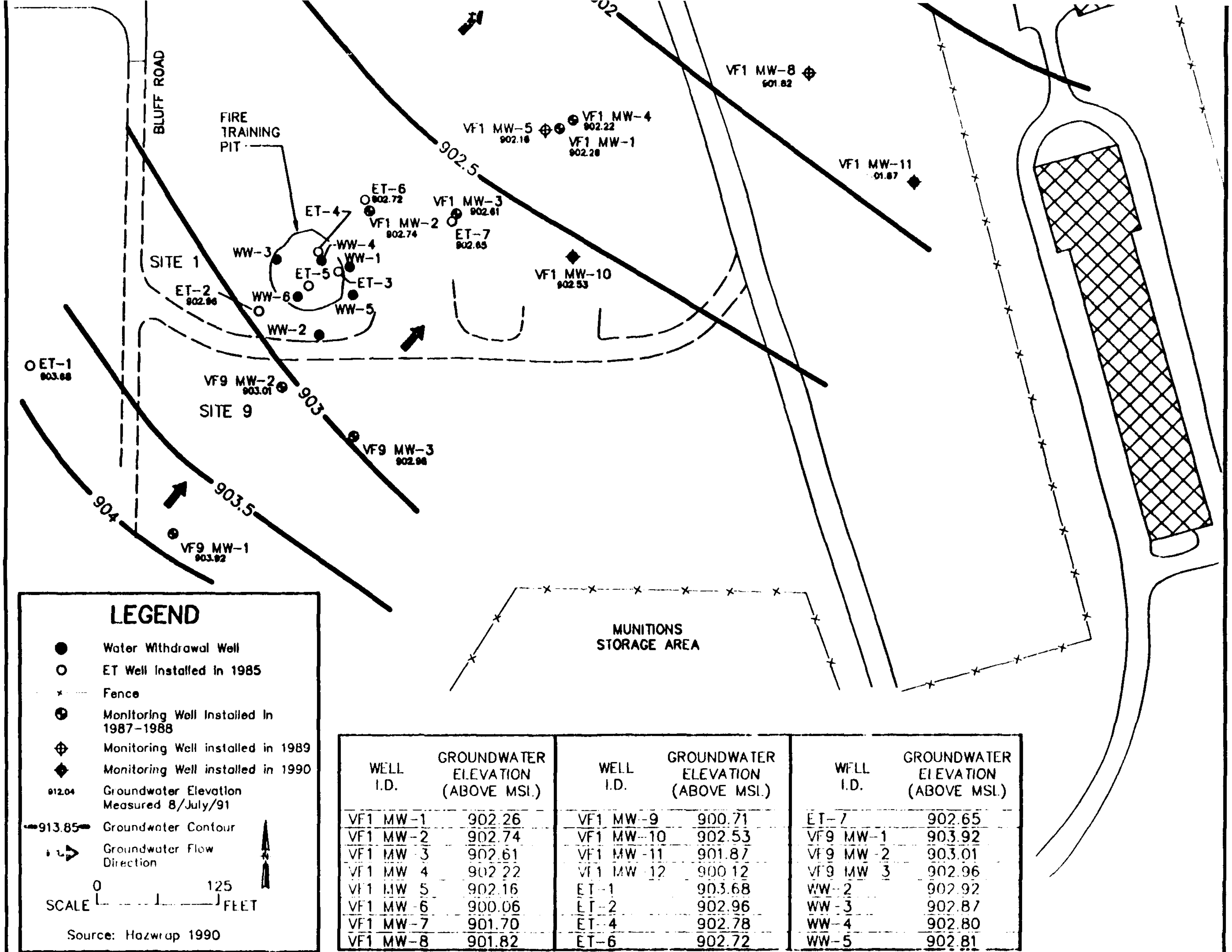
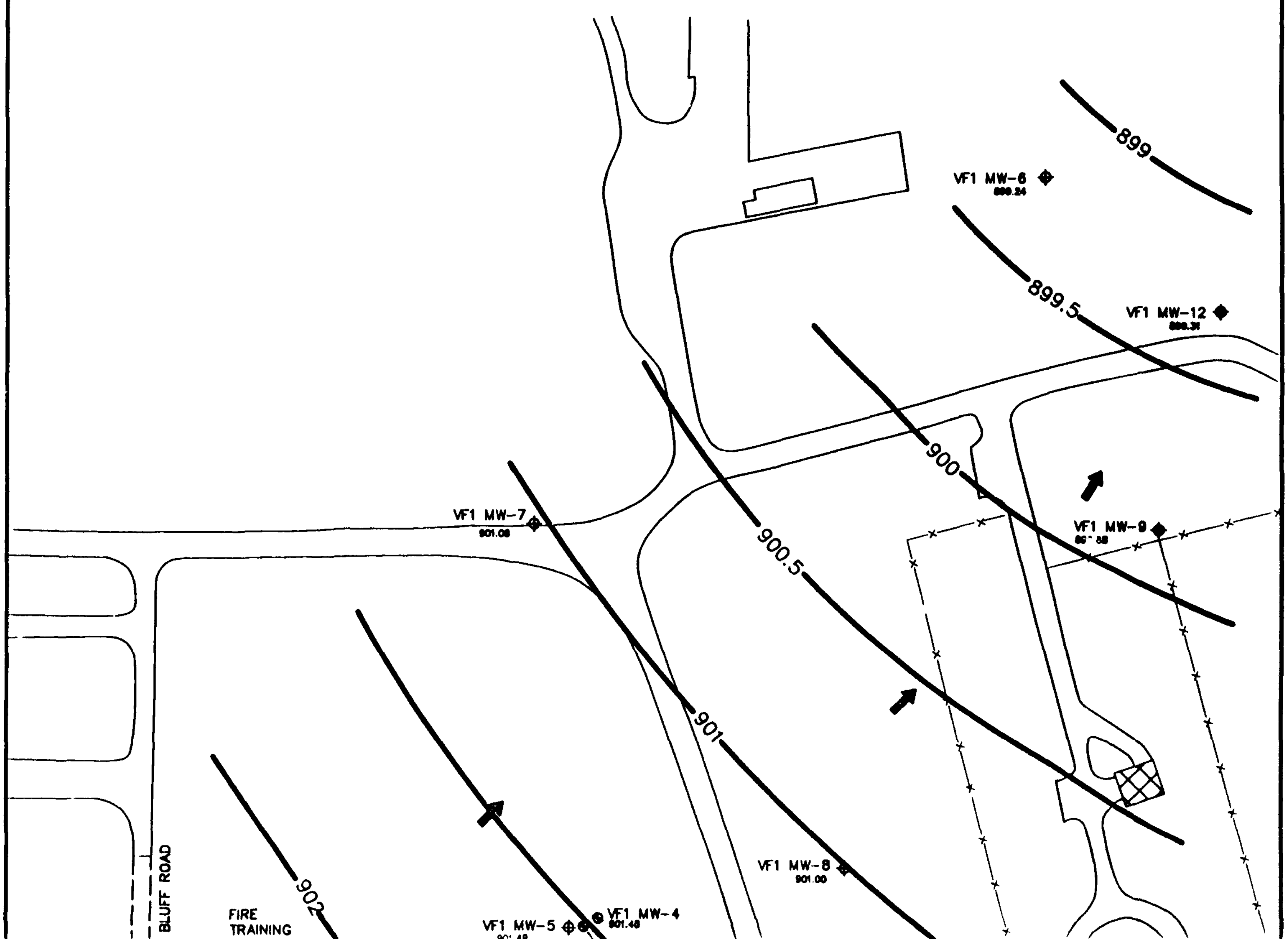


WELL I.D.	GROUNDWATER ELEVATION (ABOVE MSL.)	WELL I.D.	GROUNDWATER ELEVATION (ABOVE MSL.)	WELL I.D.	GROUNDWATER ELEVATION (ABOVE MSL.)
VF1 MW-1	902.26	VF1 MW-9	900.71	ET-7	902.65
VF1 MW-2	902.74	VF1 MW-10	902.53	VF9 MW-1	903.92
VF1 MW-3	902.61	VF1 MW-11	901.87	VF9 MW-2	903.01
VF1 MW-4	902.22	VF1 MW-12	900.12	VF9 MW-3	902.96
VF1 MW-5	902.16	ET-1	903.68	WW-2	902.92
VF1 MW-6	900.06	ET-2	902.96	WW-3	902.87
VF1 MW-7	901.70	ET-4	902.78	WW-4	902.80
VF1 MW-8	901.82	ET-6	902.72	WW-5	902.81

SITE 1, FIRE TRAINING AREA

GROUNDWATER CONTOUR MAP, 30 OCTOBER 1991

VOLK FIELD ANGB, WI



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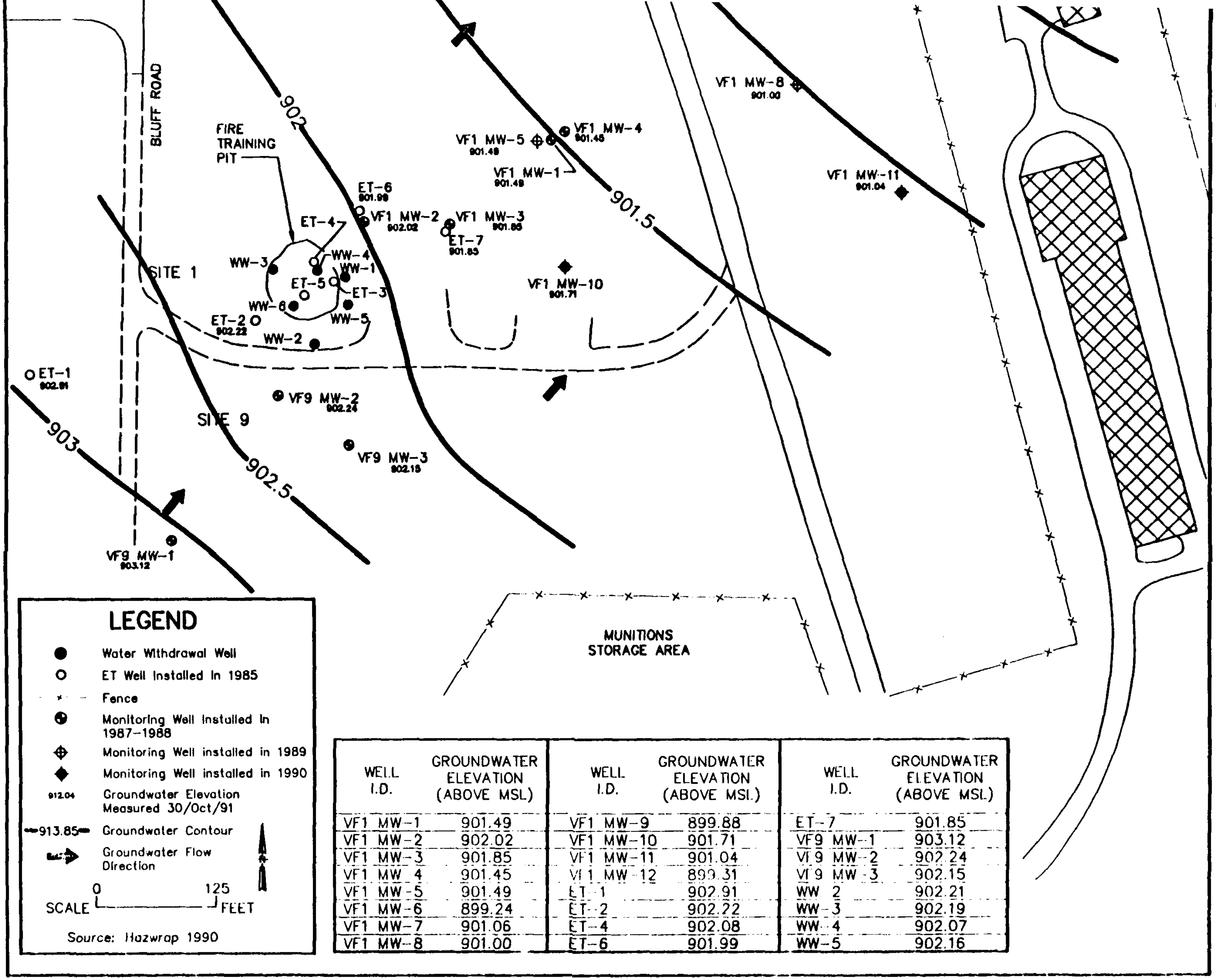
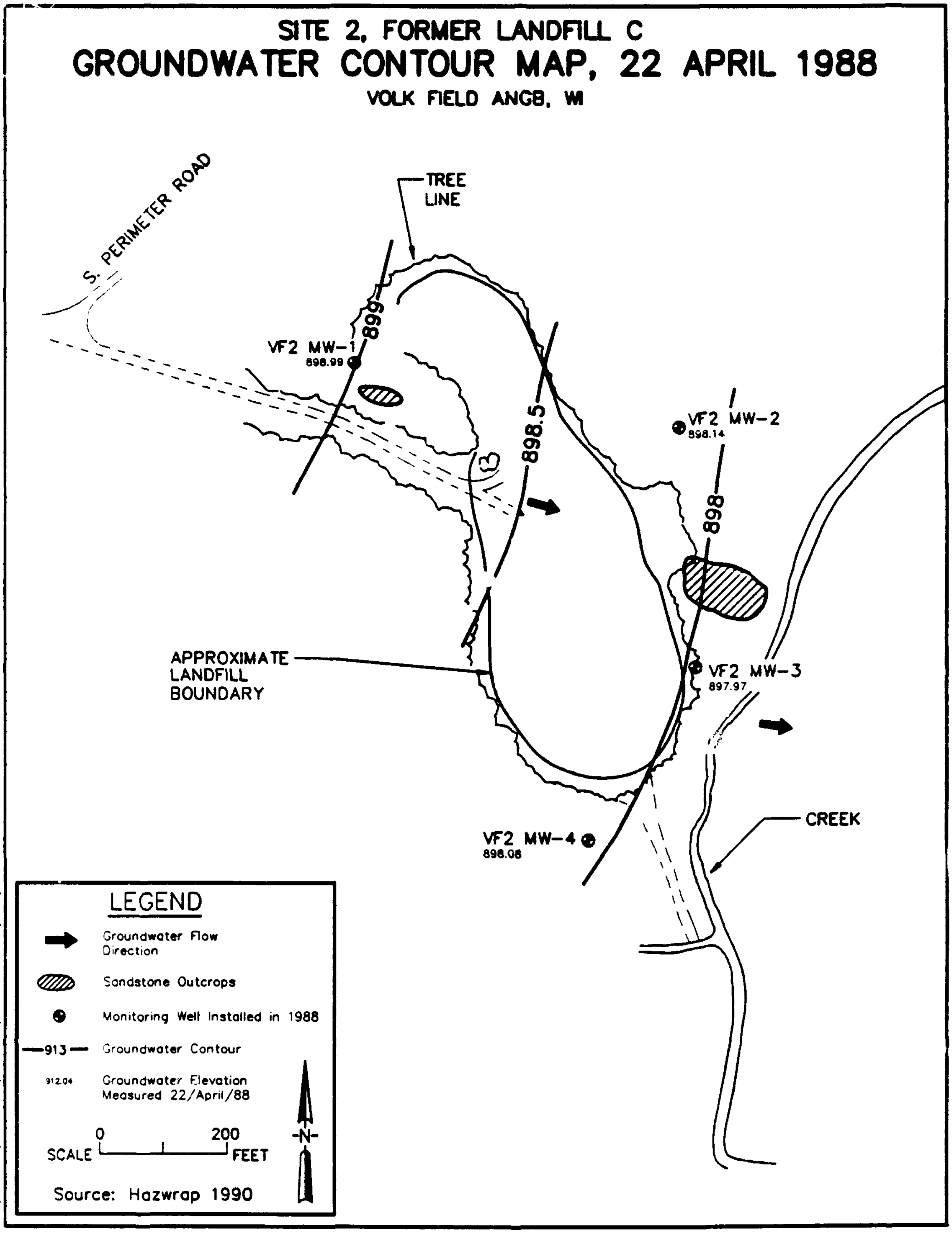


WELL I.D.	GROUNDWATER ELEVATION (ABOVE MSL)	WELL I.D.	GROUNDWATER ELEVATION (ABOVE MSL)	WELL I.D.	GROUNDWATER ELEVATION (ABOVE MSL)
VF1 MW-1	901.49	VF1 MW-9	899.88	ET-7	901.85
VF1 MW-2	902.02	VF1 MW-10	901.71	VF9 MW-1	903.12
VF1 MW-3	901.85	VF1 MW-11	901.04	VF9 MW-2	902.24
VF1 MW-4	901.45	VF1 MW-12	899.31	VF9 MW-3	902.15
VF1 MW-5	901.49	ET-1	902.91	WW-2	902.21
VF1 MW-6	899.24	ET-2	902.22	WW-3	902.19
VF1 MW-7	901.06	ET-4	902.08	WW-4	902.07
VF1 MW-8	901.00	ET-6	901.99	WW-5	902.16

ENGINEERING-SCIENCE



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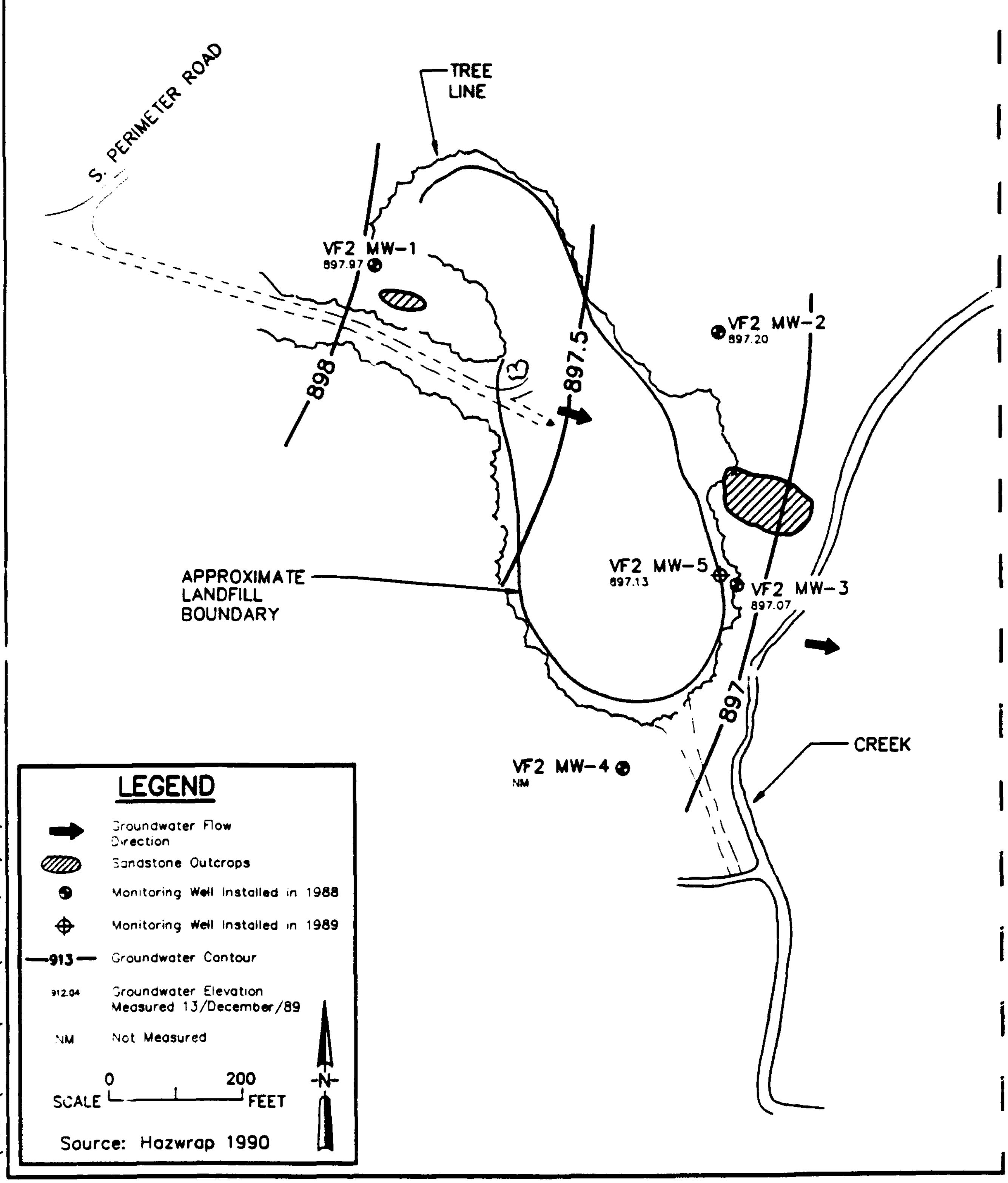
ENGINEERING-SCIENCE

SITE 2, FORMER LANDFILL C

GROUNDWATER CONTOUR MAP, 13 DECEMBER 1989

VOLK FIELD ANGB, WI



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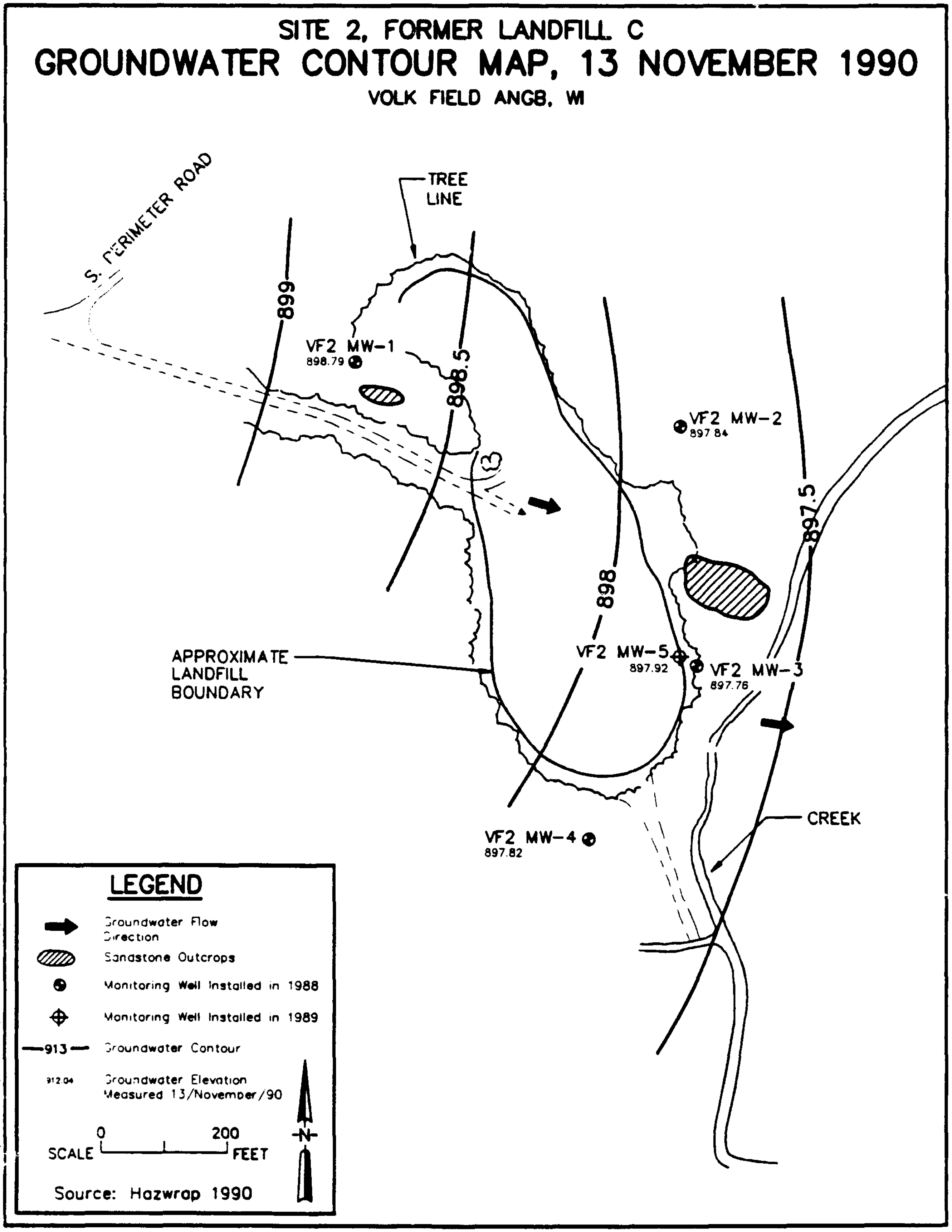
ENGINEERING-SCIENCE



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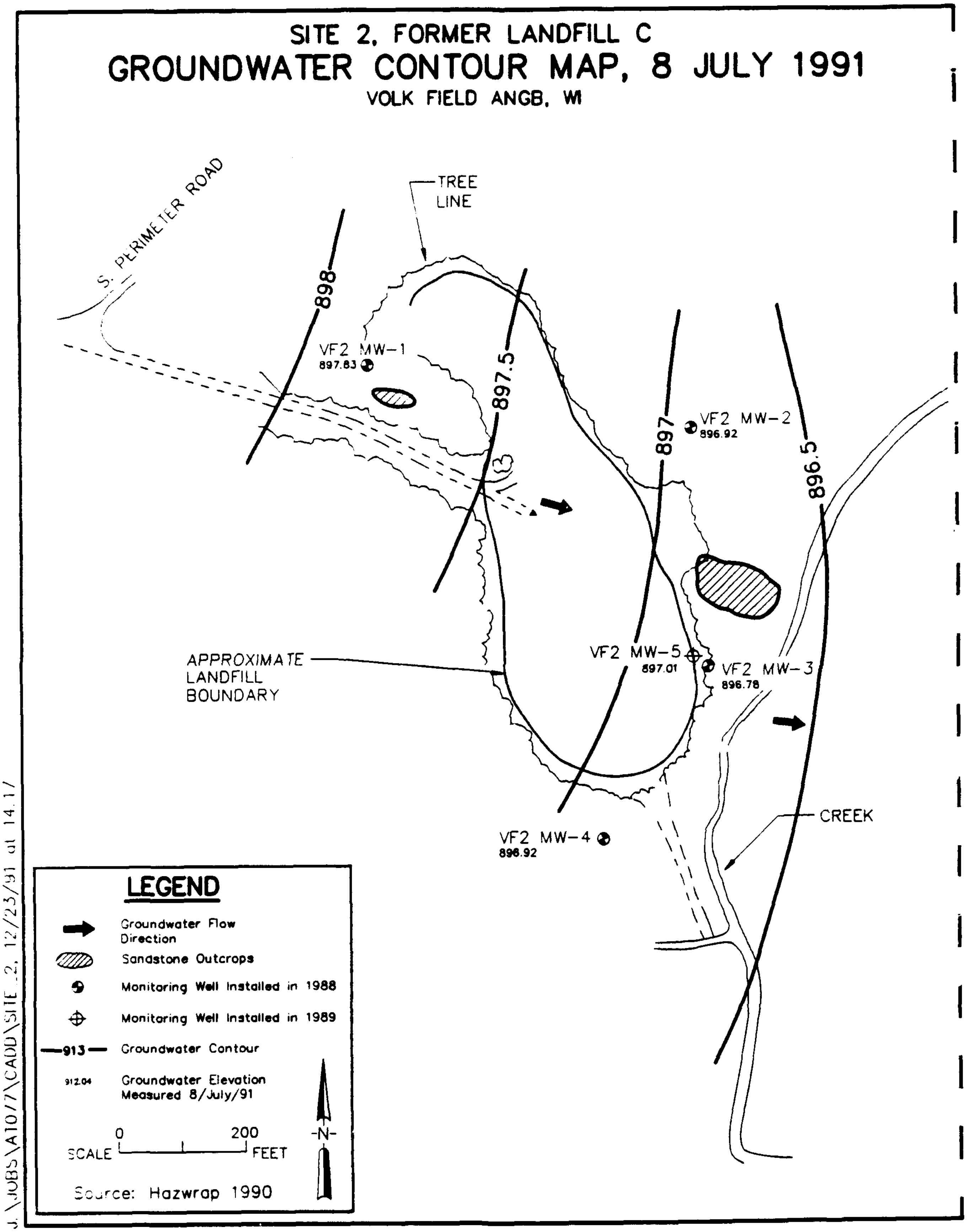
ENGINEERING-SCIENCE



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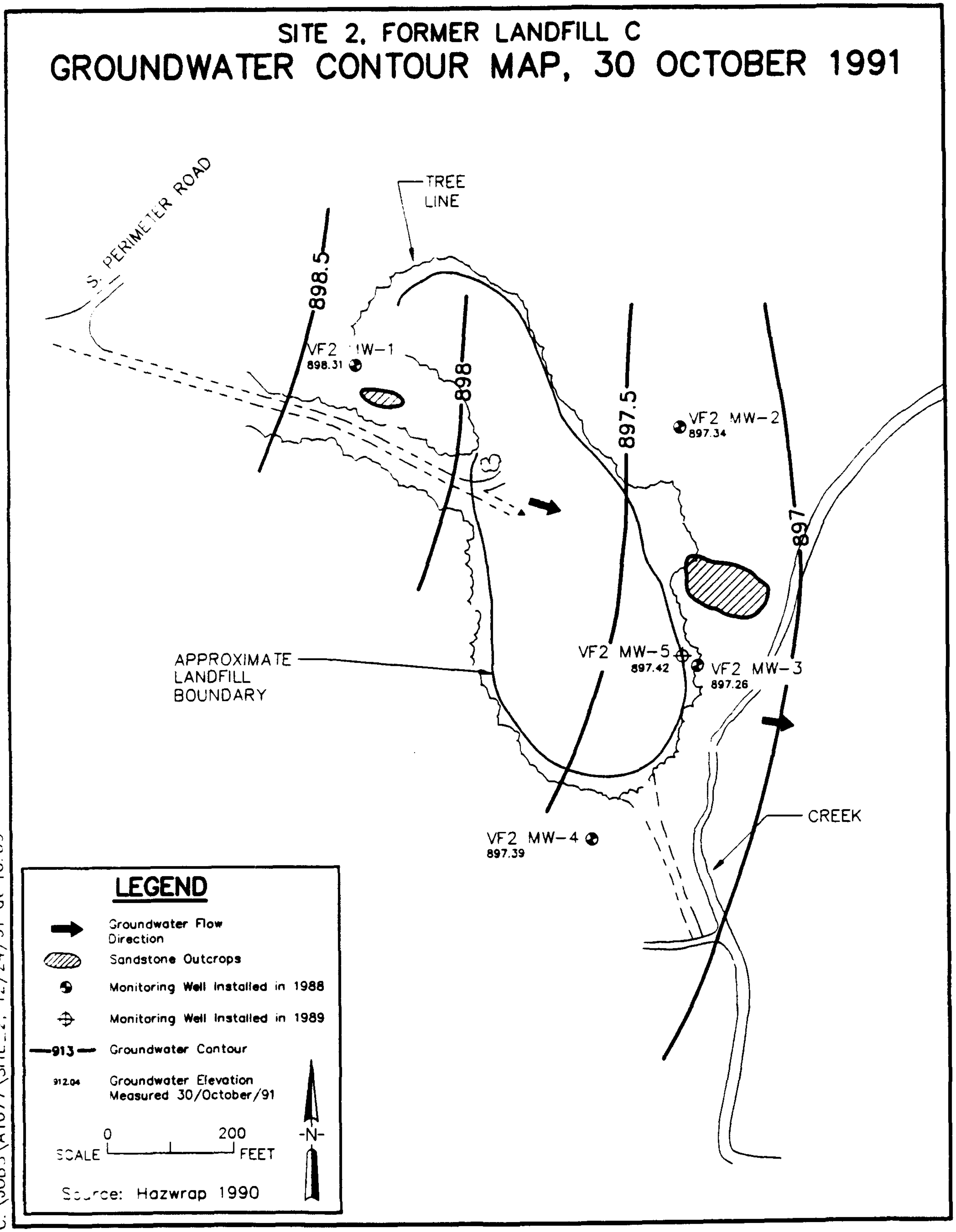
SITE 2, FORMER LANDFILL C

GROUNDWATER CONTOUR MAP, 30 OCTOBER 1991



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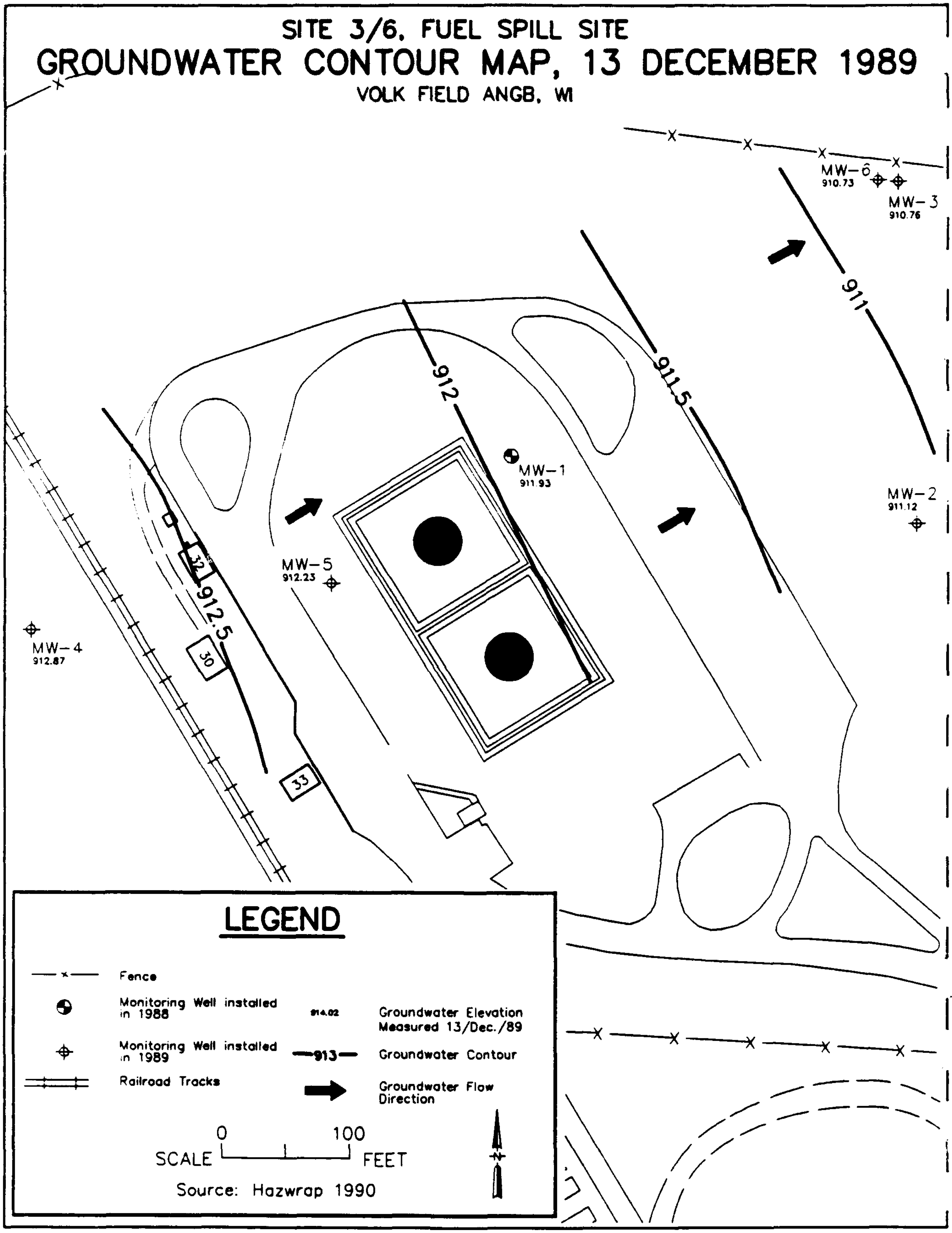

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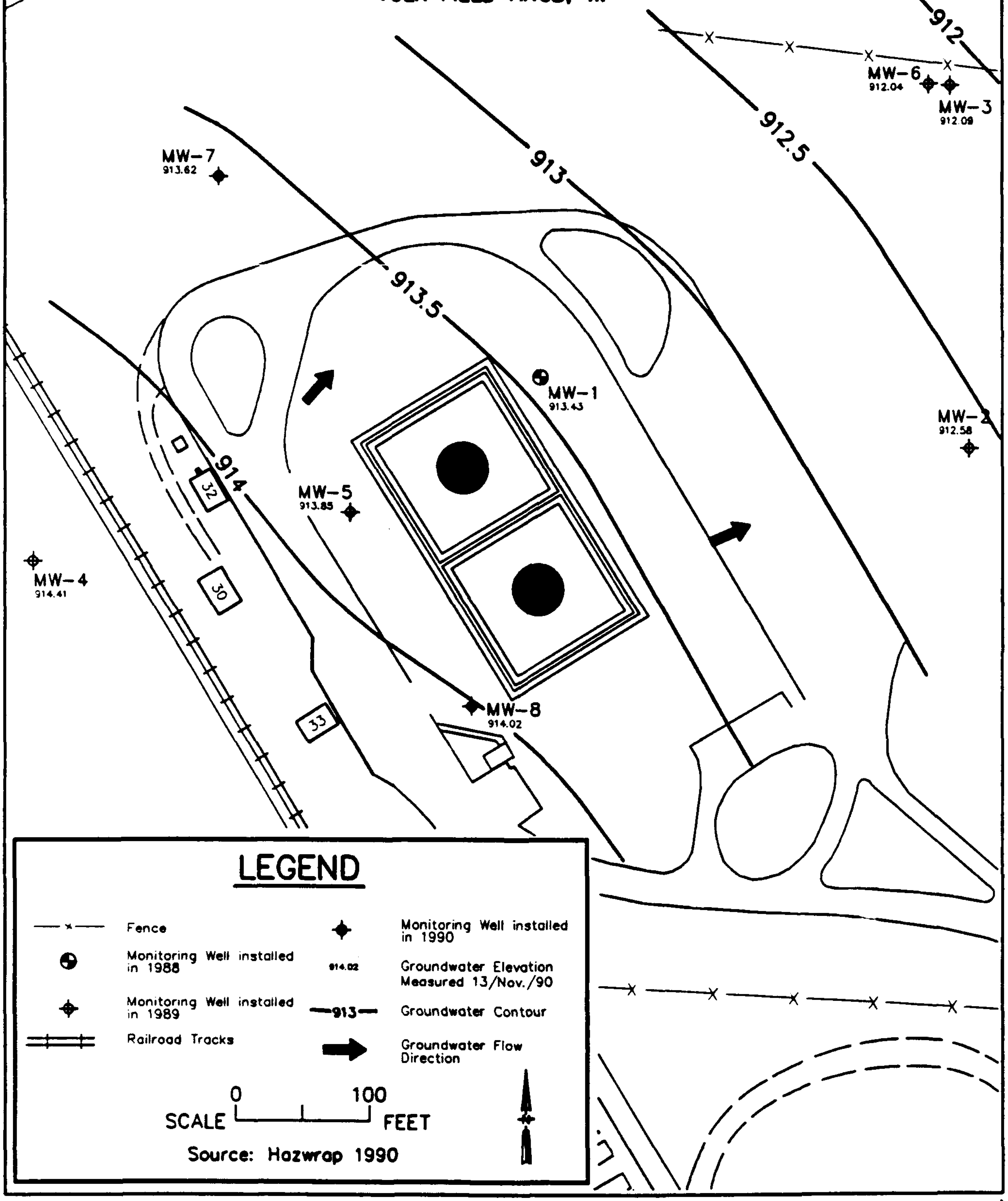
ES ENGINEERING-SCIENCE

SITE 3/6, FUEL SPILL SITE
GROUNDWATER CONTOUR MAP, 13 NOVEMBER 1990
VOLK FIELD ANGB, WI



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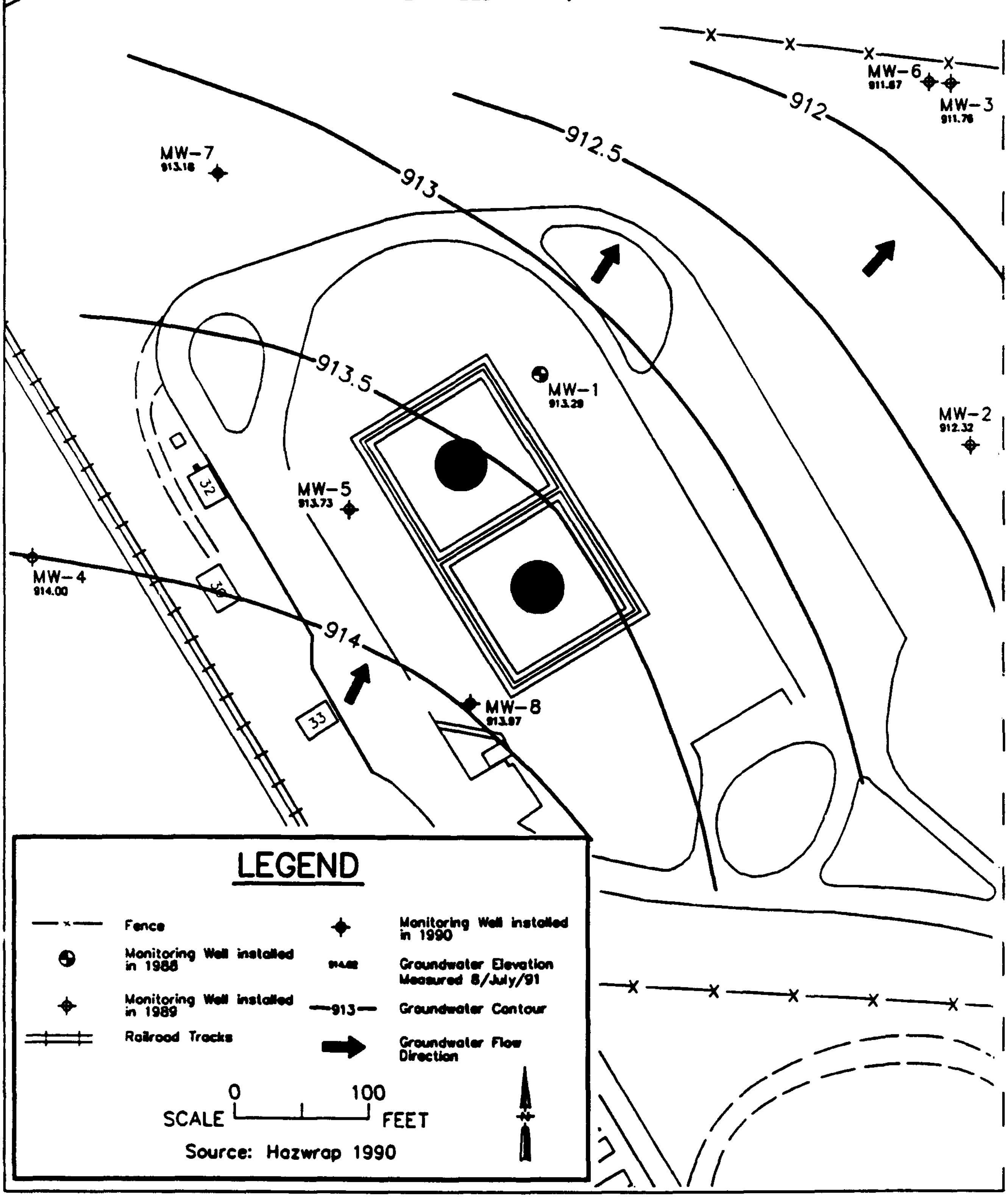
SITE 3/6, FUEL SPILL SITE

GROUNDWATER CONTOUR MAP, 8 JULY 1991

VOLK FIELD ANGB, WI



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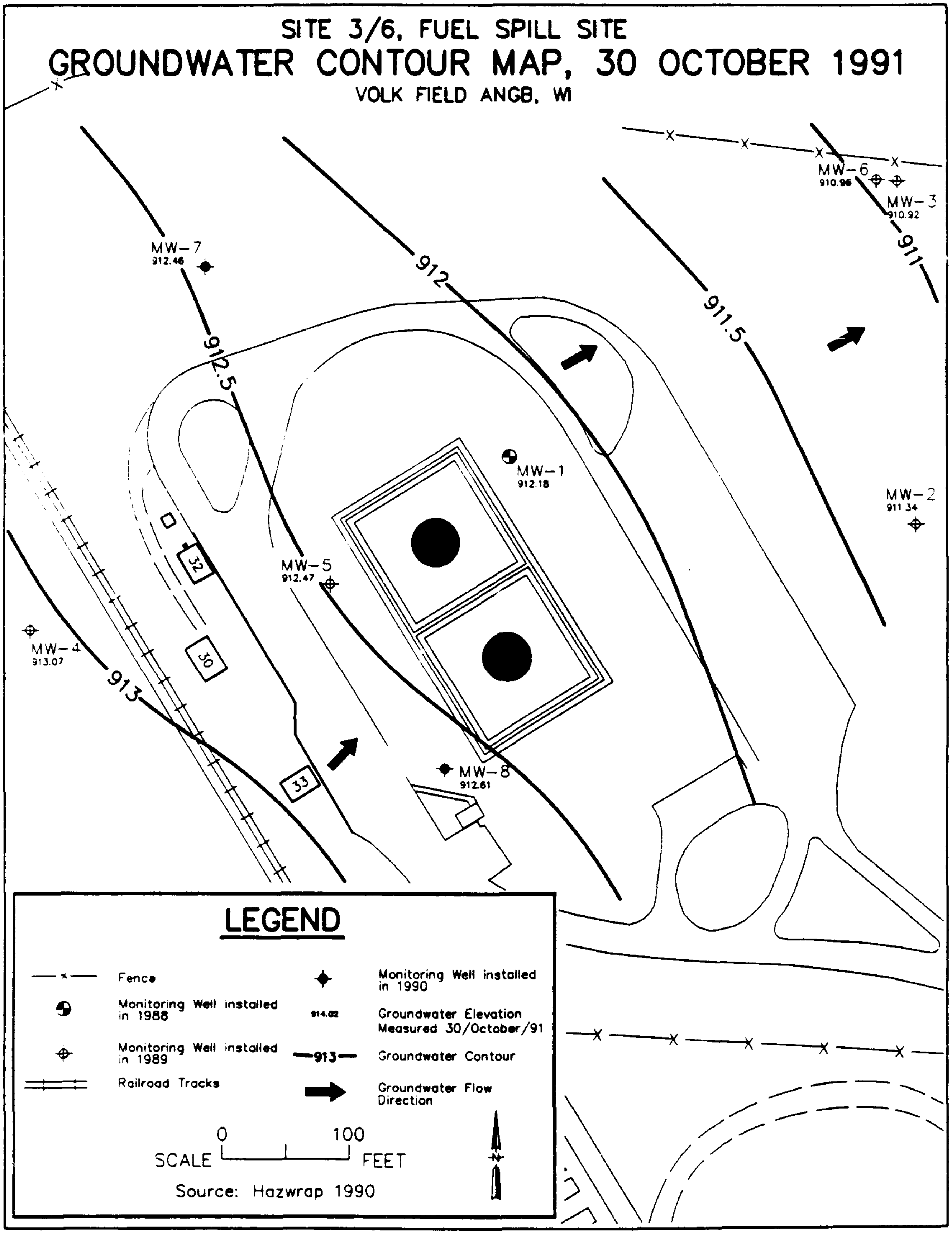
ENGINEERING-SCIENCE



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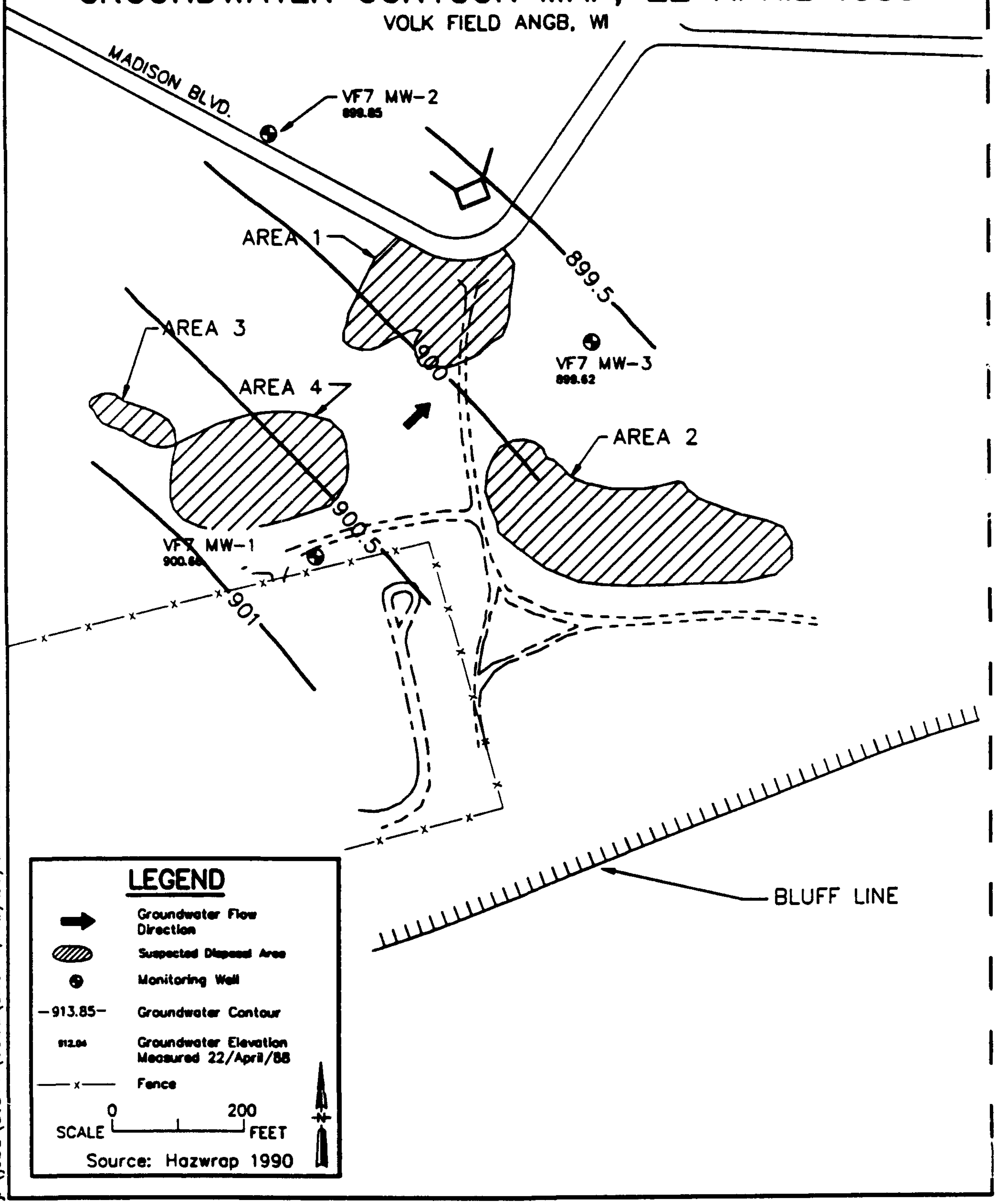
SITE 7, FORMER LANDFILL A

GROUNDWATER CONTOUR MAP, 22 APRIL 1988

VOLK FIELD ANGB, WI



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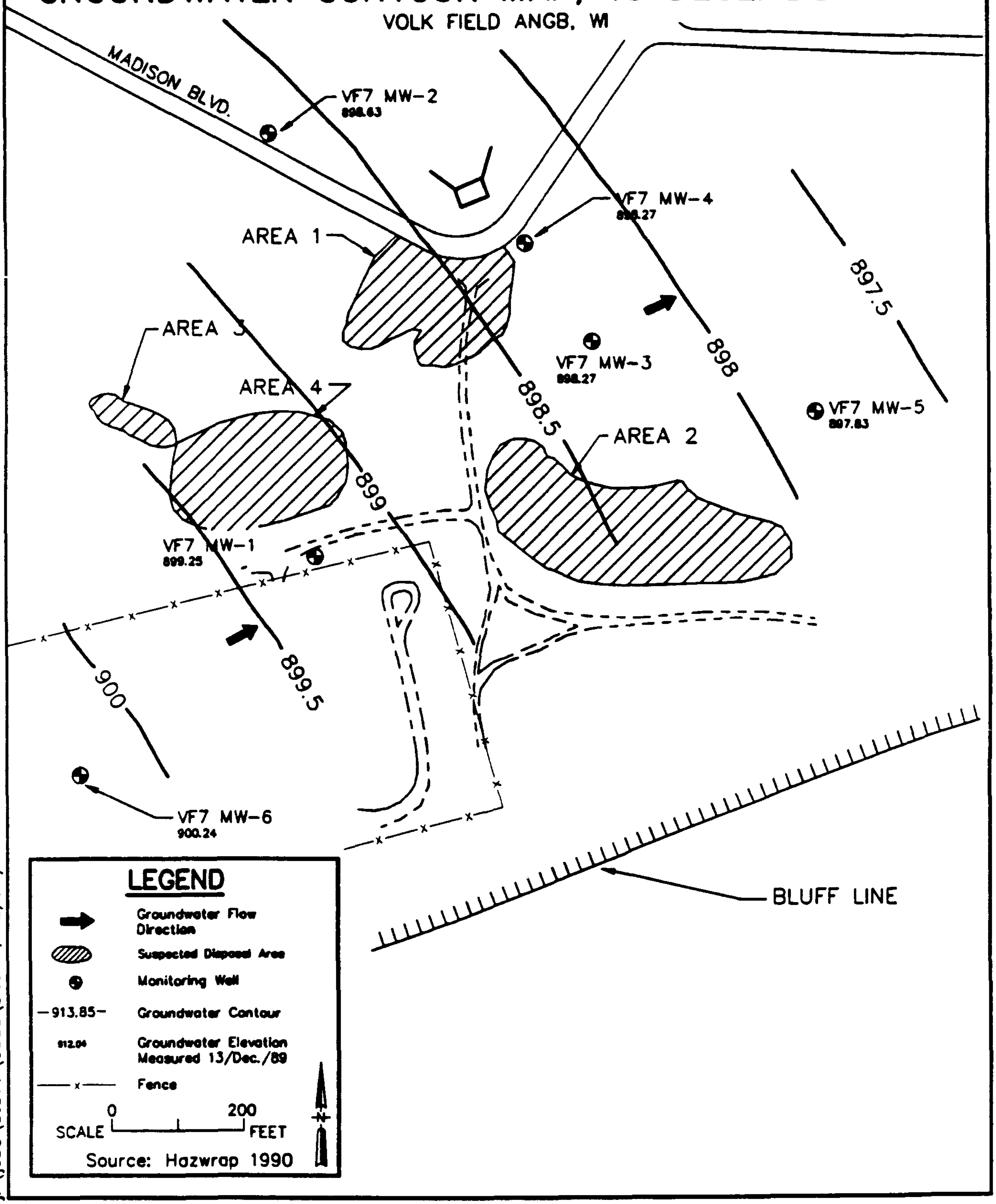
SITE 7, FORMER LANDFILL A
GROUNDWATER CONTOUR MAP, 13 DECEMBER 1989
VOLK FIELD ANGB, WI



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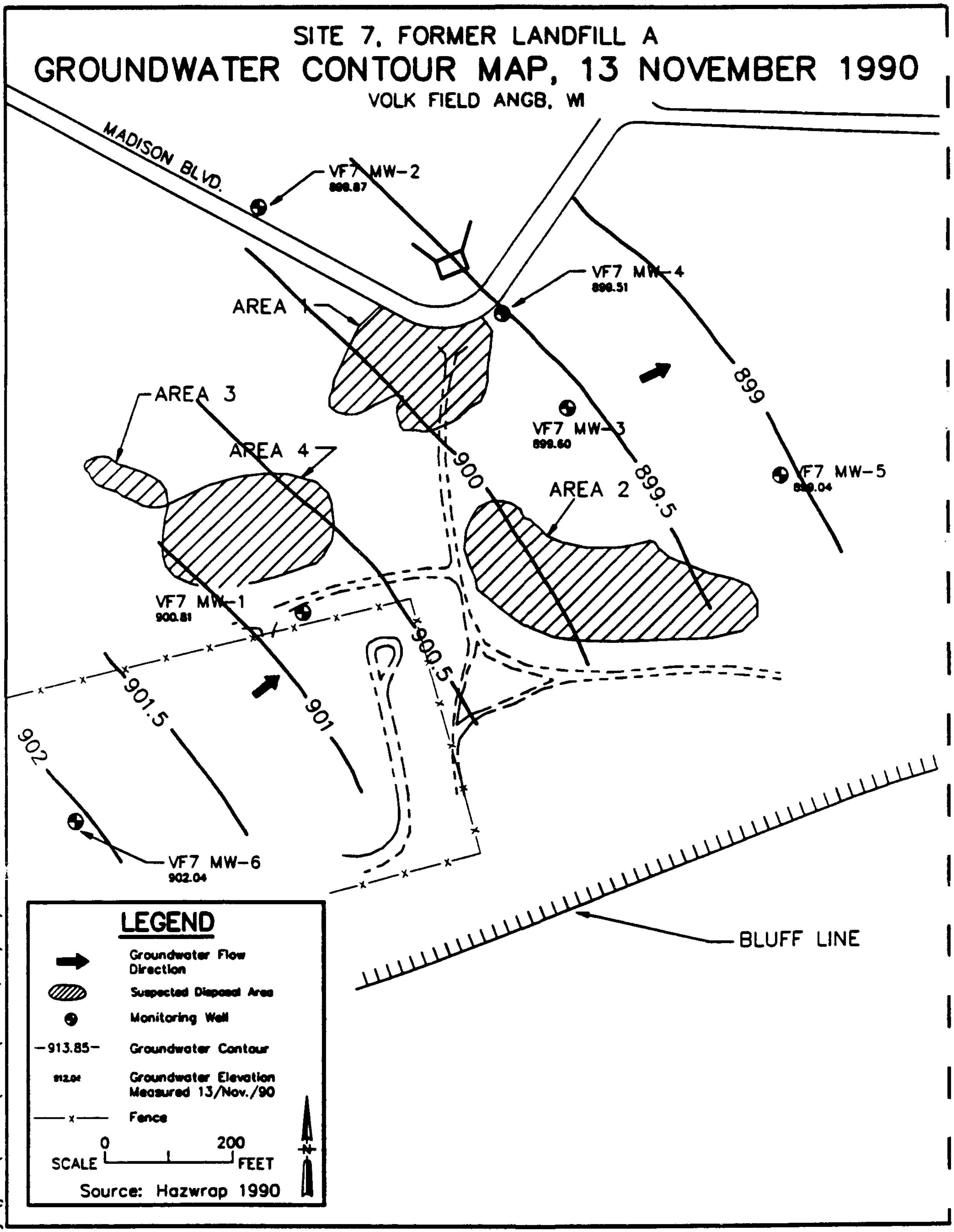
ENGINEERING-SCIENCE



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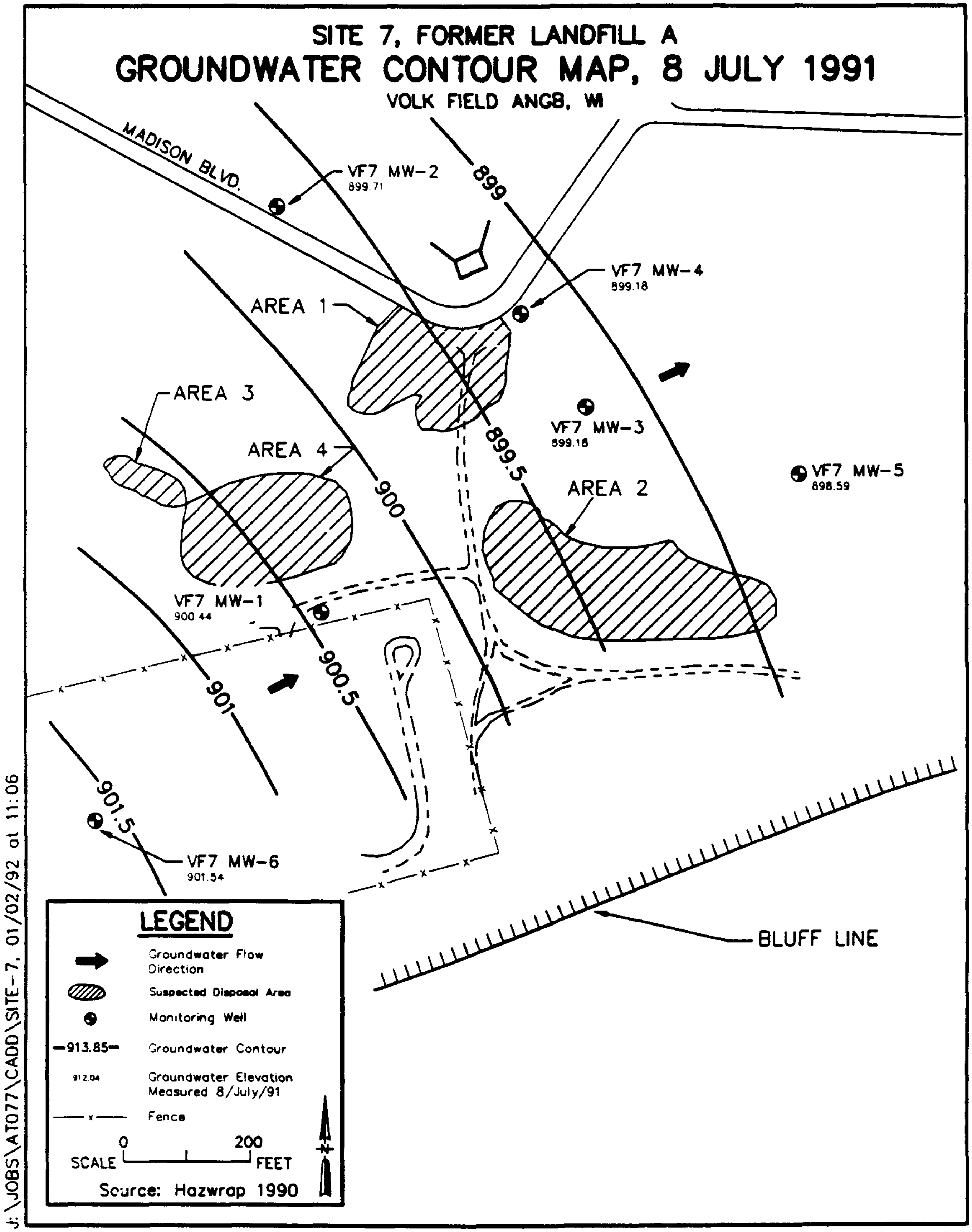
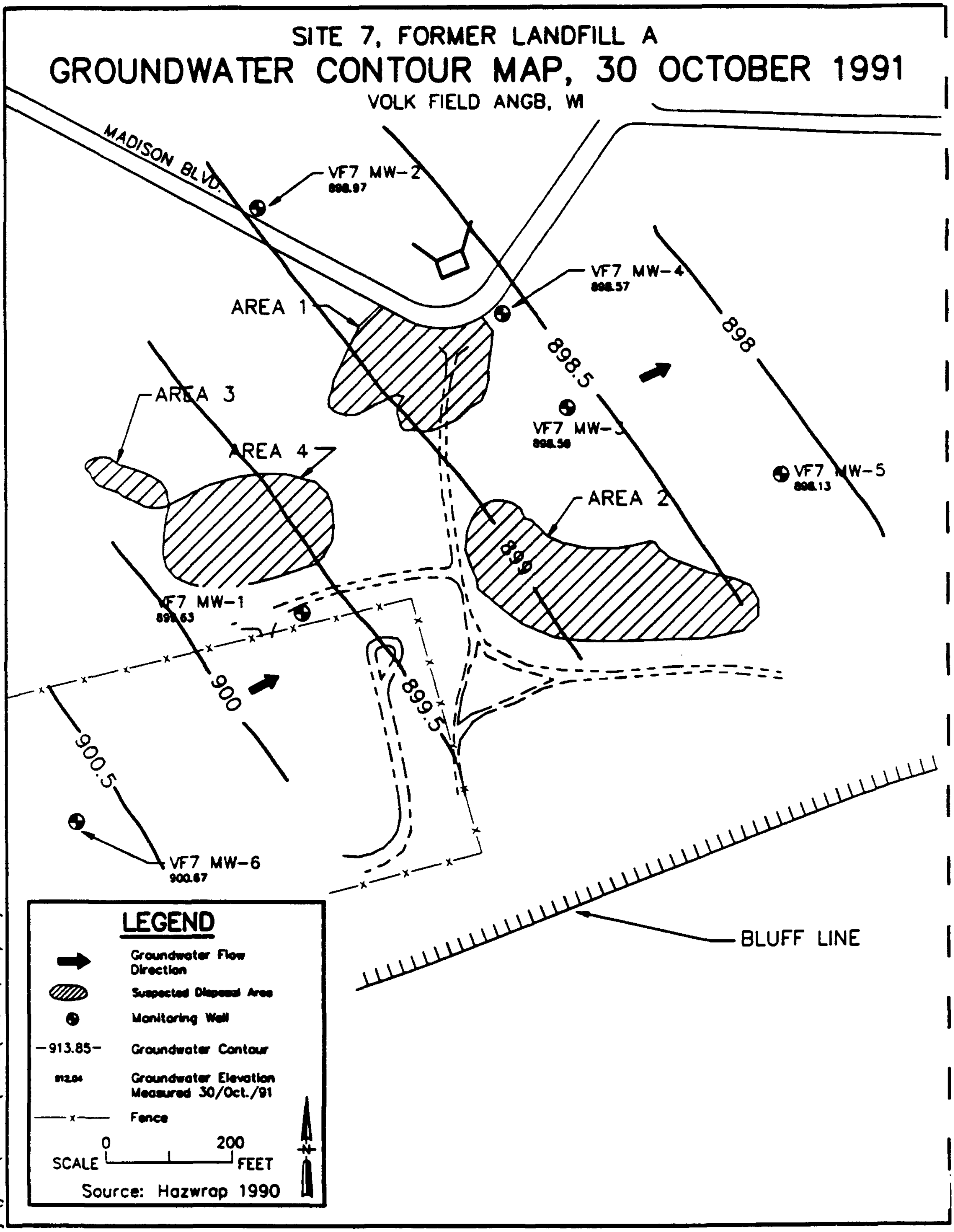
ENGINEERING-SCIENC



ENGINEERING-SCIENCE



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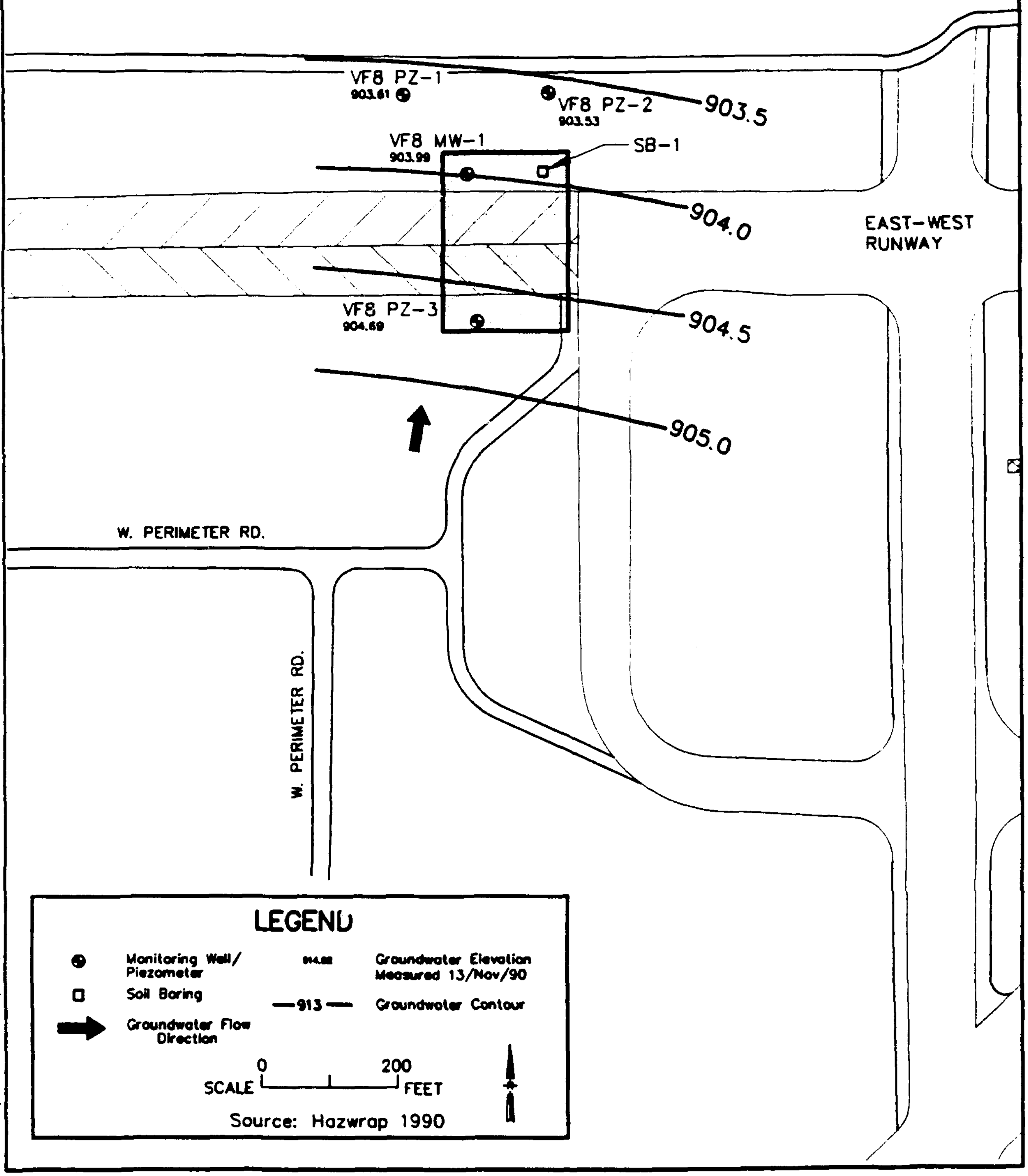
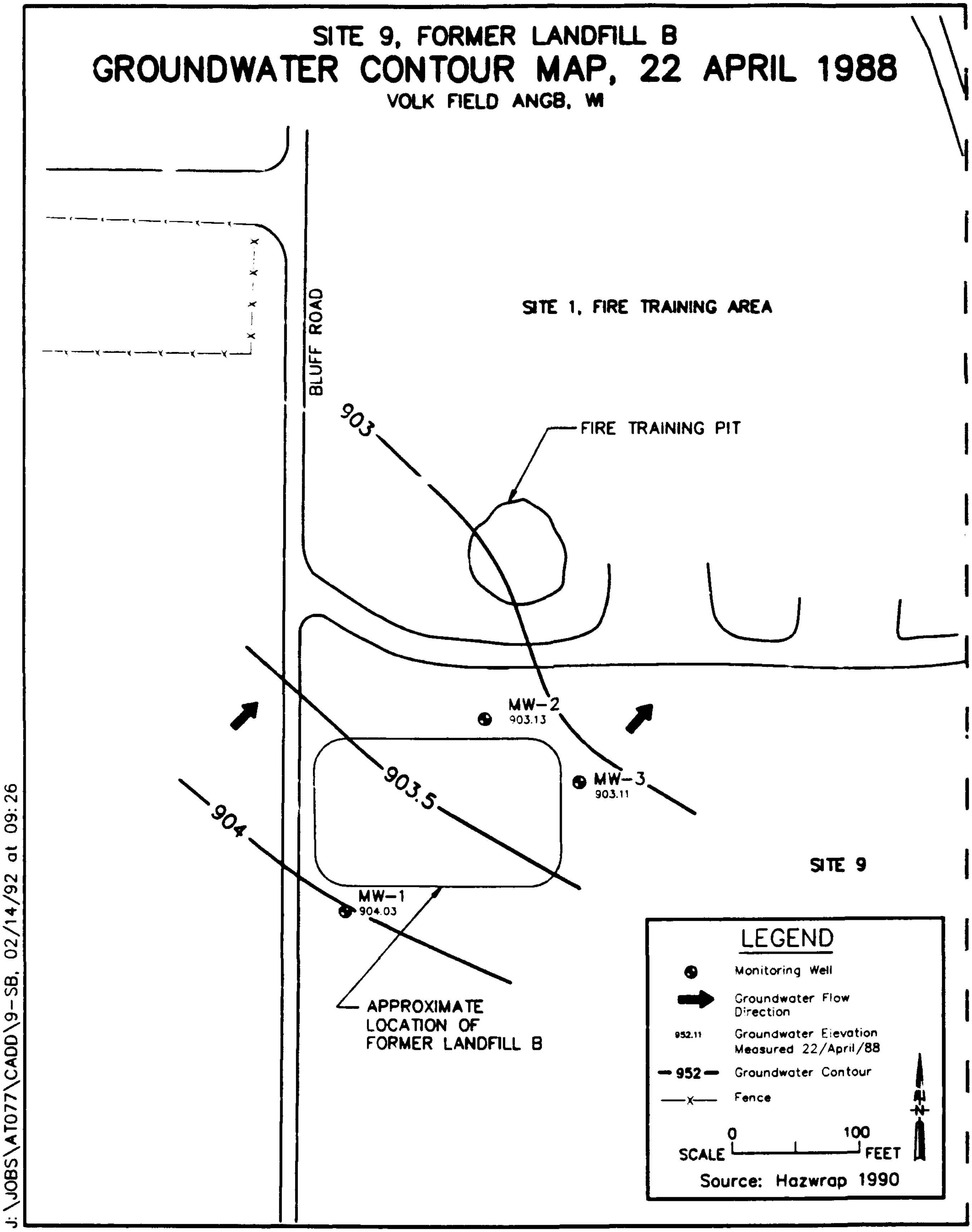
ENGINEERING-SCIENC

SITE 8, F84 CRASH SITE
GROUNDWATER CONTOUR MAP, 13 NOVEMBER 1990
VOLK FIELD ANGB, WI



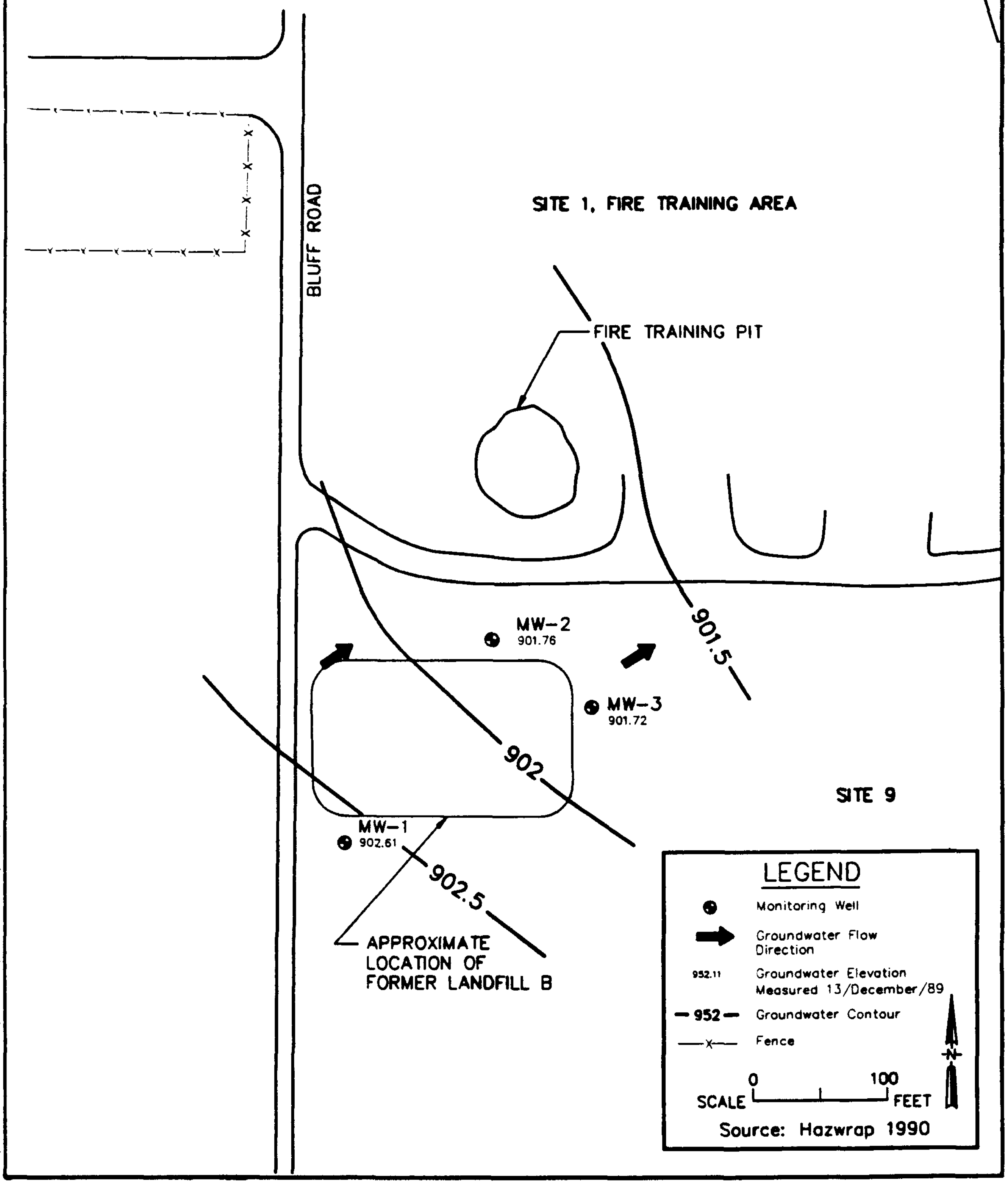
AT077\SITE-8, 02/07/92 at 11:31

ENGINEERING-SCIENCE



ENGINEERING-SCIENCE

SITE 9, FORMER LANDFILL B
GROUNDWATER CONTOUR MAP, 13 DECEMBER 1989
VOLK FIELD ANGB, WI



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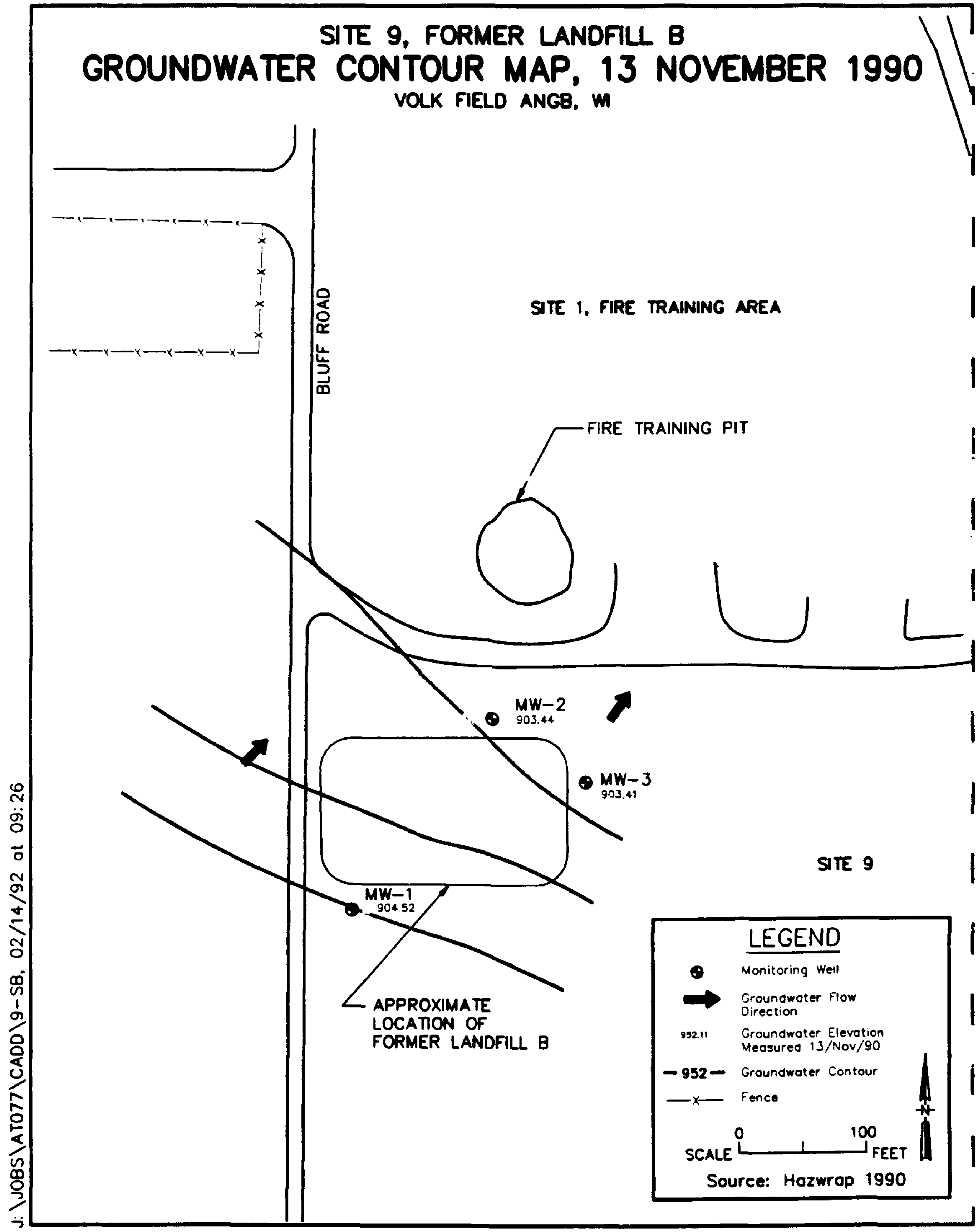
ES ENGINEERING-SCIENCE



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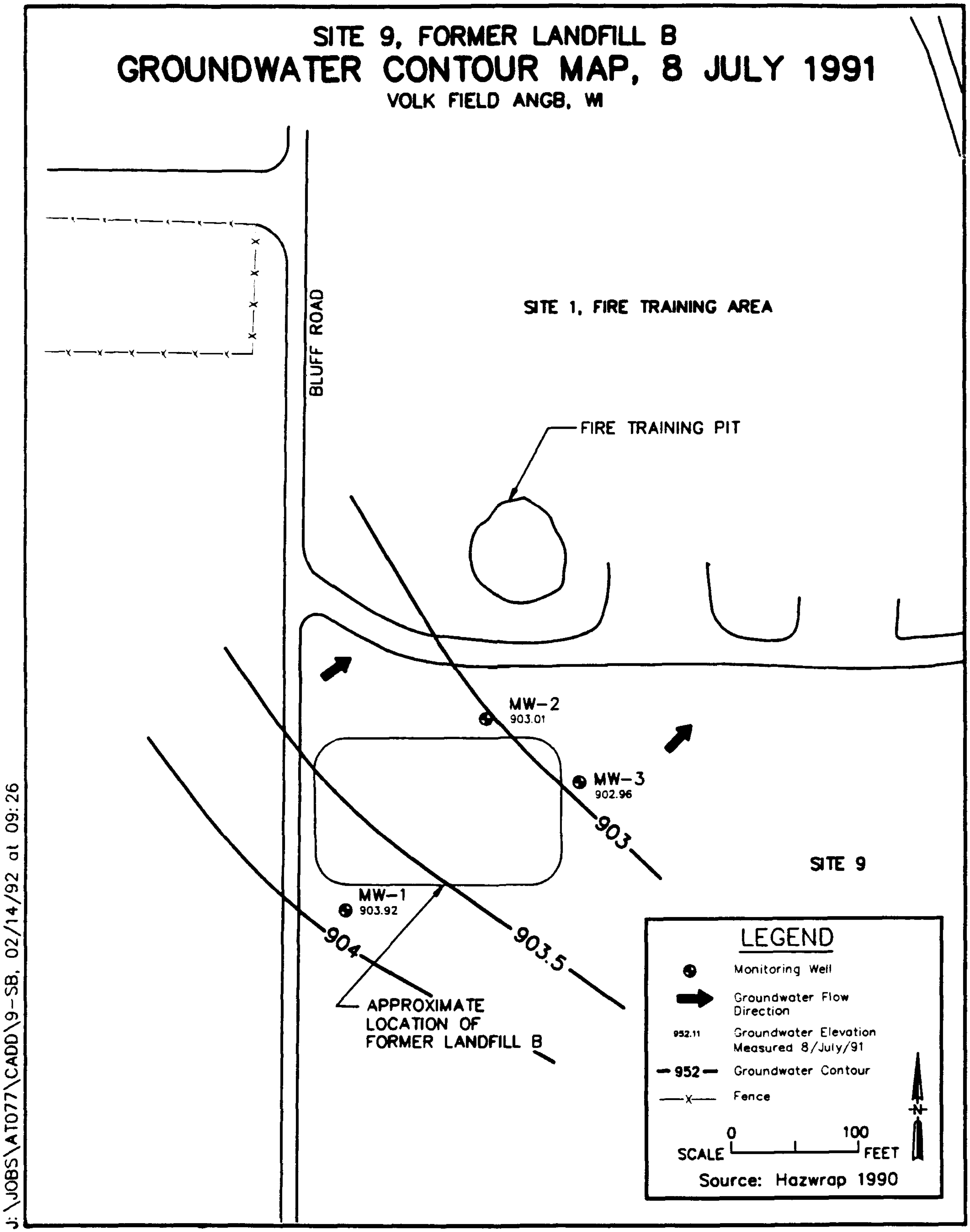
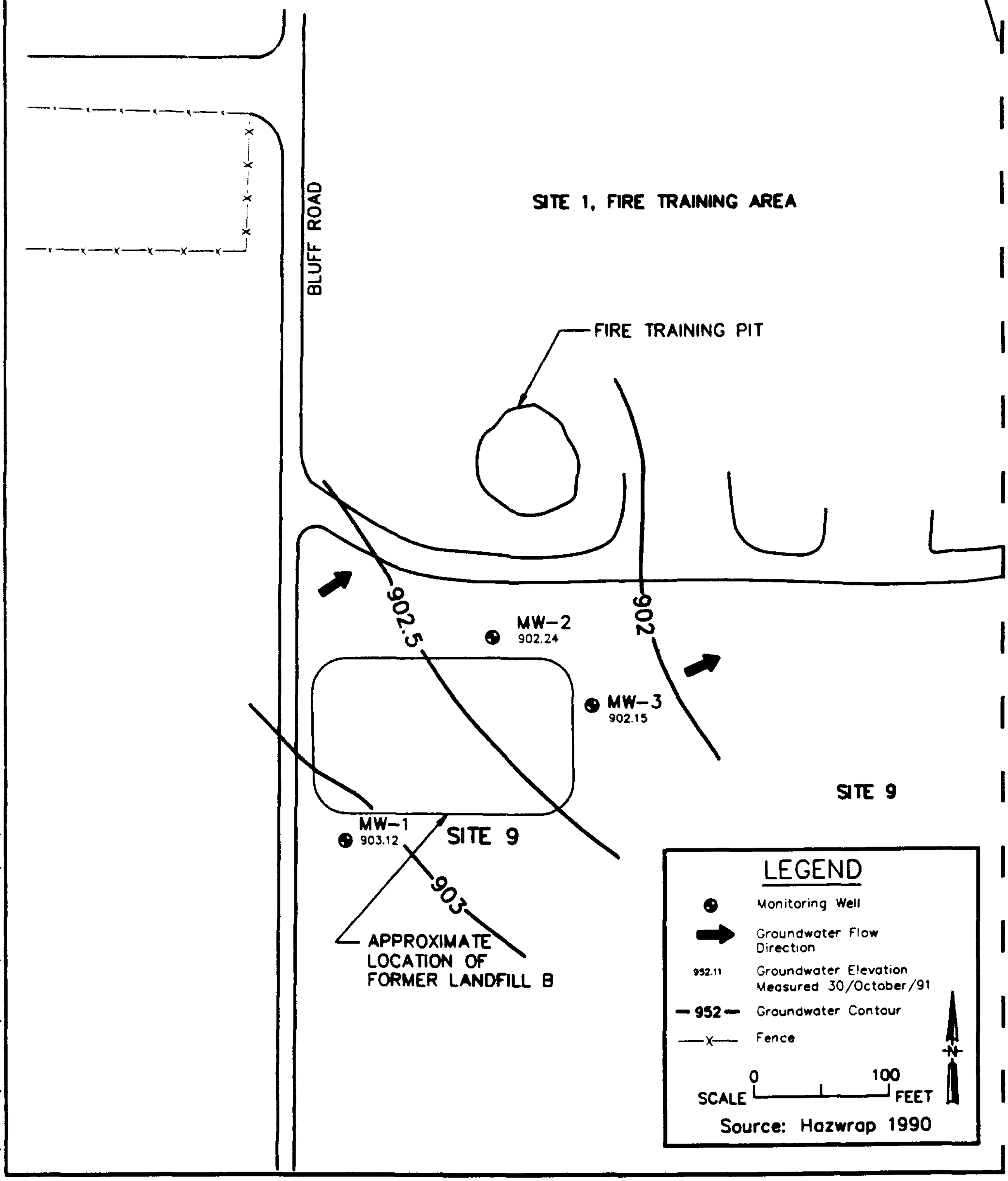


ES ENGINEERING-SCIENCE

SITE 9, FORMER LANDFILL B

GROUNDWATER CONTOUR MAP, 30 OCTOBER 1991

VOLK FIELD ANGB, WI



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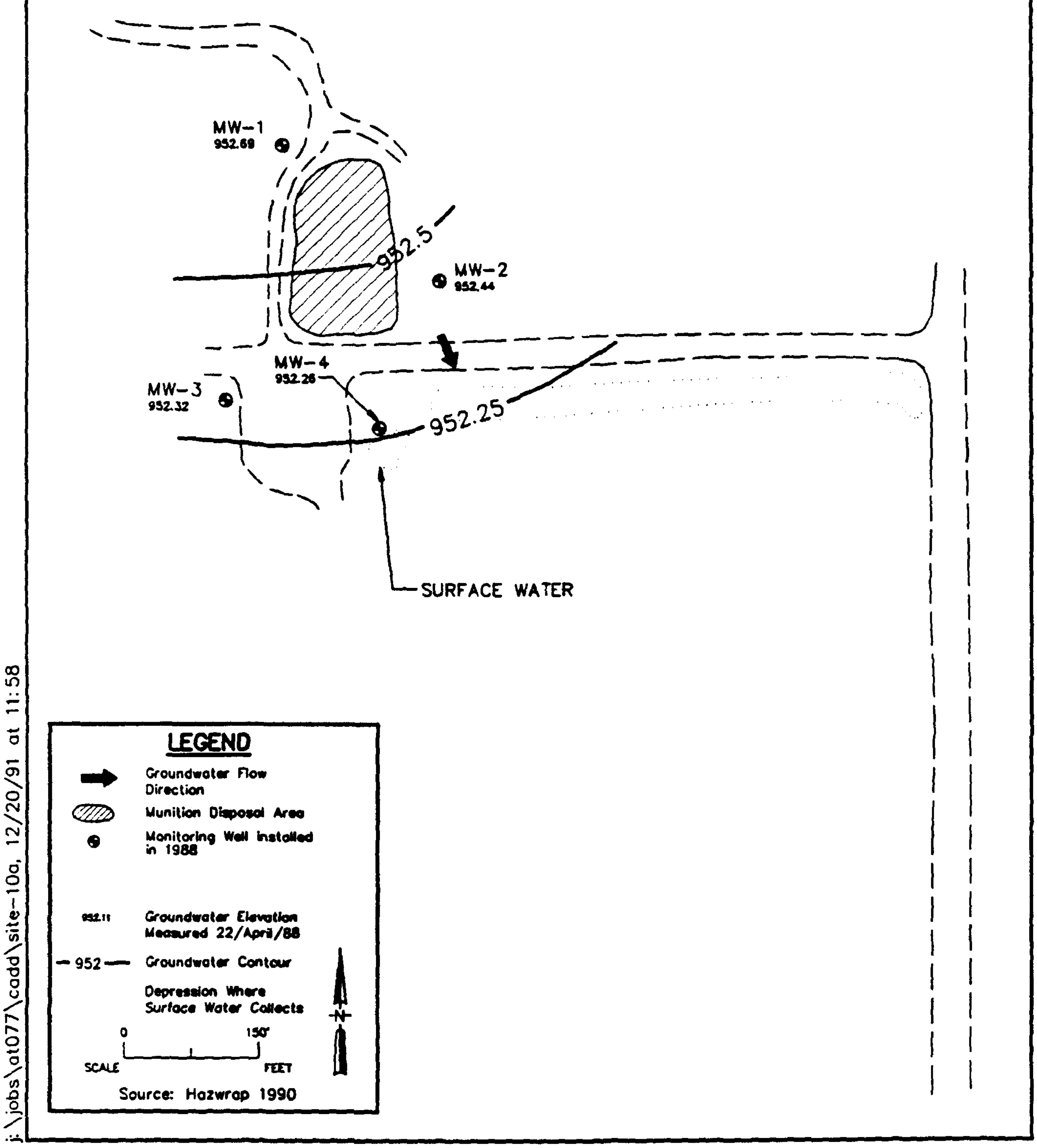
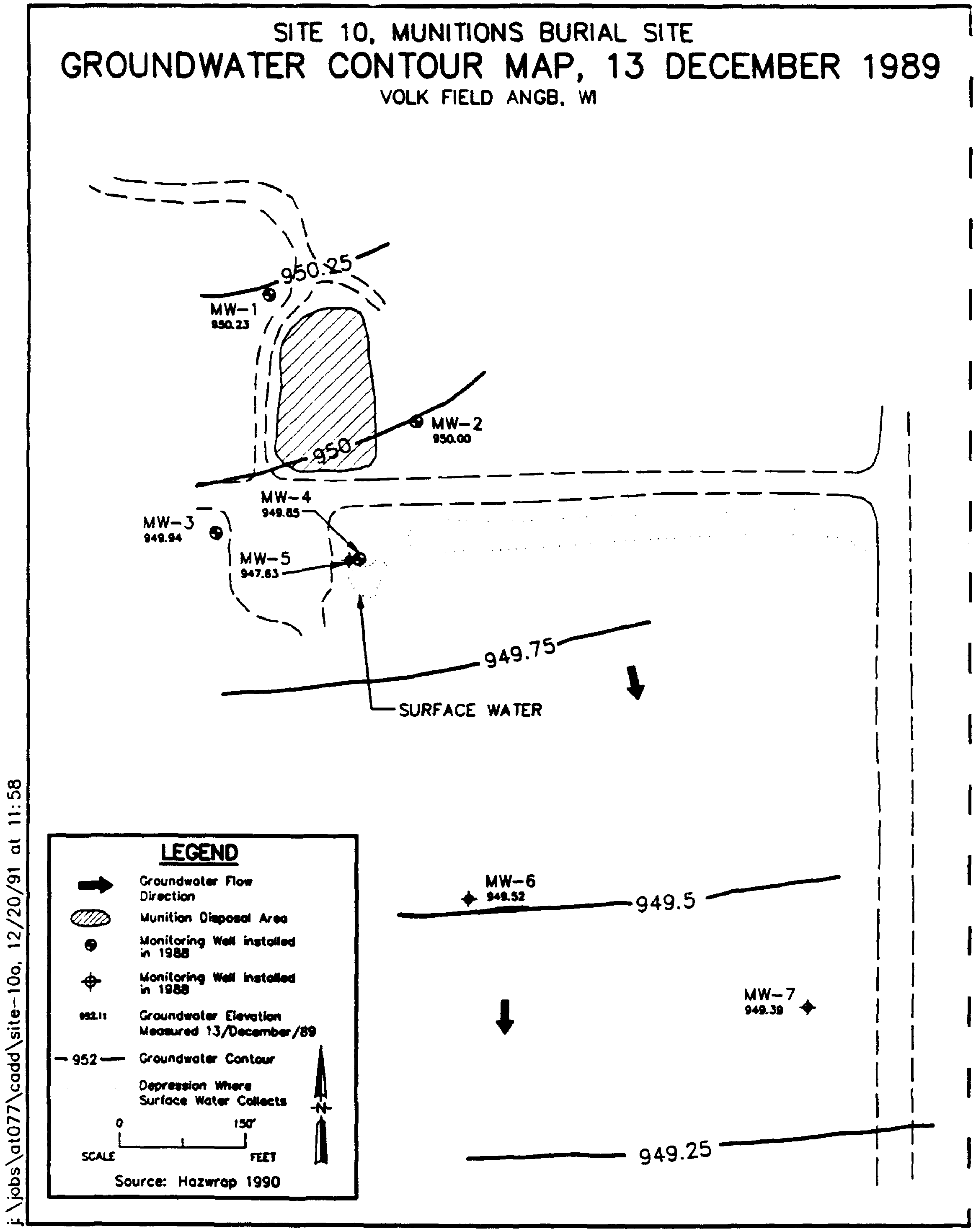
ENGINEERING-SCIENCE

SITE 10, MUNITIONS BURIAL SITE
GROUNDWATER CONTOUR MAP, 22 APRIL 1988
VOLK FIELD ANGB, WI

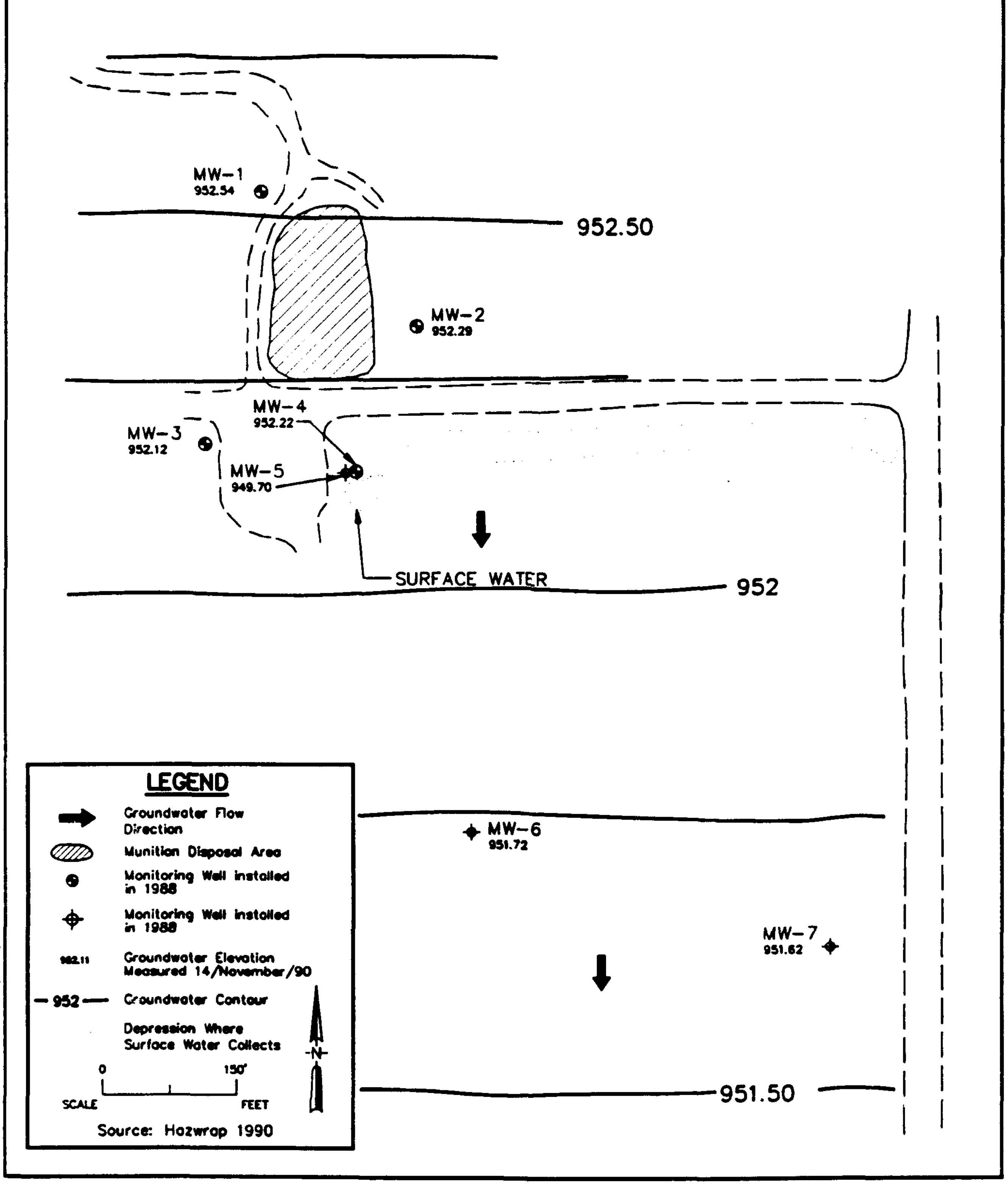


ENGINEERING-SCIENCE

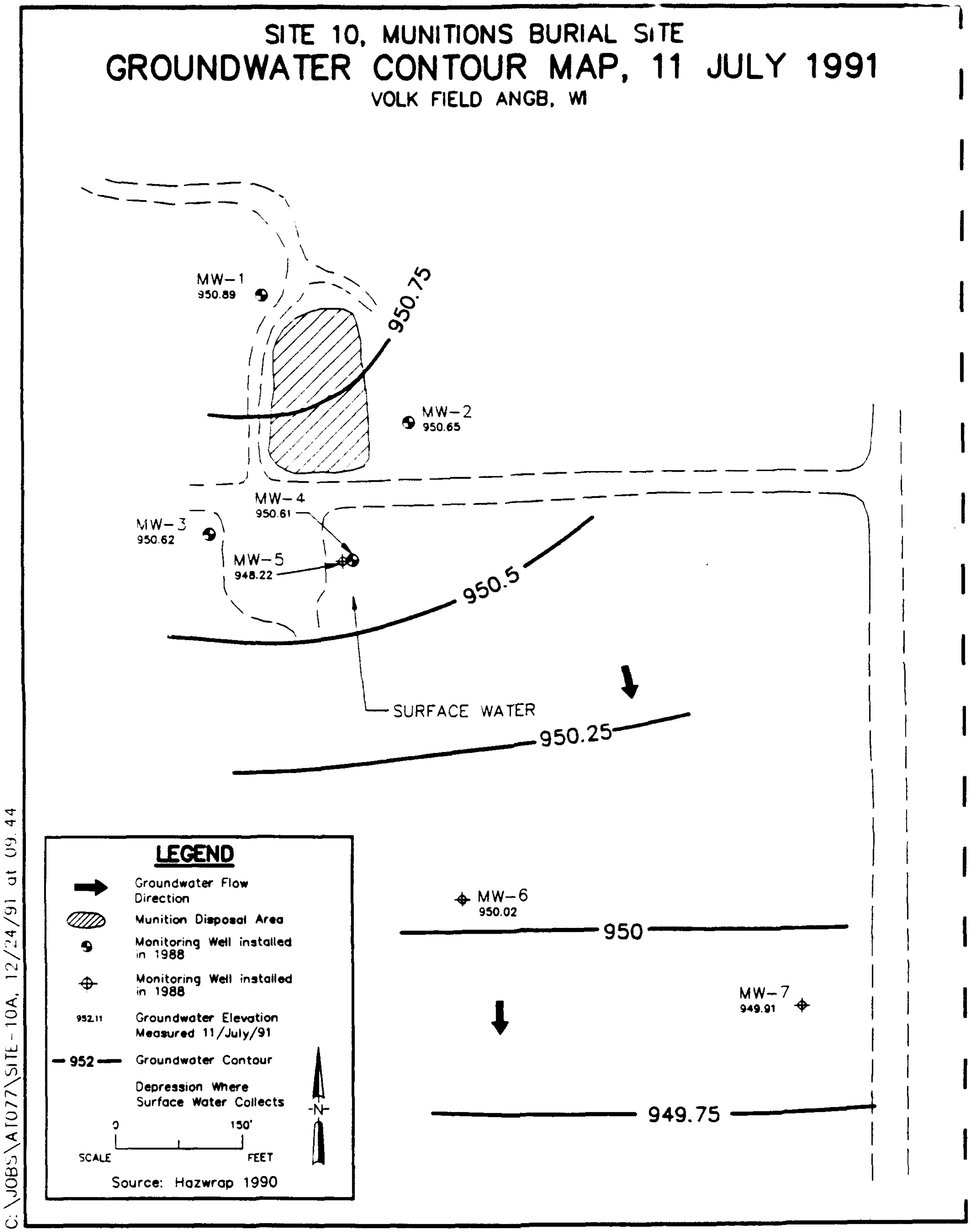


ES ENGINEERING-SCIENCE

SITE 10, MUNITIONS BURIAL SITE
GROUNDWATER CONTOUR MAP, 14 NOVEMBER 1990
VOLK FIELD ANGB, WI



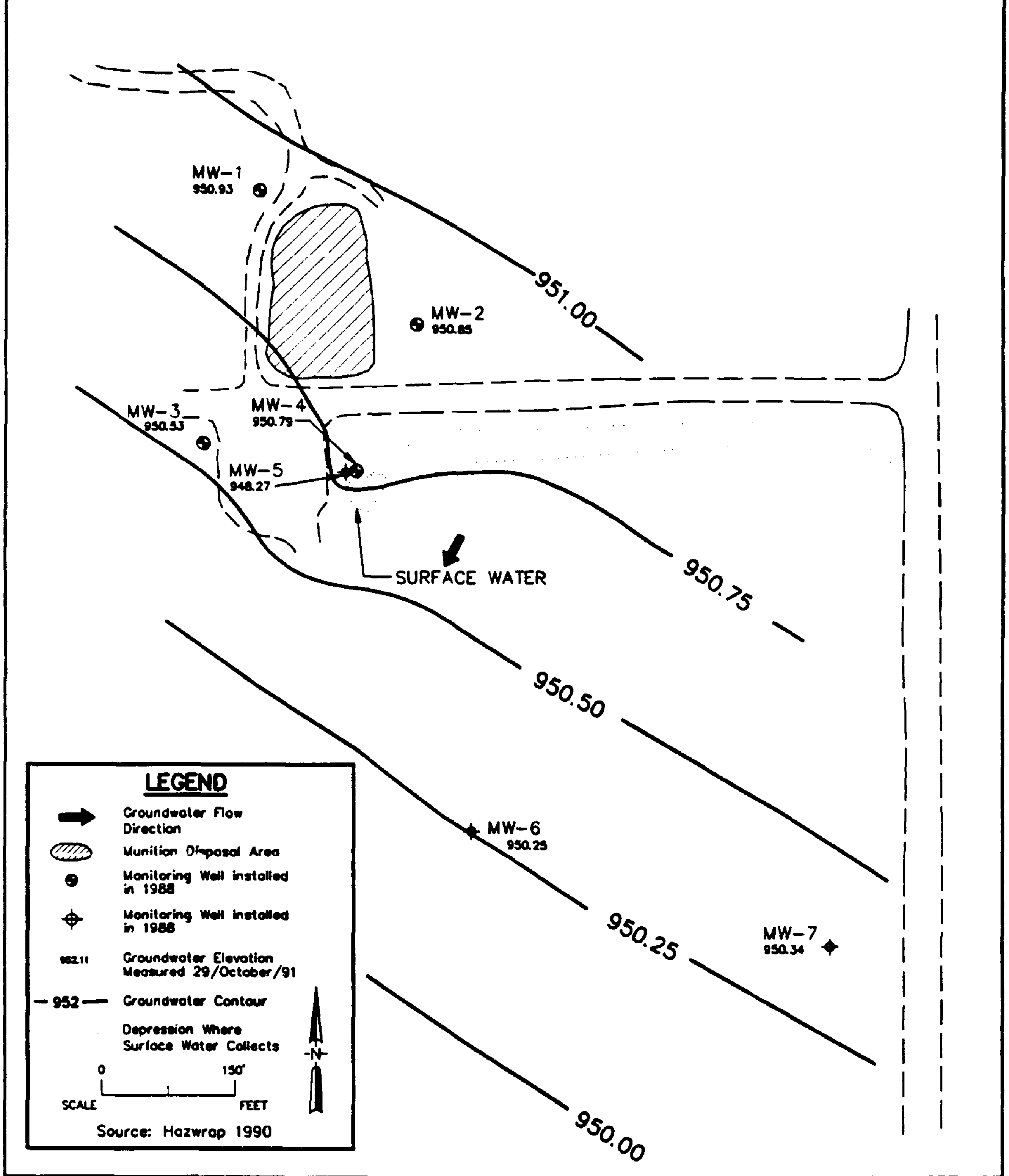
ENGINEERING-SCIENCE


SITE 10, MUNITIONS BURIAL SITE
GROUNDWATER CONTOUR MAP, 11 JULY 1991
VOLK FIELD ANGB, WI
MW-1
950.89
950.75
MW-2
950.65
MW-4
950.61
MW-3
950.62
MW-5
948.22
950.5
SURFACE WATER
950.25
MW-6
950.02
950
MW-7
949.91
949.75
LEGEND
Groundwater Flow Direction
Munition Disposal Area
Monitoring Well installed in 1988
Monitoring Well installed in 1988
952.11
Groundwater Elevation Measured 11/July/91
952
Groundwater Contour
Depression Where Surface Water Collects
N
0
150'
SCALE
FEET
Source: Hazwrap 1990
C:\JOBS\AT077\SITE-10A, 12/24/91 at 09.44
ES ENGINEERING-SCIENCE

SITE 10, MUNITIONS BURIAL SITE

GROUNDWATER CONTOUR MAP, 29 OCTOBER 1991

VOLK FIELD ANGB, WI



AT077\SITE-10A, 02/07/92 at 11:44

APPENDIX C
GEOPHYSICAL SURVEY

APPENDIX C
GEOPHYSICAL SURVEY

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APPENDIX C
GEOPHYSICAL SURVEY

Geophysical surveys were conducted in September 1989 as a part of the Installation Restoration Program Remedial Investigation work at Volk Field Air National Guard Base, Wisconsin. The objectives of these surveys were to supplement geophysical work performed previously at Sites 1 and 9, to locate possible buried munitions at Site 9 and to aid in identifying locations for the placement of soil borings and soil gas sampling probes at Site 9 and the southern part of Site 1.

Geophysical survey techniques that were used included electromagnetic (EM) conductivity and magnetometry. This appendix describes the methodology used in conducting the surveys and presents the field survey results.

METHODOLOGY

Electromagnetic Conductivity Survey

Electromagnetic terrain conductivity profiling is a method for obtaining subsurface information in areas made up of unknown materials. The EM survey was performed using a Geonics Model EM-31 electromagnetic terrain conductivity meter. It measures the terrain conductivity of the earth in millimhos per meter (mmhos/m). The EM-31 meter is effective to a depth of approximately 18 feet (McNeill, 1980). The apparent conductivity of the ground measured by this method is a function of the ability of materials to transmit electrical currents. This ability may be dependent on certain properties such as soil type, porosity, moisture content, soil thickness and in general, the ionic content of subsurface materials. Underground utilities, such as steel pipelines and/or electrical lines and buried metal are also detectable with the EM-31 by the instrument's response with a "zero" meter deflection. A "zero" meter deflection occurs when the apparent conductivity exceeds the full-scale conductivity for the range setting on the instrument.

Magnetic Survey

Magnetic measurements are indicative of variations in the earth's magnetic field. A Geometrics Model G-816/826A Portable Proton Magnetometer, which measures the total intensity of the earth's magnetic field in gammas, was used to obtain field measurements at the sites. The data collected are plotted to form a magnetic contour map which depicts magnetic anomalies present at a site.

Magnetic anomalies will be present where the earth's naturally existing magnetic field has been altered due to the presence of ferromagnetic objects (i.e., drums, pipes, steel reinforcing bars in concrete, etc.) or where the replacement of naturally existing soils with fill of lesser or greater magnetic properties has occurred.

Grid System

The grid system used at Sites 1 and 9 was established at 25-foot intervals to enable adequate coverage for both the EM and magnetic surveys. The beginning or starting point (0,0) of the grid was located 50 feet south and 48 feet west of monitoring well VF9 MW-1 (Figure C.1). The system was laid out in a north-south and east-west pattern, using a compass and a measuring tape. Marker flags were placed in the ground at each grid station and numbered with the appropriate grid coordinates. The data were gathered along the east-west rows, starting at the (0,0) grid station. For purposes of subsequent discussions, specific grid stations are identified by their north-south column number, followed by their east-west row number. For example, (100, 25) denotes the station located at the intersection of column 100 and row 25.

Presentation of Data

The EM and magnetic data were checked for completeness. The data were then computerized to enable the preparation of contour maps. Following completion of data entry, the data files were checked against the raw field data. The data are presented at the end of this appendix in Tables C.1 and C.2.

Contour maps were generated using the SURFER™ software package developed by Golden Software. Areas of anomalous EM and/or magnetic response are identified by distinct contour line patterns on these maps.

FIELD SURVEYS

Electromagnetic Conductivity Survey

EM-31 meter readings in the in-phase mode were recorded at each grid point. The in-phase mode is generally the best instrument mode for locating large metal objects or considerably large aggregates of small metal objects.

Evaluation of the EM data shows values indicative of background measurements range between 5.3 to 5.4 millimhos per meter in the south-central part of the surveyed area, increasing to between 6.5 to 7.0 millimhos per meter in the north-central part of the survey area. The contoured EM data are shown in Figure C.2.

Four EM anomalies were observed during the survey. Two anomalies are related to "zero" measurements and are indicative of buried metal. The actual conductivities at these stations are greater than 10 millimhos per meter, the full-scale deflection for the instrument's range setting used during data acquisition. For contouring purposes, an arbitrary value of 15 was substituted for the "zero" values. These anomalies are located near grid points (225, 225) and (275, 300). Another anomaly surrounding node (125, 125) exhibits higher than background values, ranging between 6.0 and 50.0 millimhos per meter. These higher measurements may be due to scattered small metal objects or other conductive material beneath the station, or to a large metal object nearby. An anomaly consisting of values less than 4 millimhos per meter is located in the vicinity of Site 1. The lower conductivities may be indicative of fuel contamination from the fire training exercises or may be the response due to the 4-inch gravel cover at the Fire Training Area.

Magnetic Survey

Evaluation of the magnetic data shows magnetic values indicative of background readings may range between 57,370 to 57,410 gammas. A natural diurnal variation was present during the survey. The magnitude of the variation was 36 gammas over a period of five hours. Four pronounced high magnetic anomalies and one pronounced low magnetic anomaly were observed at Sites 1 and 9. The contoured magnetic data are presented in Figure C.3.

The magnetic anomaly at grid station (150, 125) exhibits a high value of 57,743 gammas. This suggests the presence of buried ferromagnetic material at or very near this station. The anomaly at station (150, 175) exhibits a high value of 57,676 gammas. However, this station is located about 10 feet south of monitoring well VF9 MW-2 and the steel protective cover of the well may affect this reading. Stations (225, 200) and (275, 275) show high values of 57,794 and 57,771 gammas, respectively and suggest the presence of buried ferromagnetic material. The magnetic anomaly at stations (525, 75) and (525, 50) show low values of 57,002 and 57,061 gammas, respectively. A metal pipe was observed in the ground near these two stations and the anomaly is attributed to this pipe.

Conclusions

The geophysical surveys of Sites 1 and 9 have resulted in the identification of various EM and magnetic anomalies. The outlines of the anomalies are shown on Figure C.4. Three of the magnetic anomalies suggestive of buried ferromagnetic material correlate with EM anomalies suggestive of buried metal. The slight offsets in the location of the magnetic anomalies with respect to the EM anomalies may be attributed to the fact that, in general, magnetic anomalies are not centered over the generating object (Breiner, 1973). Also, EM can respond to non-ferrous, and therefore non-magnetic, metals as well as to ferromagnetic metals. These three anomalies are interpreted as indicating the presence of buried metal objects. The anomaly around grid point (150, 125) corresponds to the suspected location of a buried C-47 aircraft. The anomaly at grid locations (225, 200) and (225, 225) is about 50 feet northwest of the suspected munitions burn pit and may represent the actual location of this pit. The anomaly at grid locations (275, 275) and (275, 300) may be influenced by electrical lines present in the north-central part of the survey grid. However, surrounding stations do not show anomalous readings. Therefore, this anomaly is attributed to buried metal objects.

REFERENCES

Breiner, S., *Applications Manual for Portable Magnetometers*, Geometrics, Sunnyvale, California, 1973.

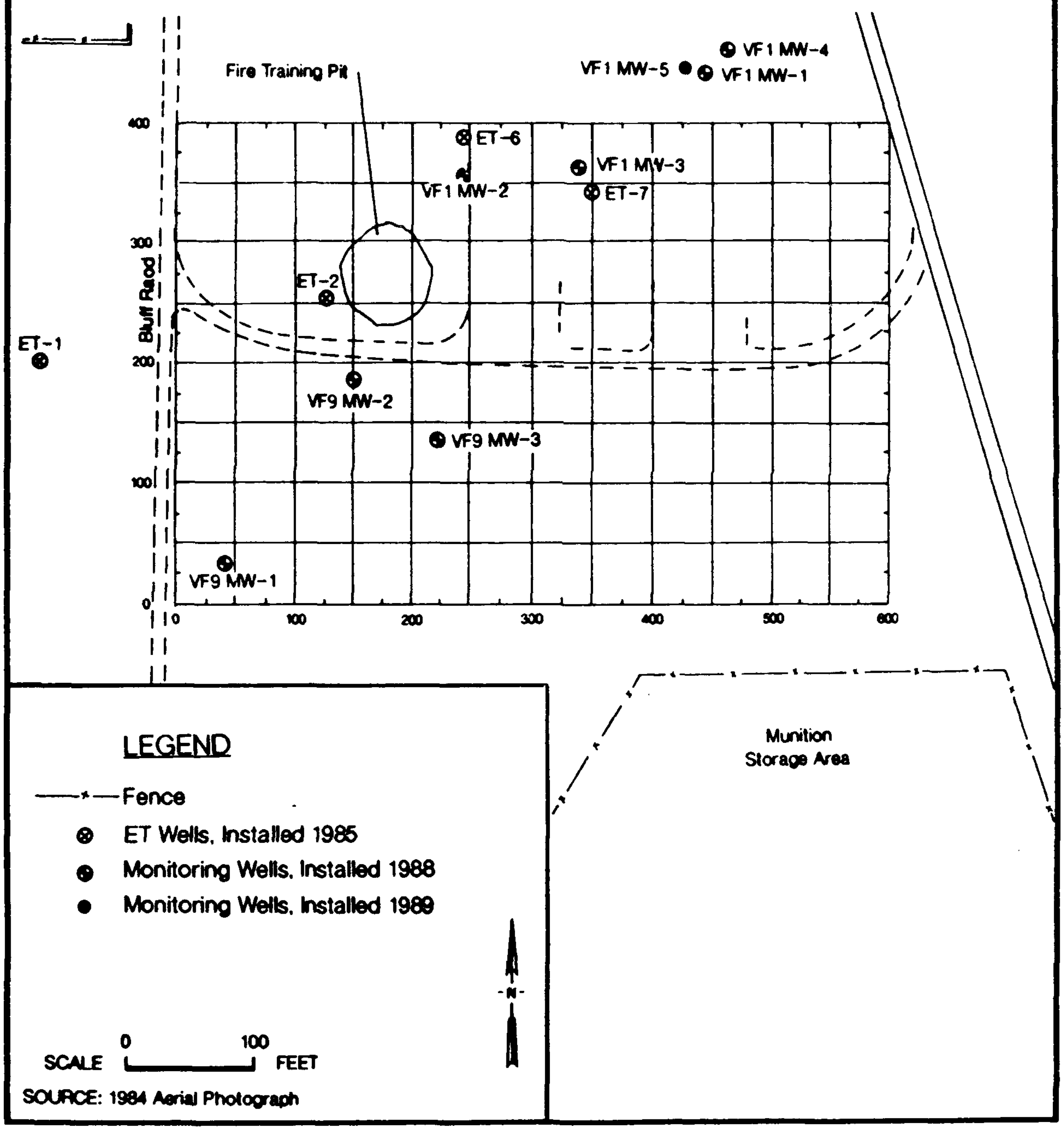
Engineering-Science, Inc., *Site Inspection Report Volk Field Air National Guard Base, Camp Douglas, Wisconsin*, 1989.

Golden Software, Inc., SURFER™ Contour Software, Golden, Colorado.

McNeill, J.D., *Electromagnetic Terrain Conductivity Measurement at Low Induction Numbers*, Geonics Limited Technical Note TN-6, Mississauga, Ontario, Canada, 1980.

GEOPHYSICAL SURVEY GRID
SITE 1 AND SITE 9
VOLK FIELD ANGB, WI

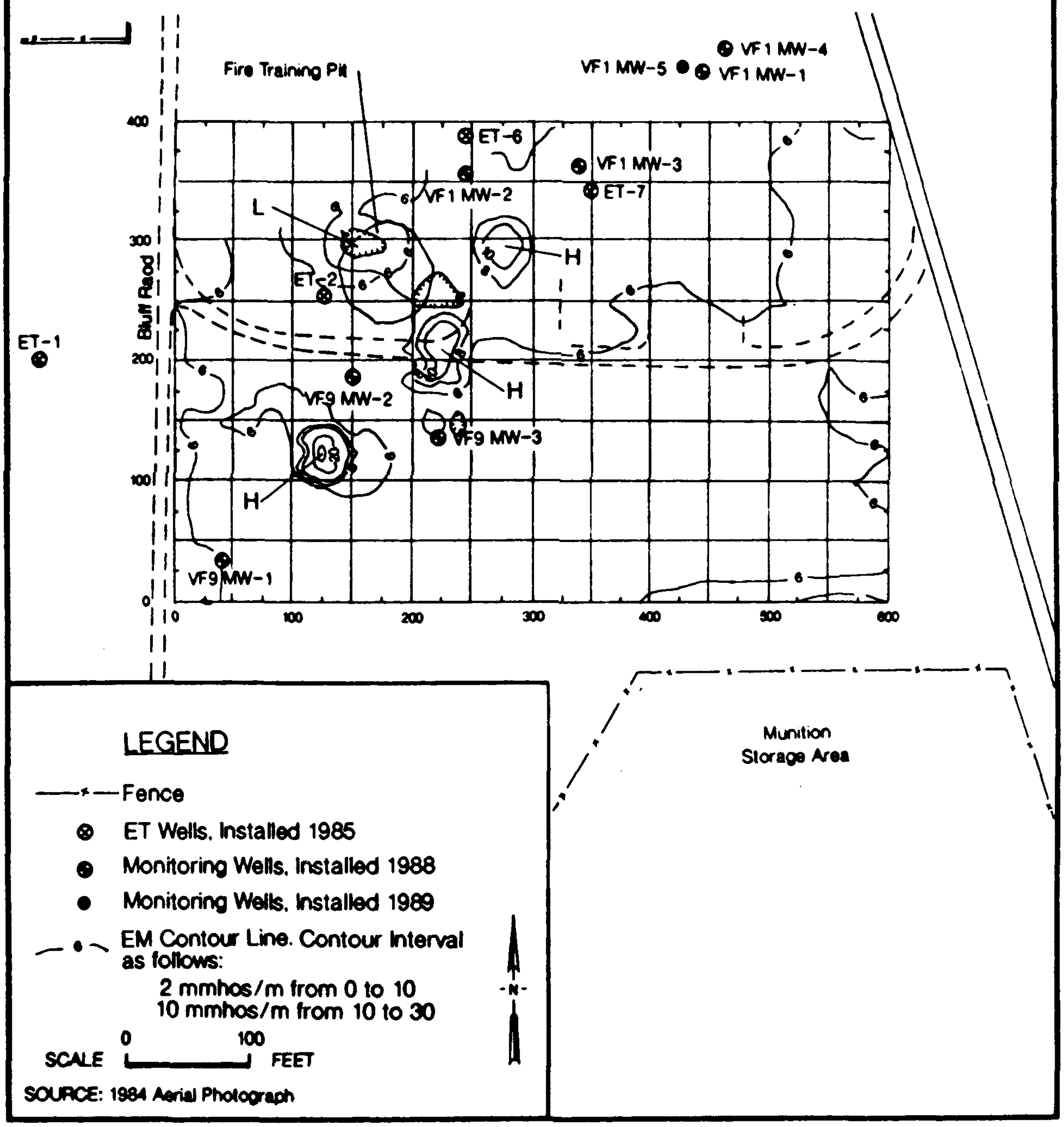
FIGURE C.1



ES ENGINEERING-SCIENCE

EM CONDUCTIVITY SURVEY MAP
SITE 1 AND SITE 9
VOLK FIELD ANGB, WI

FIGURE C.2



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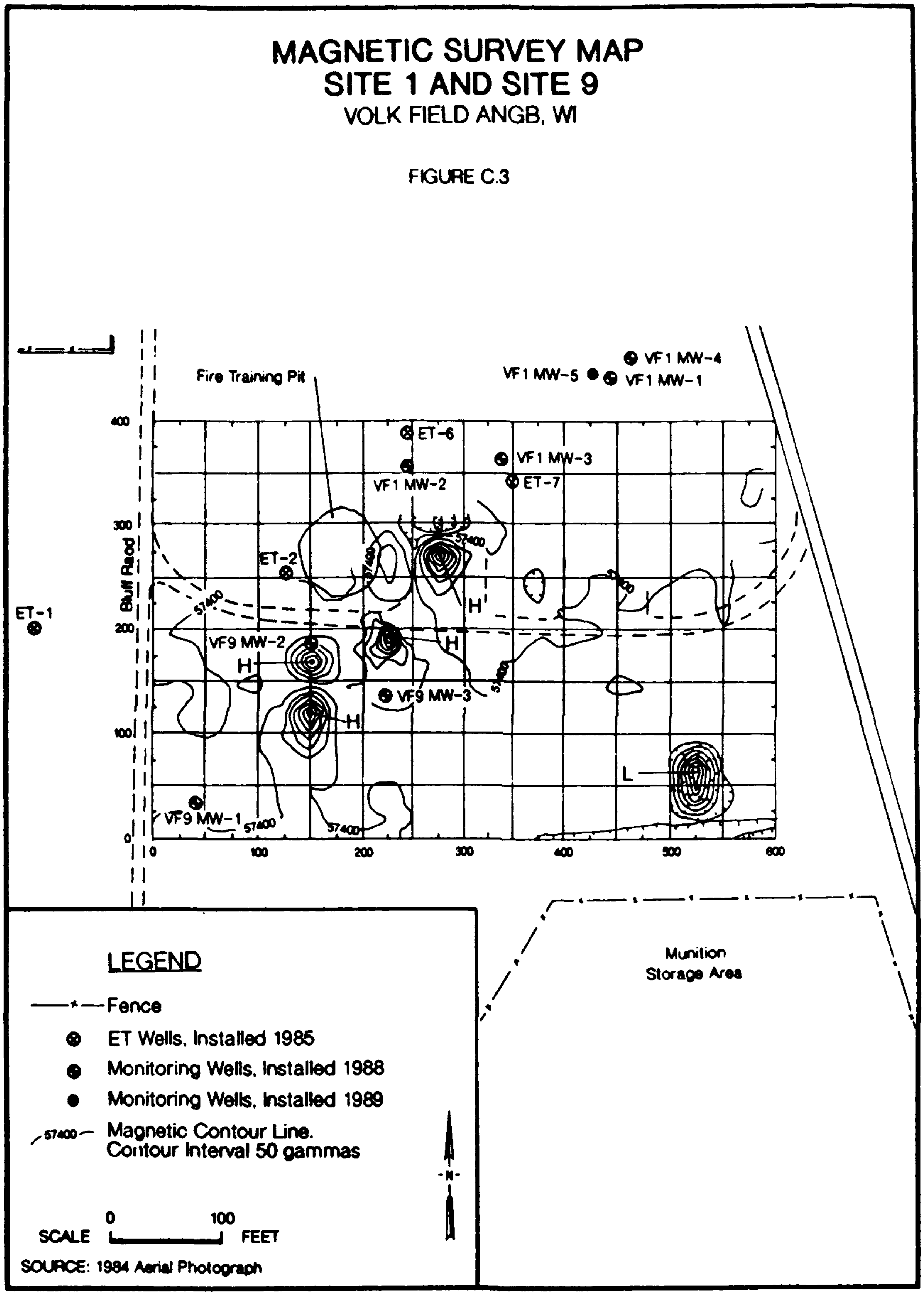

ES ENGINEERING-SCIENCE

GEOPHYSICAL ANOMALY OUTLINE MAP
SITE 1 AND SITE 9
VOLK FIELD ANGB, WI

FIGURE C.4

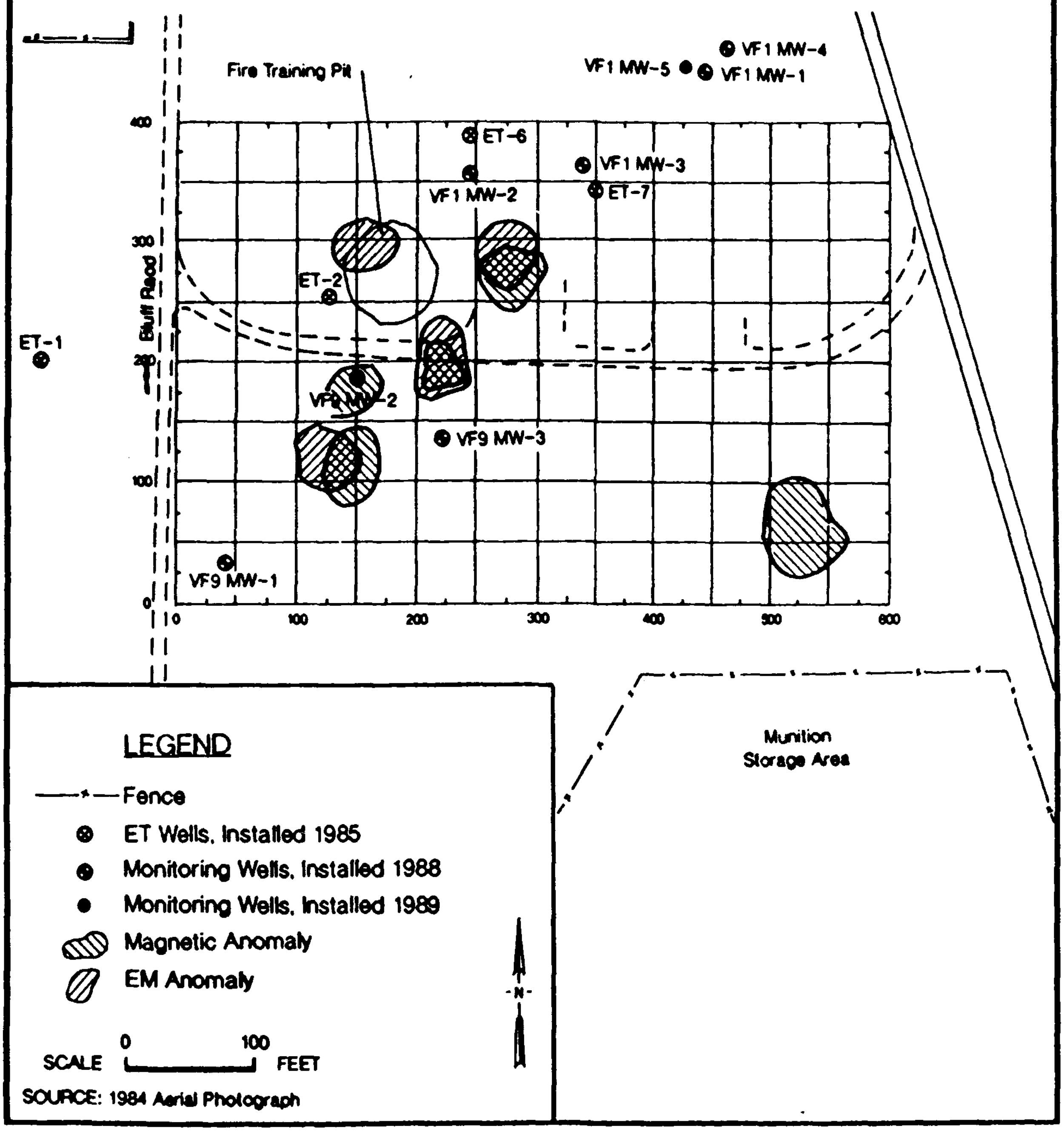

TABLE C.1
SITES 1 AND 9, FIRE TRAINING AREA AND FORMER LANDFILL B
ELECTROMAGNETIC CONDUCTIVITY DATA
VOLK FIELD ANGB, WI

Date: 09/16/89
Instrument: Geonics EM-31, serial no. 86330

Grid Identification Row	Column	Range (millimhos/meter)	Corrected Reading (millimhos/meter)	Comments
0	0	10	6.4/6.4	
0	25	10	7.0+-0.4	
0	50	10	5.4	
0	75	10	5.4	
0	100	10	5.2	
0	125	10	5.2	
0	150	10	5.2	
0	175	10	5.2	
0	200	10	5.2	
0	225	10	5.2	
0	250	10	5.2	
0	275	10	5.2	
0	300	10	5.2	
0	325	10	5.2	
0	350	10	5.4	parallel to fence
0	375	10	5.4	parallel to fence
0	400	10	6.2	parallel to fence
0	425	10	6.6	parallel to fence
0	450	10	7.2	parallel to fence
0	475	10	7.2	
0	500	10	7.4	parallel to fence
0	525	10	8.2	parallel to fence
0	550	10	8.8	
0	575	10	8.8	
0	600	10	8.0	
25	600	10	6.0+-0.4	
25	575	10	5.8+-0.2	
25	550	10	5.6	
25	525	10	5.4	
25	500	10	5.4	
25	475	10	5.4	
25	450	10	5.5+-0.1	
25	425	10	5.4	
25	400	10	5.4	
25	375	10	5.3	
25	350	10	5.3	no longer parallel to fence
25	325	10	5.3	
25	300	10	5.2	
25	275	10	5.2	
25	250	10	5.2	
25	225	10	5.2	
25	200	10	5.2	
25	175	10	5.0	
25	150	10	5.1+-0.1	
25	125	10	5.1	
25	100	10	5.3+-0.1	

TABLE C.1 (cont'd)
SITES 1 AND 9, FIRE TRAINING AREA AND FORMER LANDFILL B
ELECTROMAGNETIC CONDUCTIVITY DATA
VOLK FIELD ANGB, WI

Date: 09/16/89
Instrument: Geonics EM-31, serial no. 86330

Grid Identification Row	Grid Identification Column	Range (millimhos/meter)	Corrected Reading (millimhos/meter)	Comments
25	75	10	5.4	
25	50	10	5.5	
25	25	10	7.0+-1.0	near monitoring well, approach hill
25	0	10	8.0/8.0	east edge of road (bluff)
50	0	10	6.4+-0.1	east edge of road (bluff)
50	25	10	5.8+-0.1	near monitoring well
50	50	10	5.6+-0.1	near monitoring well
50	75	10	5.4	
50	100	10	5.4	
50	125	10	5.3	
50	150	10	5.3	
50	175	10	5.2	
50	200	10	5.4	
50	225	10	5.5	
50	250	10	5.4	
50	275	10	5.3	
50	300	10	5.3	
50	325	10	5.3	
50	350	10	5.3	
50	375	10	5.3	
50	400	10	5.3	
50	425	10	5.4	
50	450	10	5.5	
50	475	10	5.5+-0.1	
50	500	10	5.4	
50	525	10	5.8+-0.4	4 ft from cable in tree
50	550	10	5.4+-0.2	
50	575	10	5.8	near former trailer site
50	600	10	6.0	
75	600	10	6.0+-0.2	
75	575	10	5.9	
75	550	10	5.8+-0.1	former trailer site, near cable in tree
75	525	10	5.4	former trailer site, near cable in tree
75	500	10	5.4	
75	475	10	5.4	
75	450	10	5.4	
75	425	10	5.4	
75	400	10	5.4	
75	375	10	5.3	
75	350	10	5.3	
75	325	10	5.3	
75	300	10	5.3	
75	275	10	4.8/5.4	top of ridge south of site 9
75	250	10	5.3	
75	225	10	5.5	
75	200	10	5.8	site 9 depression
75	175	10	5.8	

TABLE C.1 (cont'd)
SITES 1 AND 9, FIRE TRAINING AREA AND FORMER LANDFILL B
ELECTROMAGNETIC CONDUCTIVITY DATA
VOLK FIELD ANGB, WI

Date: 09/16/89
Instrument: Geonics EM-31, serial no. 86330

Grid Identification Row	Grid Identification Column	Range (millimhos/meter)	Corrected Reading (millimhos/meter)	Comments
75	150	10	5.3	
75	125	10	5.4	
75	100	10	5.4	
75	75	10	5.5	
75	50	10	5.5	
75	25	10	5.8+-0.2	approaching hill of road
75	0	10	6.2/6.2	east edge of Bluff Rd
100	0	10	6.2+-0.1	
100	25	10	5.8/5.8	
100	50	10	5.7+-0.1	
100	75	10	5.7+-0.1	
100	100	10	5.7	
100	125	10	6.0	
100	150	10	6.6	lowest point of site 9
100	175	10	6.0	
100	200	10	5.8	
100	225	10	5.6	
100	250	10	5.5	
100	275	10	5.4	
100	300	10	5.4	
100	325	10	5.3	
100	350	10	5.3	
100	375	10	5.3	
100	400	10	5.4	
100	425	10	5.3	
100	450	10	5.5+-0.1	climbing hill to Bluff Rd
100	475	10	5.5	climbing hill to Bluff Rd
100	500	10	5.5	
100	525	10	5.6+-0.1	
100	550	10	6.0+-0.2	former trailer site
100	575	10	6.0+-0.1	
100	600	10	6.2+-0.2	
125	600	10	6.0+-0.2	
125	575	10	5.9+-0.1	
125	550	10	5.8+-0.1	
125	525	10	5.6	
125	500	10	5.3	
125	475	10	5.4+-0.2	
125	450	10	5.4+-0.1	
125	425	10	5.3	
125	400	10	5.4	
125	375	10	5.3	
125	350	10	4.8/5.0	heading into site 9 landfill
125	325	10	5.4	heading into site 9 landfill
125	300	10	5.4	heading into site 9 landfill
125	275	10	5.4	heading into site 9 landfill
125	250	10	5.4	heading into site 9 landfill

TABLE C.1 (cont'd)
SITES 1 AND 9, FIRE TRAINING AREA AND FORMER LANDFILL B
ELECTROMAGNETIC CONDUCTIVITY DATA
VOLK FIELD ANGB, WI

Date: 09/16/89
Instrument: Geonics EM-31, serial no. 86330

Grid Identification Row	Column	Range (millimhos/meter)	Corrected Reading (millimhos/meter)	Comments
125	225	10	5.5	about 6 ft from monitoring well
125	200	10	5.7	in a site 9 low spot
125	175	10	6.1	in the lowest point of site 9
125	162	10	6.7/6.8	lowest spot of site 9
125	150	30	9.0/9.0	in a site 9 low spot
125	148	3/30	0.0/4.5	
125	138	30/3	10.0/2.5	in a site 9 low spot
125	136	100	50.0/28.0	in a site 9 low spot
125	125	100	38.0/28.0	in a site 9 low spot
125	112	30	7.0/7.0	
125	100	10	6.0/6.4	climbing site 9 (S) ridge
125	87	10	5.2	
125	75	10	5.7	
125	62	10	5.9+-0.1/5.3	
125	50	10	5.9+-0.1	
125	25	10	5.8	climbing hill to Bluff Rd
125	12	10	6.2	climbing hill to Bluff Rd
125	0	10	6.2	
125	-12	10	5.8	25 ft west of grid
150	0	10	6.2	east of Bluff Rd
150	12	10	5.7	
150	25	10	5.8	
150	50	10	6.2/5.7	
150	60	10	4.8	
150	62	10	6.8	
150	75	10	5.7	
150	100	10	6.1	
150	125	10	6.5+-0.1	
150	137	10	6.0	
150	150	10	5.0	
150	162	10	5.7	
150	175	10	5.5/4.2	
150	200	10	5.6/5.6	
150	212	10	6.2/6.2	about 25 ft from monitoring well
150	225	10	6.3/6.3	about 10 ft from monitoring well
150	237	3/10	2.1/2.6	
150	250	10	5.5/5.5	
150	275	10	5.5/5.5	
150	300	10	5.3	
150	325	10	5.3	
150	350	10	5.3	
150	375	10	5.3	
150	400	10	5.4	
150	425	10	5.3	
150	450	10	5.3	
150	475	10	5.4+-0.1	
150	500	10	5.4	

TABLE C.1 (cont'd)
SITES 1 AND 9, FIRE TRAINING AREA AND FORMER LANDFILL B
ELECTROMAGNETIC CONDUCTIVITY DATA
VOLK FIELD ANGB, WI

Date: 09/16/89
Instrument: Geonics EM-31, serial no. 86330

Grid Identification Row	Grid Identification Column	Range (millimhos/meter)	Corrected Reading (millimhos/meter)	Comments
150	525	10	5.6	south edge former trailer site
150	550	10	6.0+—0.2	south edge former trailer site
150	575	10	6.2+—0.2	
150	600	10	6.0+—0.2	
150	625	10	5.3	
175	625	10	5.6	
175	600	10	6.0+—0.2	
175	575	10	6.0	
175	550	10	6.1+—.1	over an old gravel pile
175	525	10	5.8	
175	500	10	5.5	
175	475	10	5.5	about 50 ft off and parallel to FTA
175	450	10	5.5	
175	425	10	5.4	
175	400	10	5.4	
175	375	10	5.4	
175	350	10	5.5	
175	325	10	5.5	
175	300	10	5.6	
175	275	10	5.6	
175	250	10	5.6	
175	225	10	5.7	
175	200	10	5.6	
175	175	10	5.8	
175	150	10	5.8	about 8 ft away from MW-2
175	125	10	5.8	
175	100	10	6.1	lush grass area— moisture
175	75	10	6.1	
175	50	10	5.2/5.4	
175	55	10	6.1	about 2 ft away from lush grass
175	37	10	6.4/6.4	
175	25	10	6.6	
175	0	10	6.4	east of Bluff Rd
175	-15	10	5.8	middle of Bluff Rd., off grid
200	0	10	6.3/6.4	
200	25	10	5.8	
200	0	10	6.0/6.0	after lunch recheck
200	25	10	5.6	after lunch recheck
150	25	10	5.7+—0.1	after lunch recheck
200	50	10	5.5	
200	75	10	5.5	
200	100	10	5.7/5.5	approaching MW-2
200	125	10	5.5	
200	150	10	5.4	about 15 ft from MW-2
200	175	10	5.4	about 12 ft off FTA road and parallel
200	200	10	5.4	about 12 ft off FTA road and parallel
200	212	10	6.9/6.4	west of east edge of FTA

TABLE C.1 (cont'd)
SITES 1 AND 9, FIRE TRAINING AREA AND FORMER LANDFILL B
ELECTROMAGNETIC CONDUCTIVITY DATA
VOLK FIELD ANGB, WI

Date: 09/16/89

Instrument: Geonics EM-31, serial no. 86330

Grid Identification Row	Column	Range (millimhos/meter)	Corrected Reading (millimhos/meter)	Comments
200	214	10	0.0/0.0	south of electric pole
192	225	10	6.4	
194	225	3	0.0	
200	235	10	7.4/6.4	zero reading up to this location
200	250	10	5.5+-0.1	
200	275	10	5.1	
200	300	10	5.4	
200	325	10	5.6/5.6	
200	350	10	5.6	
200	375	10	5.5+-0.2	
200	400	10	5.2	
200	425	10	5.3	
200	450	10	5.5+-0.1	
200	475	10	5.5+-0.1	
200	500	10	5.8	
200	525	10	5.0+-0.2	north of former trailer site
200	512	10	6.0/5.0	
200	550	10	6.0+-0.2	
200	575	10	5.7+-0.2	
200	600	10	5.4+-0.4	
225	600	10	5.6+-0.4	
225	575	10	5.8+-0.2	
225	550	10	6.0+-0.2	south edge of FTA road
225	525	10	5.9+-0.1	
225	500	10	5.9+-0.2	
225	475	10	5.8	
225	450	10	5.7	on FTA road
225	425	10	5.7+-0.1	on FTA road
225	400	10	5.7+-0.1	on FTA road
225	375	10	6.3+-0.2	on FTA road
225	350	10	6.5+-0.1	on FTA road
225	325	10	7.0	on FTA road
225	300	10	6.8	on FTA road
225	275	10	6.1	on FTA road
225	250	10	6.2	
225	225	10	0.0	south of electric pole
225	200	10	5.8	
225	175	10	5.8	
225	150	10	5.5	on FTA road across from FTA
225	125	10	5.5	
225	100	10	5.6	
225	75	10	5.7	south of FTA road
225	50	10	5.8	
225	25	10	5.8	
225	0	10	6.1/6.1	east of Bluff Rd
250	0	10	6.0	south of FTA and Bluff Rd
250	25	10	5.9	

TABLE C.1 (cont'd)
SITES 1 AND 9, FIRE TRAINING AREA AND FORMER LANDFILL B
ELECTROMAGNETIC CONDUCTIVITY DATA
VOLK FIELD ANGB, WI

Date: 09/16/89
Instrument: Geonics EM-31, serial no. 86330

Grid Identification Row	Column	Range (millimhos/meter)	Corrected Reading (millimhos/meter)	Comments
250	50	10	5.8	near concrete pad
250	75	10	5.7	near barrels and concrete pad
250	100	10	5.8	near PW-1
250	125	10	5.7	near ET-2 over PVC scrap
250	150	10	5.7	east edge of FTA
250	175	10	5.9	south edge and middle of FTA
250	200	10	6.0	near electric pole
250	225	10	4.8	next to electric pole
250	250	10	6.5	near electric pole
250	275	10	6.9	
250	300	10	6.3	
250	325	10	6.3+-0.1	
250	350	10	6.2+-0.1	
250	375	10	5.8+-0.1	
250	400	10	5.8+-0.1	near former dirt pile
250	425	10	5.7+-0.1	near former dirt pile
250	450	10	6.0+-0.2	west edge of former dirt pile
250	475	10	6.2+-0.2	south edge of former dirt pile middle
250	500	10	6.0+-0.2	
250	525	10	6.0+-0.2	edge of former dirt pile
250	550	10	5.8+-0.4	middle of FTA road
250	575	10	6.0+-0.2	south of FTA road
250	600	10	5.8+_0.2/5.8+-0.2	
250	630	10	6.0+-0.4	edge of blacktop road
275	600	10	6.0+-0.2	south of FTA road
275	575	10	5.8+-0.2	north of FTA road
275	550	10	5.5+-0.1	
275	525	10	5.6	
275	500	10	6.1	
275	475	10	6.5	
275	450	10	6.8	middle of former dirt pile
275	425	10	6.1	west edge of former dirt pile
275	400	10	6.1	
275	375	10	6.3	
275	350	10	6.6	approaching electrical wire
275	325	10	6.5	approaching electrical wire
275	300	10	7.1	approaching electrical wire
275	275	10	9.0	very close to wire
275	250	10	7.0	under wire "f" next to pole
275	225	10	6.0	approaching east edge FTA
275	200	10	6.2	approaching east edge FTA
275	175	10	6.0	middle of FTA burn pit
275	150	10	6.2	near RF pad
275	125	10	6.2	
275	100	10	5.5	north of PW-1
275	75	10	6.0	north of barrels on concrete pad
275	50	10	6.0	

TABLE C.1 (cont'd)
SITES 1 AND 9, FIRE TRAINING AREA AND FORMER LANDFILL B
ELECTROMAGNETIC CONDUCTIVITY DATA
VOLK FIELD ANGB, WI

Date: 09/16/89
Instrument: Geonics EM-31, serial no. 86330

Grid Identification Row	Column	Range (millimhos/meter)	Corrected Reading (millimhos/meter)	Comments
275	25	10	6.8	north of FTA road
275	0	10	6.4	
300	0	10	6.0	east of Bluff Rd
300	25	10	6.3	
300	50	10	5.9	
300	75	10	5.4	on plastic liner of lagoon
300	100	10	6.4	about 5 ft south of lagoon
300	125	10	6.2	edge of FTA
300	150	10	2.4	on RF pad
300	175	10	3.5	
300	200	10	6.4	near FTA, ET, MW, wire
300	225	10	6.5	near electric wire
300	250	10	8.1	below electric wire
300	275	10	0.0	below electric wire
300	300	10	7.4	about 10 ft south of electric wire
300	325	10	6.7	
300	350	10	6.7	
300	375	10	6.3	
300	400	10	6.3	
300	425	10	7.0+–0.2	west edge of former dirt pile
300	450	10	6.6	middle of former dirt pile
300	475	10	7.4/7.4	middle of former dirt pile
300	500	10	6.4+–0.4	east edge of former dirt pile
300	525	10	5.8	
300	550	10	5.6+–0.2	
300	575	10	5.6+–0.2	
300	600	10	5.6+–0.2	center of road
325	600	10	5.8+–0.2	
325	575	10	5.4+–0.1	
325	550	10	5.5	
325	525	10	5.9+–0.1	
325	500	10	6.3+–0.1	east edge of former dirt pile
325	475	10	7.2	middle of dirt pile
325	462	10	7.8/7.8	middle of dirt pile
325	450	10	7.0	west edge former dirt pile
325	425	10	7.0	
325	400	10	6.6	approach overhead power line
325	375	10	6.7	approach overhead power line
325	350	10	6.7	approach overhead power line
325	325	10	7.0	under overhead power line
325	300	10	7.0	under overhead power line
325	275	10	7.2	west of power line
325	250	10	7.0	west of power line
325	225	10	6.5	north of FTA burn pit
325	200	10	6.2	
325	175	10	6.8	West of FTA
325	150	10	5.8	west of RF pad

TABLE C.1 (cont'd)
SITES 1 AND 9, FIRE TRAINING AREA AND FORMER LANDFILL B
ELECTROMAGNETIC CONDUCTIVITY DATA
VOLK FIELD ANGB, WI

Date: 09/16/89
Instrument: Geonics EM-31, serial no. 86330

Grid Identification Row	Column	Range (millimhos/meter)	Corrected Reading (millimhos/meter)	Comments
325	125	10	6.4	btn RF pad and lagoon
350	150	10	5.5	
350	175	10	5.6	north of FTA
350	200	10	5.7	
350	225	10	6.4	approach power line
350	250	10	6.6	approaching power line
350	275	10	6.8	approaching power line
350	300	10	6.8	approaching power line
350	325	10	6.8	approaching power line
350	350	10	6.8	under power line
350	375	10	6.8	east of power line
350	400	10	6.8	east of power line
350	425	10	6.8	east of power line
350	450	10	7.0	north edge former dirt pile
350	475	10	6.5+-0.1	north edge former dirt pile
350	500	10	6.0	northeast corner former dirt pile
350	525	10	5.6	
350	550	10	5.8+-0.2	
350	575	10	5.8+-0.2	
375	575	10	5.7+-0.1	west of blacktop road
375	550	10	5.7+-0.1	
375	525	10	5.8+-0.1	
375	500	10	6.0	north of former dirt pile
375	475	10	6.4/6.4	north of former dirt pile
375	450	10	6.8	
375	425	10	6.8	approach power line
375	400	10	6.8	under power line
375	375	10	6.5	northwest of power line
375	350	10	6.4	northwest of power line
375	325	10	6.7	about 6 ft west of MW-3
375	287	10	4.8	
375	300	10	6.3	
375	275	10	6.0	
400	275	10	5.4	
400	300	10	5.8	
400	325	10	6.0	
400	350	10	6.4/6.4	
400	375	10	6.4	approach power line
400	400	10	7.0+-0.2	approach power line
400	425	10	6.8	approach power line
400	450	10	6.8	
400	475	10	6.4+-0.1	
400	500	10	6.3+-0.1	
400	525	10	6.0+-0.2	
400	550	10	5.9	
400	575	10	6.2	west edge of blacktop road

TABLE C.2
SITES 1 AND 9, FIRE TRAINING AREA AND FORMER LANDFILL B
MAGNETOMETER DATA
VOLK FIELD ANGB, WI

Date: 09/17/89
Instrument: GeoMetrics G-816/826A

Grid Identification Row	Grid Identification Column	Traverse Direction	Sensor Orientation (compass heading)	Time (24-hr clock)	Reading gammas)	Comment
Base Station			N	0945	57373	
Base Station			N		57373	
Base Station			N		57374	
Base Station			N		57374	
Base Station			E		57375	
Base Station			S		57372	
Base Station			W		57373	
Base Station			N		57373	
0	0	west to east	N		57406	
0	25				57405	
0	50				57402	
0	75				57404	
0	100				57403	
0	125				57401	
0	150				57404	
0	175				57401	
0	200				57401	
0	225				57401	
0	250				57399	
0	275				57397	
0	300				57394	
0	325	west to east	N	1000	57388	
0	350				57375	25 ft northwest of fence
0	375				57342	50 ft north of fence
0	400				57334	50 ft north of fence
0	425				57335	50 ft north of fence
0	450				57326	50 ft north of fence
0	475				57318	50 ft north of fence
0	500				57311	30 ft north of fence
0	525				57317	30 ft north of fence
0	550				57301	30 ft north of fence
0	575				57265	30 ft N fence & near trailer area
0	600				57241	30 ft N fence & near trailer area
25	600	east to west		1007	57356	40 ft N fence & near trailer area
25	575				57360	40 ft north of fence
25	550				57356	50 ft north of fence
25	525				57352	50 ft north of fence
25	500				57368	
25	475				57373	50 ft north of fence
25	450				57374	50 ft north of fence
25	425				57375	50 ft north of fence
25	400				57377	
25	375	east to west	N	1020	57382	
25	350				57387	
25	325				57393	

TABLE C.2 (cont'd)
SITES 1 AND 9, FIRE TRAINING AREA AND FORMER LANDFILL B
MAGNETOMETER DATA
VOLK FIELD ANGB, WI

Date: 09/17/89
Instrument: GeoMetrics G-816/826A

Grid Identification Row	Grid Identification Column	Traverse Direction	Sensor Orientation (compass heading)	Time (24-hr clock)	Reading gammas)	Comment
25	300				57395	
25	275				57396	
25	250				57400	
25	225				57400	on top of slope
25	200				57399	
25	175				57399	
25	150				57401	
25	125				57400	
25	100				57399	
25	75				57395	
25	50				57399	25 ft southeast of MW-1
25	25				57409	25 ft southwest of MW-1
25	0				57399	on road ed.
50	0	west to east	N	1037	57398	on road ed.
50	25				57360	25 ft northwest of MW-1
50	50				57358	25 ft north of MW-1
50	75				57394	
50	100				57397	
50	125	west to east	N	1040	57401	
50	150				57400	
50	175				57399	
50	200				57397	scooped out of hill
50	225				57413	slope
50	250				57392	top of rise
50	275				57393	
50	300				57390	
50	325				57387	
50	350				57396	
50	375				57381	
50	400				57390	
50	425				57378	
50	450				57377	
50	475				57371	
50	500				57357	near pipe
50	525				57061	adjacent pipe
50	550				57333	near pipe
50	575				57371	trailer area
50	600				57367	
75	600	east to west	N	1047	57373	trailer area
75	575				57373	trailer area
75	550				57357	trailer area
75	525				57002	near pipe
75	500				57360	
75	475				57380	
75	450				57384	

TABLE C.2 (cont'd)
SITES 1 AND 9, FIRE TRAINING AREA AND FORMER LANDFILL B
MAGNETOMETER DATA
VOLK FIELD ANGB, WI

Date: 09/17/89
Instrument: GeoMetrics G-816/826A

Grid Identification Row	Column	Traverse Direction	Sensor Orientation (compass heading)	Time (24-hr clock)	Reading gammas)	Comment
75	425				57385	
75	400				57386	
75	375				57388	
75	350				57388	
75	325				57390	
75	300				57390	
75	275				57392	
75	250				57390	low area
75	225				57383	
75	200				57392	
75	175				57400	
75	150				57410	
75	125				57403	
75	100				57397	
75	75	east to west	N	1100	57391	
75	50				57390	
75	25				57391	
75	0				57397	
100	0	west to east			57394	
100	25				57395	
100	50				57395	
100	75				57395	
100	100				57396	
100	125				57453	
100	150				57560	
100	175				57393	
100	200				57399	
100	225				57390	
100	250				57391	
100	275				57391	
100	300				57391	
100	325				57385	
100	350				57394	
100	375				57384	
100	400				57382	
100	425				57378	
100	450	west to east	N	1107	57397	
100	475				57378	
100	500				57368	
100	525				57366	trailer area
100	550				57377	
100	575				57371	trailer area
100	600				57376	trailer area
125	600	east to west	N	1109	57378	trailer area
125	575				57378	trailer area

TABLE C.2 (cont'd)
SITES 1 AND 9, FIRE TRAINING AREA AND FORMER LANDFILL B
MAGNETOMETER DATA
VOLK FIELD ANGB, WI

Date: 09/17/89
Instrument: GeoMetrics G-816/826A

Grid Identification		Traverse	Sensor Orientation (compass	Time (24-hr	Reading	Comment
Row	Column	Direction	heading)	clock)	gammas)	
125	550				57377	
125	525				57377	
125	500				57380	
125	475				57384	
125	450				57384	
125	425				57384	
125	400				57387	
125	375				57388	
125	350				57387	
125	325				57388	
125	300				57389	
125	275				57387	
125	250	east to west	N	1121	57398	
125	225				57386	
125	200				57379	
125	175				57365	
125	150				57743	
125	125				57426	
125	100				57383	
125	75				57396	
125	50				57417	
125	25				57400	
125	0				57395	
Base Station			N	1130	57387	
Base Station			E		57389	
Base Station			S		57387	
Base Station			W		57387	
Base Station			N	1240	57396	
Base Station			E		57394	
Base Station			S		57394	
Base Station			W		57395	
100	0		N		57397	
100	25				57400	
100	50				57398	
100	75				57397	
100	100				57400	
0	0				57397	
0	25				57396	
0	50				57395	
0	75				57395	
0	100				57396	
150	0	west to east	N	1156	57396	
150	25				57378	
150	50				57422	
150	75				57399	

TABLE C.2 (cont'd)
SITES 1 AND 9, FIRE TRAINING AREA AND FORMER LANDFILL B
MAGNETOMETER DATA
VOLK FIELD ANGB, WI

Date: 09/17/89
Instrument: GeoMetrics G-816/826A

Grid Identification Row	Column	Traverse Direction	Sensor Orientation (compass heading)	Time (24-hr clock)	Reading gammas)	Comment
150	100				57405	
150	125				57351	
150	150				57346	
150	175				57399	
150	200				57403	
150	225				57483	12 ft south of MW-3
150	250				57401	
150	275	west to east	N	1300	57397	
150	300				57398	
150	325				57406	
150	350				57392	
150	375				57395	
150	400				57391	
150	425				57393	
150	450				57404	
150	475				57400	
150	500				57398	
150	525				57383	trailer area
150	550				57400	trailer area
150	575				57385	trailer area
150	600		N	1305	57386	trailer area
175	600	east to west			57386	trailer area
175	575				57388	trailer area
175	550				57392	trailer area
175	525				57394	
175	500				57394	
175	475				57395	
175	450				57395	
175	425	east to west	N	1310	57396	
175	400				57397	
175	375				57397	
175	350				57400	
175	325				57400	
175	300				57400	
175	275				57398	
175	250				57403	
175	225				57414	
175	200				57388	
175	175				57398	
175	150				57676	north of MW-2 10 ft
175	125				57387	
175	100				57392	
175	75				57392	
175	50				57393	
175	25				57437	

TABLE C.2 (cont'd)
SITES 1 AND 9, FIRE TRAINING AREA AND FORMER LANDFILL B
MAGNETOMETER DATA
VOLK FIELD ANGB, WI

Date: 09/17/89
Instrument: GeoMetrics G-816/826A

Grid Identification Row	Column	Traverse Direction	Sensor Orientation (compass heading)	Time (24-hr clock)	Reading gammas)	Comment
175	0				57402	
200	0	west to east	N	1329	57403	
200	25				57398	
200	50				57390	
200	75	west to east	N	1333	57390	
175	12				57454	
200	100				57391	
200	125				57381	near MW-2
200	150				57360	south of MW-2
200	175				57390	
200	200				57385	
200	225				57794	
200	212				57481	
187	212				57548	
187	225				57653	
212	225				57342	
212	237				57360	
200	237				57392	
200	250				57383	
200	275				57401	
200	300				57405	
200	325				57401	
200	350				57402	
200	375				57400	
200	400				57402	
200	425	west to east	N	1343	57401	
200	450				57399	
200	475				57397	
200	500				57395	
200	525				57392	Trailier Area
200	550				57399	Trailier Area
200	575				57399	Trailier Area
200	600				57399	Trailier Area
225	600	east to west			57392	Trailier Area
225	575				57388	Trailier Area
225	550				57403	Trailier Area
225	525				57393	Trailier Area
225	500				57395	
225	475				57400	
225	450				57400	
225	425				57399	
225	400				57399	
225	375				57402	
225	350				57401	
225	325				57404	

TABLE C.2 (cont'd)
SITES 1 AND 9, FIRE TRAINING AREA AND FORMER LANDFILL B
MAGNETOMETER DATA
VOLK FIELD ANGB, WI

Date: 09/17/89
Instrument: GeoMetrics G-816/826A

Grid Identification Row	Column	Traverse Direction	Sensor Orientation (compass heading)	Time (24-hr clock)	Reading gammas)	Comment
225	300				57400	
225	275	east to west	N	1350	57404	
225	250				57391	
225	225				57382	
225	200				57390	
225	175				57393	
225	150				57396	
225	125				57397	
225	100				57397	
225	75				57396	
225	50				57400	
225	25				57402	
225	0				57407	
225	-25				57405	
Base Station			N	1400	57399	
Base Station			E		57399	
Base Station			S		57398	
Base Station			W		57398	
250	175	west to east			57416	
250	200				57393	
250	150				57400	
250	225				57453	poles
250	250	west to east	N	1407	57393	
250	275				57493	
250	300				57421	
250	325				57416	
250	350				57403	
250	375				57395	
250	400				57414	
250	425				57399	
250	450				57398	
250	475				57403	
250	500				57400	
250	525				57398	
250	550				57401	
250	575				57398	
250	600				57397	
275	600	east to west	N	1510	57397	
275	575				57396	
275	550				57402	
275	525				57403	
275	500				57404	
275	475				57404	
275	450	east to west	N	1412	57406	
275	425				57403	

TABLE C.2 (cont'd)
SITES 1 AND 9, FIRE TRAINING AREA AND FORMER LANDFILL B
MAGNETOMETER DATA
VOLK FIELD ANGB, WI

Date: 09/17/89
Instrument: GeoMetrics G-816/826A

Grid Identification Row	Column	Traverse Direction	Sensor Orientation (compass heading)	Time (24-hr clock)	Reading gammas)	Comment
275	400				57405	
275	375				57405	
275	350				57402	
275	325				57400	7 flashes on battery
275	300				57474	
275	275				57771	pole
275	250				57363	pole
275	225				57493	pole
275	200				57388	pole
300	200	west to east	N	1418	57352	pole
300	225				57388	pole
300	250				57300	pole
300	275				57241	
300	300				57342	
300	325				57393	
300	350				57403	
300	375				57408	
300	400				57415	
300	425				57410	
300	450	east to west	N	1420	57408	
300	475				57409	
300	500				57407	
300	525				57405	
300	550				57404	
300	575				57405	
300	600				57402	
325	600	west to east	N		57402	
325	575				57399	
325	550				57402	
325	525				57404	
325	500				57404	
325	475				57405	
325	450				57404	
325	425				57403	
325	400				57405	
325	375				57402	
325	350				57416	
325	325				57404	
325	300					
325	275					
350	400	west to east	N		57405	
350	425				57413	
350	450				57409	
350	475				57407	
350	500				57405	

TABLE C.2 (cont'd)
SITES 1 AND 9, FIRE TRAINING AREA AND FORMER LANDFILL B
MAGNETOMETER DATA
VOLK FIELD ANGB, WI

Date: 09/17/89
Instrument: GeoMetrics G-816/826A

Grid Identification Row	Grid Identification Column	Traverse Direction	Sensor Orientation (compass heading)	Time (24-hr clock)	Reading gammas)	Comment
350	525				57405	
350	550				57406	
350	575				57399	
375	575	east to west		1430	57404	
375	550				57417	
375	525				57419	
375	500				57407	
375	475				57417	
375	450				57420	
375	425				57410	
375	400				57414	
375	375				57403	
375	350				57419	
400	350	west to east			57420	
400	375				57401	
400	400				57455	
400	425				57404	
400	450				57410	
400	475				57421	
400	500				57423	
400	525				57421	
400	550				57406	
400	575				57404	
450	550				57463	
field					59870	
field					57389	
Base Station			N	1445	57409	
Base Station			E		57410	
Base Station			S		57410	
Base Station			W		57410	

APPENDIX D
SOIL GAS SURVEY ANALYSIS

APPENDIX D
SOIL GAS SURVEY

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APPENDIX D
SOIL GAS SURVEY

Engineering-Science conducted soil gas surveys at Volk Field Air National Guard Base from September 29 through October 11, 1989. The surveys were conducted at the Fire Training Area (Site 1) and the KC-97 Cras' Site (Site 5). The objectives of the survey were to:

- define the potential source areas of volatile organic compounds (VOCs)
- aid in the selection of optimal locations for new soil borings and monitoring wells

This appendix includes a summary of the methods used in the collection and analysis of soil gas and headspace samples followed by a discussion of the results obtained at each location.

PROCEDURES

Procedures used during the soil gas surveys are presented in this subsection. A Photovac 10S50 portable gas chromatograph (GC) was used for on-site analysis of soil gas and headspace samples. The Photovac 10S50 was equipped with a 9 meter capillary column (CPSil-5CB) and a 1 meter precolumn/backflush system. The detector was a 10.6 eV photoionization detector capable of detecting trichloroethene (TCE)at concentrations less than 5 parts per billion (ppb) and most aromatic hydrocarbons at concentrations less than 10 ppb.

Calibration

Both commercial and field standards were used for the initial and continuous calibration of the gas chromatograph. The commercially prepared standard, Matheson Gas, includes 1,1-dichlorethene (1,1-DCE), 1,2-dichloroethene (1,2-DCE) and TCE at 1 parts per million (ppm) each. TCE was included in the calibration gas because it is believed TCE had been burned at the Fire Training Area; the dichloroethenes were included because they are normal degradation products of TCE. All three compounds are regulated by the State and Federal government in drinking water supplies. In addition, field standards were prepared for three common fuel constituents, benzene, toluene and o-xylene, due to their suspected presence and governmental regulation. Benzene, toluene and o-xylene standards were prepared by diluting vapor from the headspace above a volume of pure liquid. The vapor pressures were calculated using Antoine's Equation and a table of constants.

$$\log P = A - B / (T + C)$$

where:

A, B and C are constants of the pure liquid

T is the temperature

P is the vapor pressure

A three point calibration curve was performed for each standard compound prior to sampling to insure the instrument had not been damaged in transit. This also provided information on the validity of the subsequent analytical data. Regression analysis of the calibration curves yielded excellent coefficients of correlation, $r^2 > 0.990$, indicating a high degree of linearity. Percent relative standard deviation, a measure of precision, was well below the 25 unit control limit for all standards.

1, 1-DCE	$r^2 = 0.9999$	%RPD = 13.6
1, 2-DCE	$r^2 = 0.9989$	%RPD = 11.6
TCE	$r^2 = 0.9990$	%RPD = 9.5
Benzene	$r^2 = 0.9999$	%RPD = 10.4
Toluene	$r^2 = 0.9994$	%RPD = 12.1
Xylene	$r^2 = 0.9918$	%RPD = 9.8

The instrument can respond to concentrations below 5 ppb; however, based on the standard deviations computed from a triplicate standard run and field experience, quantities below 30 ppb were considered to be estimated concentrations. A "J" flag was used to indicate a concentration was estimated. As an additional check on the lower limits of instrument response, a commercially prepared 10 ppb standard of benzene (Scott Speciality Gases) was analyzed following the initial calibration procedure. The concentration calculated from the benzene calibration curve exceeded the theoretical concentration by 9.52%. When this was added as a fourth point to the calibration curve for benzene, the coefficient of correlation fell slightly from $r^2 = 0.9999$ to $r^2 = 0.9970$, but was well within the $r^2 > 0.990$ limits.

Continuous calibration of the gas chromatograph was performed before and after every sample group or a minimum of four times throughout the day.

Blank Analysis

An instrument blank, syringe blank, sample train assembly blank and water blank were run at instrument startup. The instrument blank was an injection of high purity (Ultra Zero Grade) air and was used to gauge instrument stability, flow balance and column contamination. The syringe blank was an injection of ambient air used as an indication of background contamination as well as a check on the syringe decontamination procedure. The probe blank was used to measure possible sample train assembly contamination. The water blank was a GC headspace analysis of each new lot of distilled water used for decontaminating the probe assembly. Analysis results were used to verify the decontamination rinse water was free of interfering volatile organic compounds.

Decontamination

After each sample, the probe assembly was dismantled and decontaminated. The procedure included an industrial detergent wash, a water rinse and a final rinse with analyzed distilled water.

Computational Procedure

Benzene, toluene, o-xylene, 1,1-DCE, 1,2-DCE, TCE and total hydrocarbons concentrations were reported for field samples. The identification and quantification of the standard compounds in the field samples were accomplished directly, by the method of external standards. The response factors for the first and last standards were averaged for each target compound and the average response factor was used to quantify the remaining samples. Some values for chlorinated compounds are reported with an "N" flag. The "N" flag means "presumptive evidence" and is an indication of the relative uncertainty of identifying a single compound in the presence of a complex mixture of petroleum products. Values reported for Total Hydrocarbons (TH) were the sum of all peak responses in millivolt-seconds from the retention time of benzene through the retention time of o-xylene, with the exception of identified chlorinated compounds. The result was quantified using the response factor of toluene and the final concentration was used as a measure of sample contamination by petroleum hydrocarbons and/or unidentified compounds.

Sampling Procedures

Soil gas samples were collected using a hardened steel probe inserted mechanically into the soil to a depth of 2.5 to 7.5 feet, but not below the water table. At the tip of the probe was a detachable well point enabling soil gas to enter the hollow bore when separated from the probe. A Teflon sampling hose was connected to the head of the probe with a stainless steel filling. The probe assembly was connected to a vacuum pump and purged with a minimum of three volumes of soil gas. When purging was completed, the sampling assembly was connected to a Tedlar air sampling bag situated inside a vacuum chamber. The chamber was evacuated and the soil gas sample was collected inside the Tedlar bag.

If saturated soil clogged the probe tip, the sample bag could not reach equilibrium with ambient pressure and the bag would collapse upon releasing the vacuum. This method provided a nonsubjective technique for determining if an authentic soil gas sample had been extracted. When clogging occurred, a sample of soil (approximately 5 g) was collected from the probe tip or a hand augered sample and sealed in a 40 ml volatile organic analysis (VOA) vial. The sample was equilibrated at approximately 35°C and the gases above the sample were analyzed for headspace contamination. The concentrations of contaminants derived from headspace analysis cannot be directly compared to those derived from soil gas, but serve as a relative indication of soil contamination in areas where in-situ soil gas samples cannot be obtained. This technique is referred to as the headspace method. This method was also used when an alternate method of soil gas analysis was desired.

Tedlar bags used for soil gas sampling were supplied by SKC, Inc. and are made of an analytically clean, nonporous polymer designed for high purity gas sampling. Each bag was equipped with a cut-off valve for connection to the probe assembly and a septum for sample withdrawal. Sample gases were withdrawn with a gas-tight syringe and injected into a portable gas chromatograph for analysis.

SITE 1 - FIRE TRAINING AREA

SITE 1 - FIRE TRAINING AREA

The results and conclusions of the soil gas survey conducted at Site 1 are presented in this subsection.

Results

The soil gas survey grid coincides with the grid previously established for the geophysical survey; however, every geophysical survey node was not sampled. The origin of this grid system was established 50 feet south and 48 feet west of monitoring well VF9 MW-1. For purposes of subsequent discussions, specific grid stations are identified by their distance north and east of the origin. For example, VF1SG300,225 denotes the soil gas sample collected at Site 1 300 feet north and 225 feet east of the origin (Figure D.1). Tabulated soil gas survey results have been provided in Table D.1 for Site 1.

The soil at this site consists primarily of hard packed sand on the surface and less densely packed sand at the 4- to 5-foot level. The area of the suspected second burn pit is covered with one to three inches of black peaty soil over the packed sand. No probes were rejected and no buried objects were encountered.

The fire training pit had been investigated by a previous soil gas survey. One test point was placed in the fire training pit during this soil gas survey. This test point, near VF1SG300,225, gave offscale results for a dilute injection that was too concentrated to quantify within the range of the instrument. No other soil gas points were placed in the visible burn pit area or downgradient of the pit.

A total of 84 soil gas points were installed at Site 1 on the grid of 25-foot centers. Eighty-one of the soil gas points were installed at the 5-foot level as indicated on Figure D.1. Vertical profile readings were obtained at locations (VF1SG275,525) and (VFSG275,475).

A total of 59 soil gas points were installed in the area of the suspected second burn pit. A hand augered sample, collected during an earlier investigation from the suspected second burn pit, was analyzed for headspace contamination. A small quantity of toluene, 16 ppb, had been identified in the headspace gases. One of the vertical profiles at this site was performed at the point nearest to the hand auger boring (VF1SG275,475). Samples were taken at the 2.5-, 5.0- and 7.5-foot levels. An additional vertical profile was obtained at (VF1SG275,525). Readings were taken at 2.5 and 5.0 feet. No VOCs were found in the vertical profile samples so the middle, 5-foot level was selected for the horizontal profile. Of the remaining soil gas samples collected in the suspected burn pit area, no volatile organic contamination was detected.

Twenty-one soil gas samples were taken in a horizontal profile near the western and southern (upgradient) borders of the visible burn pit. The southern perimeter of the profile crossed near the area believed to be the former munitions burn pit at points (VF1SG200,175) through (VF1SG200,275). Points (VF1SG200,200) and (VF1SG200,225) were not advanced or sampled due to possible unexploded buried ordinance in this area.

No volatile organic contaminants were detected along the western and southwestern sections of the perimeters, but positive results were detected along the southwestern perimeter for a single chlorinated volatile solvent, trichloroethylene. TCE was identified at 3 points (VF1SG200,250; VF1SG225,275; and VF1SG200,275) adjacent to the former munitions burn pit (Figure D.1). Concentrations ranged from 73 ppb at point VF1SG200,275 to 162 ppb at point VF1SG225,275. A perimeter of non-detect results isolated the positive points in an area approximately 75 feet long and 50 feet wide. As this area is downgradient from the suspected location of the former munitions burn pit, the source may have originated there.

A final horizontal profile of 4 points (VF1SG125,W40 through VF1SG275,W40) was placed along the extreme western side of Site 1 across Bluff Road from the visible fire pit. Soil gas analyses gave negative results for all points along this profile.

Conclusions

Headspace results of the test point collected at the eastern edge of the fire training pit (VF1SG300,225) indicate the fire training pit area is a source for high concentrations of VOCs. This result agrees with the 1987/1988 investigations of the area.

Soil gas results for the second suspected burn pit did not indicate contamination of the shallow vadose zone and did not identify this area as a source area for VOCs.

The soil gas survey identifies a source area of TCE near the suspected munitions burn pit. Higher concentrations could be expected at greater depths if volatilization of TCE in the groundwater is the source of TCE in the soil gas.

volatilization of TCE in the groundwater is the source of TCE in the soil gas. Negative results for the horizontal profile along Bluff Road indicate a source upgradient of the visible burn pit (toward the bluff) is unlikely.

SITE 1, FIRE TRAINING AREA

SOIL GAS SURVEY LOCATIONS AND DETECTIONS

VOLK FIELD ANGB, WI

FIGURE D.1

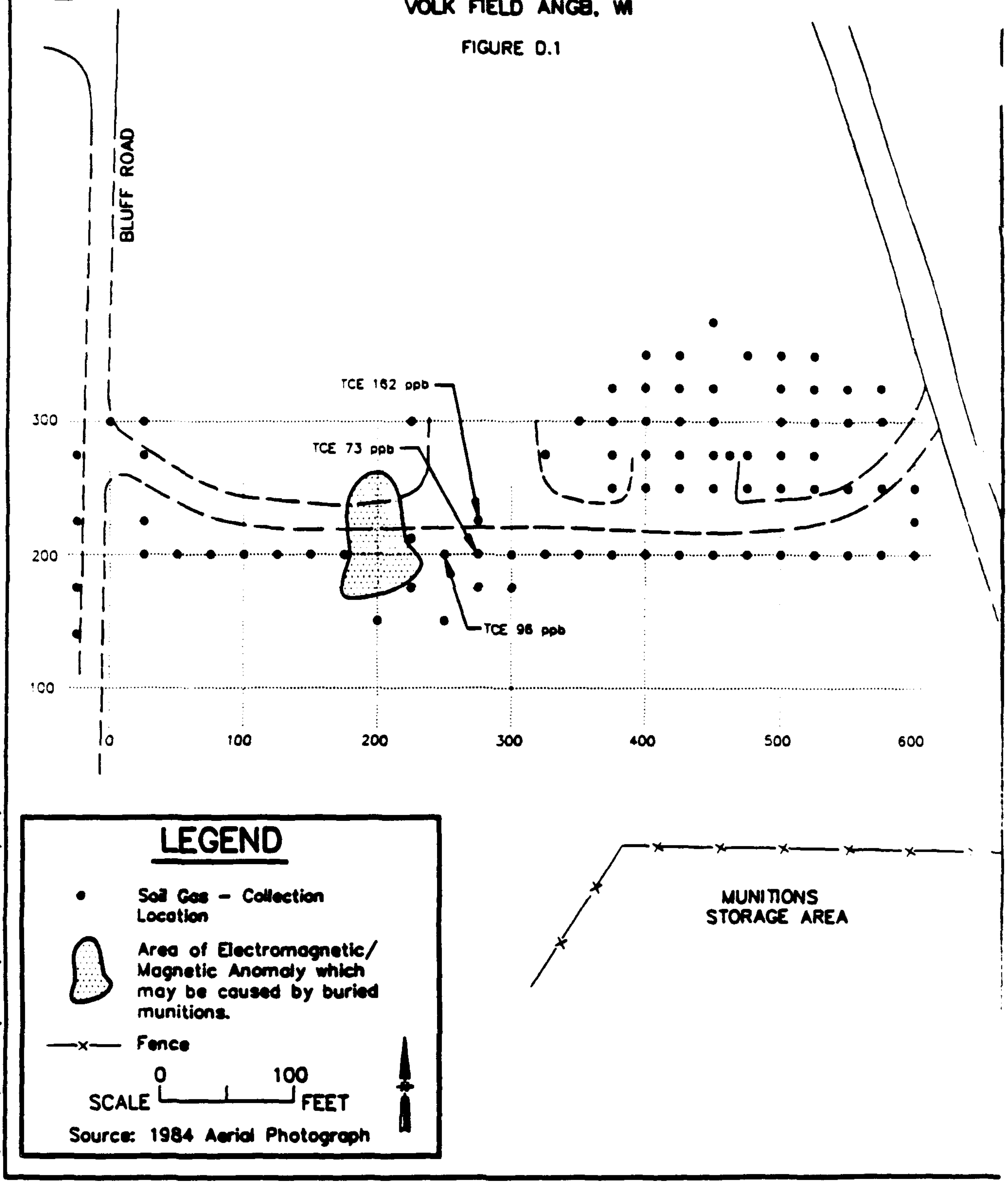


TABLE D.1
SOIL GAS SURVEY DATA
SITE 1 - FIRE TRAINING AREA

Sample #	Depth	Compound Found	Value (ppb)
VF1SG275,525	2.5	-	-
VF1SG275,525	5	-	-
VF1SG275,475	2.5	-	-
VF1SG275,475	5	-	-
VF1SG275,475	7.5	-	-
VF1SG275,425	5	-	-
VF1SG300,500	5	-	-
VF1SG275,500	5	-	-
VF1SG325,500	5	-	-
VF1SG350,500	5	-	-
VF1SG275,450	5	-	-
VF1SG325,525	5	-	-
VF1SG350,525	5	-	-
VF1SG300,525	5	-	-
VF1SG300,550	5	-	-
VF1SG325,550	5	-	-
VF1SG325,575	5	-	-
VF1SG300,575	5	-	-
VF1SG350,475	5	-	-
VF1SG350,425	5	-	-
VF1SG300,400	5	-	-
VF1SG350,400	5	-	-
VF1SG325,400	5	-	-

TABLE D.1 (Continued)
SOIL GAS SURVEY DATA
SITE 1 - FIRE TRAINING AREA

Sample #	Depth	Compound Found	Value (ppb)
VF1SG275,462	5	-	-
VF1SG300,375	5	-	-
VF1SG325,375	5	-	-
VF1SG275,375	5	-	-
VF1SG275,400	5	-	-
VF1SG250,375	5	-	-
VF1SG250,400	5	-	-
VF1SG250,425	5	-	-
VF1SG250,450	5	-	-
VF1SG250,475	5	-	-
VF1SG300,450	5	-	-
VF1SG250,500	5	-	-
VF1SG325,425	5	-	-
VF1SG250,600	5	-	-
VF1SG250,525	5	-	-
VF1SG325,450	5	-	-
VF1SG200,550	5	-	-
VF1SG300,425	5	-	-
VF1SG250,550	5	-	-
VF1SG250,575	5	-	-
VF1SG225,600	5	-	-
VF1SG200,600	5	-	-
VF1SG200,575	5	-	-

TABLE D.1 (Continued)
SOIL GAS SURVEY DATA
SITE 1 - FIRE TRAINING AREA

Sample #	Depth	Compound Found	Value (ppb)
VF1SG200,525	5	-	-
VF1SG200,500	5	-	-
VF1SG200,475	5	-	-
VF1SG200,450	5	-	-
VF1SG200,425	5	-	-
VF1SG200,400	5	-	-
VF1SG200,375	5	-	-
VF1SG200,350	5	-	-
VF1SG200,325	5	-	-
VF1SG200,275	5	TCE	73
VF1SG200,300	5	-	-
VF1SG200,175	5	-	-
VF1SG175,275	5	-	-
VF1SG300,225 HS	5	off scale	> 100,000
VF1SG200,150	5	-	-
VF1SG200,125	5	-	-
VF1SG200,100	5	-	-
VF1SG200,75	5	-	-
VF1SG200,50	5	-	-
VF1SG200,25	5	-	-
VF1SG225,25	5	-	-
VF1SG275,25	5	-	-
VF1SG300,25	5	-	-

TABLE D.1 (Continued)
SOIL GAS SURVEY DATA
SITE 1 - FIRE TRAINING AREA

Sample #	Depth	Compound Found	Value (ppb)
VF1SG300,0	5	-	-
VF1SG275,W40	5	-	-
VF1SG225,W40	5	-	-
VF1SG175,W40	5	-	-
VF1SG125,W40	5	-	-
VF1SG150,250	5	-	-
VF1SG175,300	5	-	-
VF1SG225,275	5	TCE	162
VF1SG375,450	5	-	-
VF1SG300,350	5	-	-
VF1SG275,325	5	-	-
VF1SG212,225	5	-	-
VF1SG150,200	5	-	-
VF1SG200,250	5	TCE	96
VF1SG175,225	5	-	-

HS - Indicates head space analysis.

TCE - Trichloroethylene

SITE 5 - KC97 CRASH SITE

SITE 5 - KC97 CRASH SITE

The results and conclusions of the soil gas survey conducted at Site 5 are presented in this subsection.

Results

A total of 93 soil gas points were installed at Site 5 on a grid of 25-foot centers (Figure D.2). Ninety-two of the soil gas points were installed at the 4- to 5-foot level and one point was installed at 7.5 feet. The grid origin was established and its position was later surveyed. For purposes of subsequent discussion, specific grid stations are identified by their distances north and east of the origin. For example VF5SG75,125 denotes the soil gas sample collected at Site 5 75 feet north and 125 east of the origin. Table D.2 provides a complete list of the Site 5 soil gas results.

Soil at the site is a fine black peat that allows easy penetration and withdrawal of the soil gas probes. No underground obstructions were encountered and no probes were rejected. Sampling of soil gas was somewhat difficult due to the fine peat that clogs the probe point. This was especially true in the low lying sectors where saturated soil was found at 5 feet.

A vertical profile was performed at the center of the area where the release of JP-4 and AVGAS was originally believed to have occurred (VF5SG75,125). The vertical profile sample taken at the 5-foot level was normal, but the sample from the 7.5-foot level contained groundwater. Adjacent points gave water vapor at the 5-foot level. Therefore, the sampling depth was raised to 4 feet.

A total of 31 soil gas points were installed on the eastern portion of the site which is slightly higher in elevation than the rest of the site. The JP-4 and AVGAS spill site was located by the soil gas survey in the southern portion of this elevated area. It covers an area of approximately 6,000 square feet. Seven soil gas points contained total hydrocarbons (TH) in excess of 1,000 ppb (Figure D.3). Benzene, toluene and xylenes in thousands of parts per billion concentrations made up a significant portion of the TH quantities. Quantities of trichloroethene and 1,1-dichloroethene were tentatively identified in 6 of the spill area samples. Concentrations of these compounds in Table D.2 are flagged with an "N" as an indication of the uncertainty of identifying chlorinated compounds in the presence of high concentrations of petroleum products.

A total of 62 points were installed in the low lying area in the western and central sections of the site. o-Xylene was detected at concentrations from 18 to 30,000 ppb (Figure D.4). Toluene was detected in 22 soil gas samples (Figure D.5). Many of the 62 soil gas points had small ill-defined chromatograph peaks. The peaks were not produced by any of the six calibrated standards. The small peaks may have resulted from column contamination, low concentrations of other xylene isomers, naturally occurring compounds in peat bogs or low concentrations of uncalibrated fuel constituents.

Two samples (VF5SG75,175 HS and VF5SG125,225 HS) were also analyzed by the headspace method. Xylenes were identified in one headspace sample at approximately half the concentration of the associated soil gas sample. The other headspace sample gave results below detection limits for xylenes.

Site 5 Conclusions

The KC96 crash site was successfully located by the soil gas survey. The approximate lateral extent of fuel contamination was determined by successive perimeters of points until negative results were achieved.

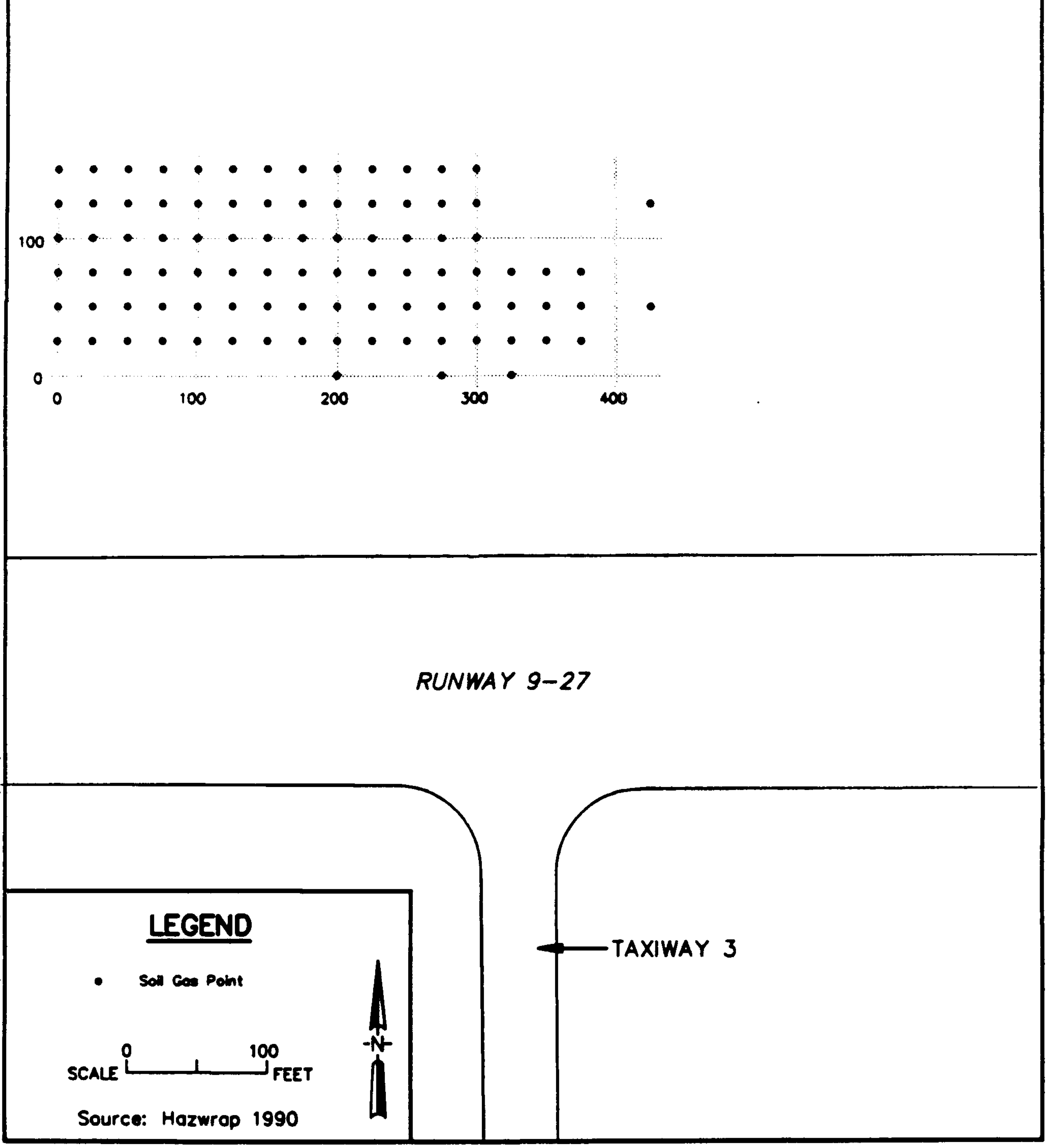
The presence of small quantities (ppb) of toluene and xylenes in the low lying areas may be due to leaching of these relatively water soluble compounds from the crash site by surface water drainage.

SITE 5, KC97 CRASH SITE

SOIL GAS SURVEY LOCATIONS

VOLK FIELD ANGB, WI

FIGURE D.2



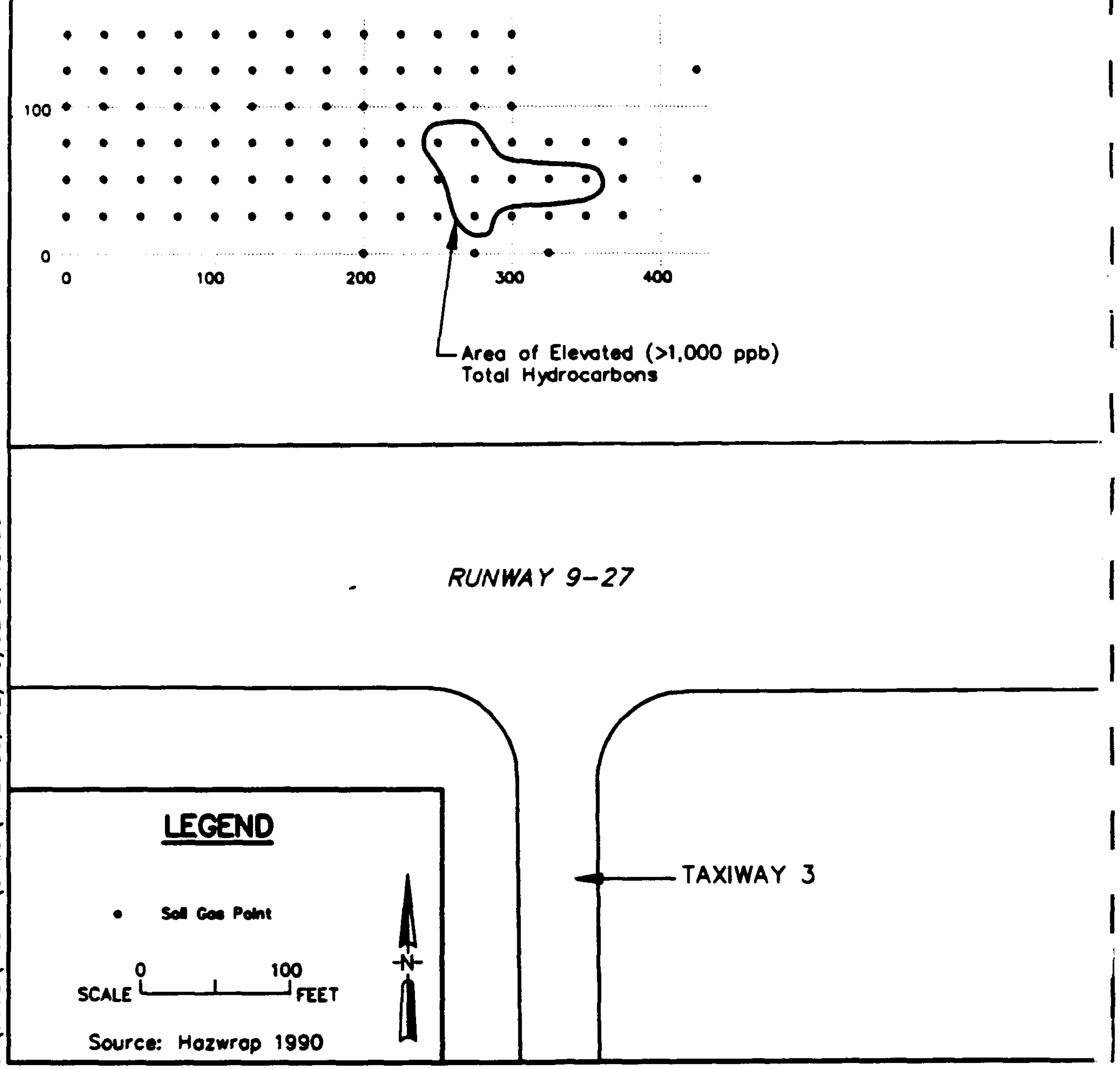
J:\JOBS\AT077\CADD\SITE-5A, 02/13/92 at 17:30

SITE 5, KC97 CRASH SITE

TOTAL HYDROCARBONS DETECTED IN SOIL GAS

VOLK FIELD ANGB, WI

FIGURE D.3



J:\JOBS\AT077\CADD\SITE-5C, 02/13/92 at 13:36

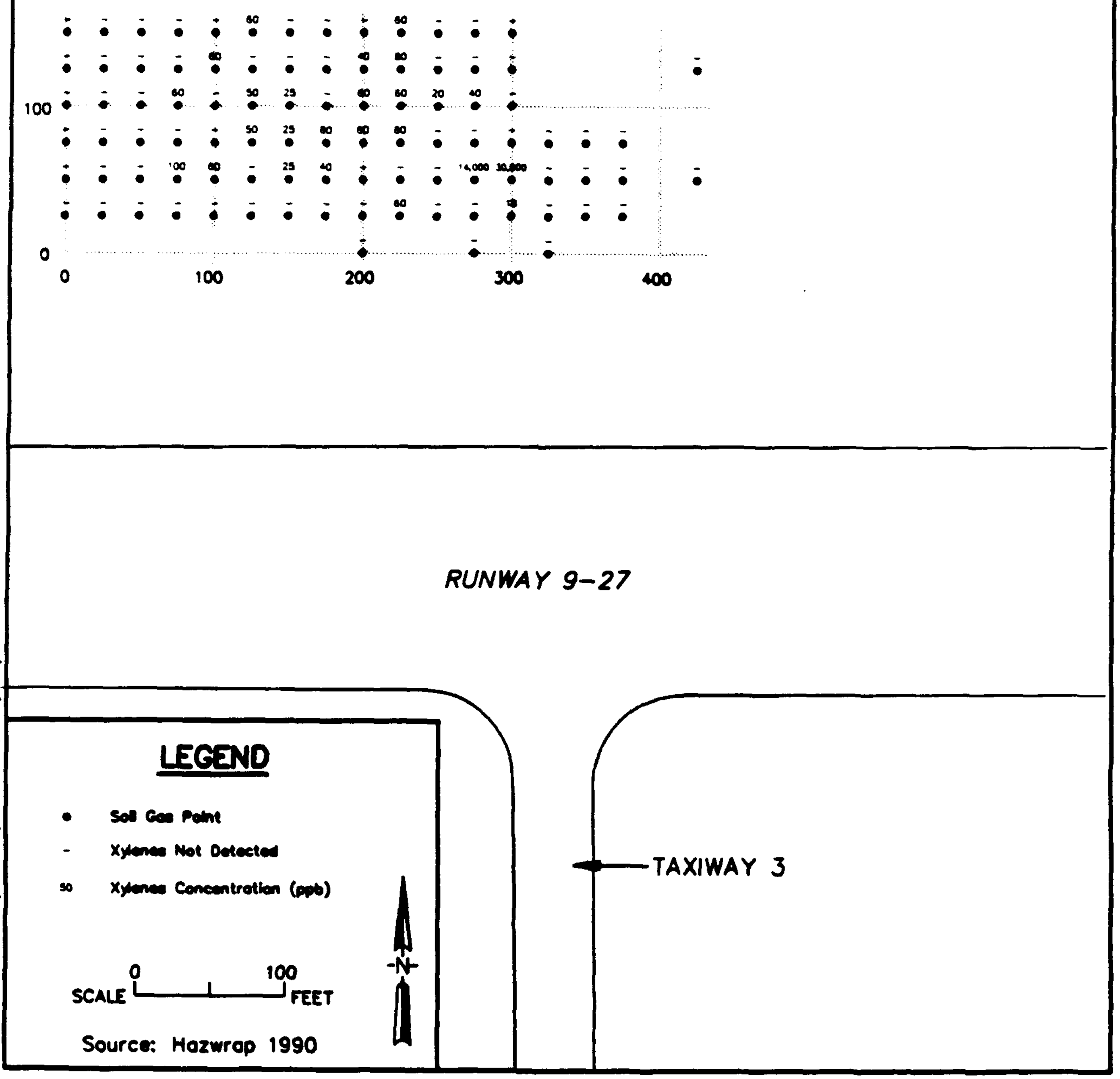
ENGINEERING-SCIENCE

SITE 5, KC97 CRASH SITE

O-XYLENES DETECTED IN SOIL GAS

VOLK FIELD ANGB, WI

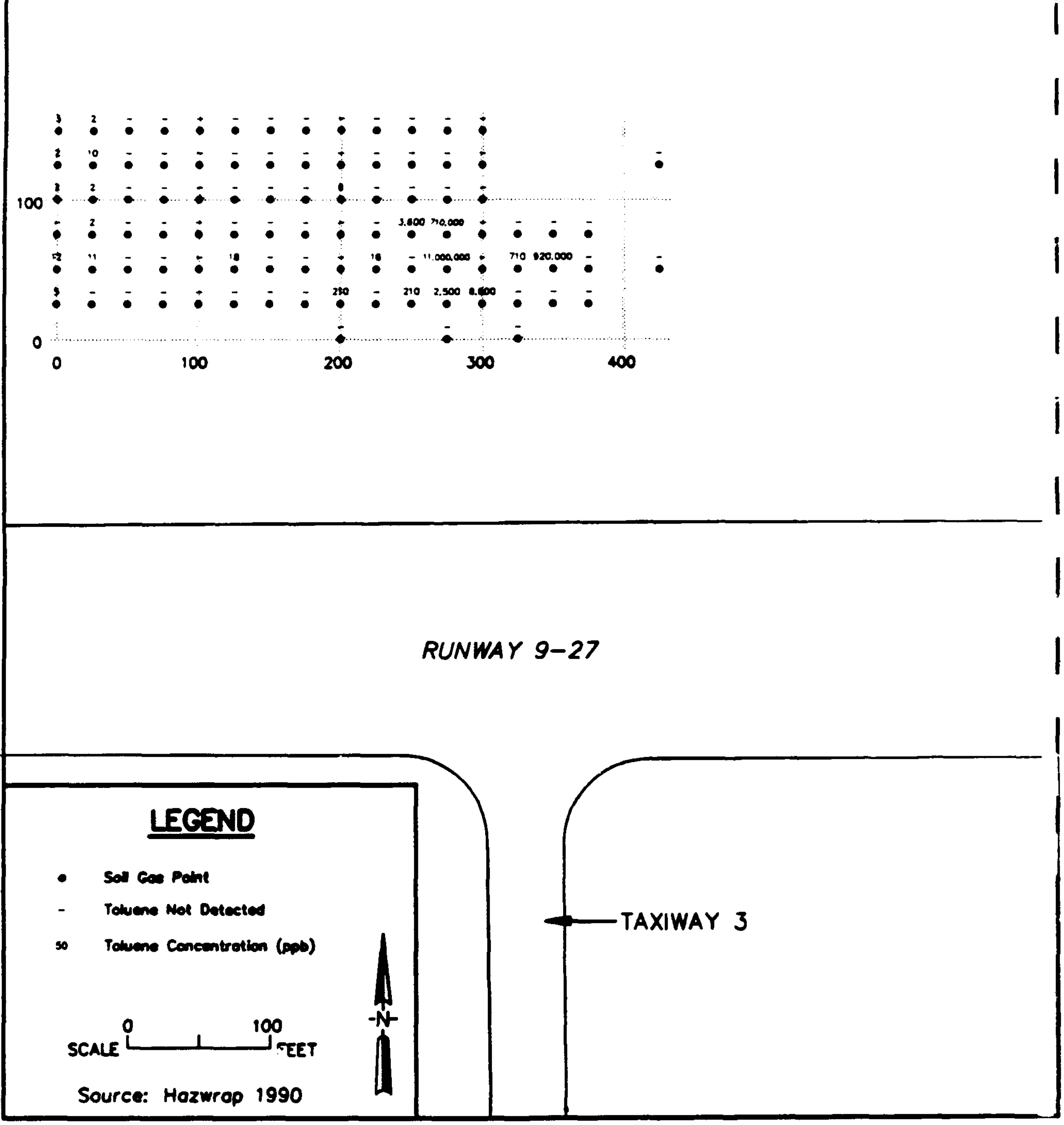
FIGURE D.4



J:\JOBS\AT077\CADD\SITE-5B, 12/31/91 at 11:05

SITE 5, KC97 CRASH SITE
SOIL GAS SURVEY LOCATIONS
VOLK FIELD ANGB, WI

FIGURE D.5



J:\JOBS\AT077\CADD\SITE-5A, 02/13/92 at 14:56

ENGINEERING-SCIENCE

TABLE D.2
SOIL GAS SURVEY DATA
SITE 5 - KC97 CRASH SITE

Sample #	Depth	Compound Found	Value (ppb)
VF5SG75,125	5 ft	xylene	50
VF5SG75,125	7.5 ft (wet)	xylene	50
VF5SG50,125	5 ft	toluene	18J
VF5SG50,150	5 ft	xylene	25J
VF5SG75,150	5 ft	xylene	25J
VF5SG100,150	4 ft	xylene	25J
VF5SG100,125	4 ft	xylene	50
VF5SG125,125	4 ft	-	-
VF5SG125,150	4 ft	-	-
VF5SG150,150	4 ft	-	-
VF5SG150,175	4 ft	-	-
VF5SG125,175	4 ft	-	-
VF5SG100,175	4 ft	-	-
VF5SG25,0	4 ft	toluene	5J
VF5SG50,0	4 ft	toluene	12J
VF5SG100,0	4 ft	toluene	2J
VF5SG125,0	4 ft	toluene	2J
VF5SG150,0	4 ft	toluene	3J
VF5SG150,25	4 ft	toluene	2J
VF5SG125,25	4 ft	toluene	10J
VF5SG100,25	4 ft	toluene	2J
VF5SG75,25	4 ft	toluene	2J
VF5SG50,25	4 ft	toluene	11J
VF5SG25,25	4 ft	-	-

TABLE D.2 (Continued)
SOIL GAS SURVEY DATA
SITE 5 - KC97 CRASH SITE

Sample #	Depth	Compound Found	Value (ppb)
VF5SG25,50	4 ft	-	-
VF5SG50,50	4 ft	-	-
VF5SG75,50	4 ft	-	-
VF5SG100,50	4 ft	-	-
VF5SG125,50	4 ft	-	-
VF5SG150,50	4 ft	-	-
VF5SG75,0	4 ft	-	-
VF5SG150,75	4 ft	-	-
VF5SG150,100	4 ft	-	-
VF5SG150,125	4 ft	xylene	60
VF5SG125,100	4 ft	xylene	60
VF5SG100,100	4 ft	-	-
VF5SG100,75	4 ft	xylene	60
VF5SG125,75	4 ft	-	-
VF5SG75,75	4 ft	-	-
VF5SG75,100	4 ft	-	-
VF5SG50,100	4 ft	xylene	60
VF5SG50,75	4 ft	xylene	100
VF5SG25,75	4 ft	-	-
VF5SG25,100	4 ft	-	-
VF5SG25,125	4 ft	-	-
VF5SG25,150	4 ft	-	-
VF5SG150,200	4 ft	-	-

TABLE D.2 (Continued)
SOIL GAS SURVEY DATA
SITE 5 - KC97 CRASH SITE

Sample #	Depth	Compound Found	Value (ppb)
VF5SG125,200	4 ft	toluene xylene	6J 40
VF5SG100,225	4 ft	xylene	60
VF5SG150,225	4 ft	xylene	60
VF5SG125,225	4 ft	xylene	80
VF5SG100,200	4 ft	xylene	60
VF5SG75,225	4 ft	xylene	80
VF5SG75,200	4 ft	xylene	60
VF5SG75,175	4 ft	xylene	80
VF5SG50,175	4 ft	xylene	40
VF5SG25,175	4 ft	-	-
VF5SG50,200	4 ft	-	-
VF5SG25,200	4 ft	TCE toluene TH	110N 210 290
VF5SG50,225	4 ft	toluene TH	16J 190
VF5SG25,225	4 ft	xylene	60
VF5SG0,200	4 ft	-	-
VF5SG150,250	4 ft	-	-
VF5SG150,275	4 ft	-	-
VF5SG150,300	4 ft	-	-
VF5SG125,300	4 ft	TH	76
VF5SG125,250	4 ft	TH	97
VF5SG125,275	4 ft	-	-
VF5SG100,250	4 ft	xylene	20J

TABLE D.2 (Continued)
SOIL GAS SURVEY DATA
SITE 5 - KC97 CRASH SITE

Sample #	Depth	Compound Found	Value (ppb)
VF5SG100,275	4 ft	xylene	40
VF5SG100,300	4 ft	-	-
VF5SG75,300	4 ft	-	-
VF5SG75,275	4 ft	TCE	310,000 N
		toluene	710,000
		TH	930,000
VF5SG75,250	4 ft	TCE	250 N
		toluene	3600
		TH	9300
VF5SG50,250	4 ft	TH	250
VF5SG50,275	4 ft	1,1 DCE	1,800,000 N
		TCE	640,000 N
		toluene	11,000,000
		xylene	14,000
		benzene	180,000
		TH	13,000,000
VF5SG50,300	4 ft	xylene	30,000
		TH	1,600,000
VF5SG25,300	4 ft	toluene	8,600
		xylenes	18J
VF5SG25,275	4 ft	toluene	2500
		TH	3100
VF5SG25,250	4 ft	toluene	210
		TH	280
VF5SG50,325	4 ft	TCE	830 N
		toluene	710
		TH	1600
VF5SG0,325	4 ft	-	-
VF5SG0,275	4 ft	-	-
VF5SG50,350	4 ft	TCE	490,000 N
		toluene	920,000
		TH	1,400,000

TABLE D.2 (Continued)
SOIL GAS SURVEY DATA
SITE 5 - KC97 CRASH SITE

Sample #	Depth	Compound Found	Value (ppb)
VF5SG75,375	4 ft	-	-
VF5SG50,375	4 ft	-	-
VF5SG25,375	4 ft	-	-
VF5SG25,350	4 ft	-	-
VF5SG25,325	4 ft	-	-
VF5SG75,325	4 ft	-	-
VF5SG75,-350	4 ft	-	-
VF5SG125,425	4 ft	-	-
VF5SG50,425	4 ft	-	-
VF5SG125,225 HS	4 ft	toluene	30
VF5SG75,175 HS	4 ft	toluene xylene	24J 40

HS - Indicates head space analysis.

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INTRODUCTION

Field investigations were conducted during the fall of 1989 and the fall of 1990 as a part of a Remedial Investigation being conducted at the Volk Field Air National Guard Base, Camp Douglas, WI. Sixty soil samples, 16 groundwater samples, and 4 surface water samples were collected between November 2 and November 10, 1989; an additional 38 soil samples, 65 groundwater samples, and 5 surface water samples were collected between September 25 and November 10, 1990. Samples were packed in ice and shipped *via* overnight courier to Savannah Laboratories and Environmental Services, Inc., in Savannah, Georgia, for laboratory analysis. The samples from both 1989 and 1990 were selectively analyzed for purgeable halogenated volatiles (SW8010), purgeable aromatic volatiles (SW8020), semi-volatile organics [CLP 2/88 SOW], total petroleum hydrocarbons (EPA 418.1), organochlorine pesticides and PCBs (SW8080), priority pollutant metals, lead, and total dissolved solids (EPA160.1). In addition, selected 1989 samples were analyzed for oil and grease (SW9071).

PRESENTATION OF DATA

Several types of tables are used to present the results of the Quality Assurance/Quality Control (QA/QC) report. The tables follow at the end of the text in the order that they are presented below, beginning with Table E.2. Table E.1 lists the target analytes associated with each of the six semivolatile internal standards.

Target compound lists are provided in Tables E.2 and E.3. They list the target compounds for each laboratory analysis and their reported detection level for both water and soil matrices. Tables are provided for samples analyzed in 1989 and samples analyzed in 1990 because both the target compounds and reported detection limits varied.

Tables E.4 through E.32 summarize all of the raw analytical data supplied by the laboratory including every qualification flag applied during the QA/QC process. The qualified analytical data sheets and the laboratory supplied QA is published in a separate document titled "Remedial Investigation: 1989 and 1990 Analytical Data, Volk Field ANGB" [ES, 1991]. The summary tables are arranged by site and by sample matrix for each year. Summary tables for the trip blanks, equipment rinsates and field blanks follow the site tables. The format of the individual tables was established to present every piece of analytical data (with qualifications) as precisely and consistently as possible. The data summary tables are self-explanatory with the exception of the following two items.

The detection level multiplier is used to account for sample variability due to the moisture in a soil or the sample dilution factor. If the result for a compound is reported as undetected (U), then the exact detection level can be determined by multiplying the appropriate detection level from either Table E.2 or E.3 by the detection level multiplier. Use of the detection level multiplier prevents the necessity of listing every analyte individually and it keeps table clutter to a minimum which allows for rapid identification of detected analytes.

The "general" row is the other feature requiring an explanation. The "general" row can appear for any analysis used to detect more than one analyte. "General" refers to any analyte on the target compound list for a specific analysis which is not individually listed in the data summary table. For instance, if the table user was interested in the 1990 SW8010 result for dichloromethane in sample VF10-MW6, they would consult Table E.25 and discover that dichloromethane does not have an individual listing; therefore, the result listed in the "general" row applies. In this case, the listing is UJ3 which means that dichloromethane was not detected above its detection limit, but the detection limit has been estimated since the analysis holding time was exceeded for this sample. Data qualification and flags will be described in the following subsections.

Holding time tables (Table E.33 through E.57) follow the data summary tables. They are presented by year for each sample matrix for each site. The holding times tables for trip blanks, equipment rinsates, and field blanks follow the site tables for each year.

Tables E.58 through E.61 are the duplicates tables for 1989 and 1990 where the results of detected analytes are compared for duplicate samples. A relative percent difference (RPD) is used to evaluate the precision.

The final 8 tables (Tables E.62 through E.69) are reference tables which identify the trip blank, equipment rinsates, field blank, and laboratory identification number for each sample from 1989 and 1990.

CRITERIA USED TO ASSESS LABORATORY DATA QUALITY

The analytical data collected during the Remedial Investigation (RI) were evaluated in accordance with the Hazardous Waste Remedial Actions Program (HAZWRAP) document "Requirements for Quality Control of Analytical Data" [DOE/HWP-65/HZ-RAP-102-1] and the procedures contained in the Quality Assurance Project Plan, Revision 0 [ES, 1989] for the 1989 Samples and Revision 2

[ES, 1990] for the 1990 samples. The following criteria were used to evaluate the data where applicable to the particular analysis:

- Sample holding times
- Gas chromatograph/mass spectrometry (GC/MS) tuning and mass calibrations
- Initial and continuing calibrations
- Internal standards
- Surrogate spike results
- Second column confirmations
- Matrix spike and matrix spike duplicate results
- Detection limit compliance
- Laboratory blank results
- Field blank results
- Duplicate results
- Completeness

The results of the evaluation of the preceding criteria are used in the assessment of the overall precision, accuracy, and completeness of the data.

Summary of Data Flags

Flags used to qualify the data are an effort to describe the circumstances surrounding and quality of that piece of data. They are based on all the information available to the data reviewer. Flags presented in this report reflect the ES interpretation of the data. Flags and symbols used are defined as follows:

U - The compound was not present in the sample above the detection limit.

J - The number preceding is estimated. The qualitative analysis is acceptable but the value cannot be considered as accurate.

1. Blank was contaminated.
2. Calibration Relative Response Factor (RRF), Internal Standard (IS) or minimum response criteria were outside of control limits.
3. Holding time was exceeded.
4. Other QC criteria were outside control limits.

N - Presumptive evidence exists for the presence of material (tentative identification). There is evidence that the material is present, but for some reason or combination of reasons, it has not been confirmed.

R - Data is rejected and is totally unusable. The only way to obtain useful data is to resample and reanalyze.

It is possible that a result may contain more than one qualifying flag. For instance a result may be reported as UJ. This indicates that the target compound was not detected in the sample; however, uncertainty exists over the detection limit. A "+" sign is used when the flag applies to detected (positive) results. The "-" sign is used to denote that the flag applies to non-detected (negative) results. The "+" and "-" signs are included in the written descriptions in order to abbreviate and clarify flag application explanations; the "+" and "-" signs are not used in the tables.

Criteria for Holding Time Compliance

For all of the analyses conducted, specific holding times apply. Tables E.33 through E.57 present the holding times for each analysis performed during the RI. Revision 0 and Revision 2 of the Quality Assurance Project Plan (QAPP) had small differences in holding time criteria for semi-volatiles, pesticides/PCBs, and mercury. The differences are discussed where relevant under the subsection on the Evaluation of Laboratory QA/QC. If holding times were not met, both positive and negative data are considered estimated (J3). If any holding time had been exceeded by a factor of 2, the data would have been rejected (R).

Criteria for Instrument Tuning and Calibration

Tuning and calibration criteria are used to evaluate the ability of the analytical instrument to identify and quantify the target compounds of concern. The tuning and calibration criteria are method specific.

For volatile organics analyzed by gas chromatograph (GC), a five-standard initial instrument calibration is required. The laboratory chose to plot calibration curves of height ratio *versus* amount ratio for each compound rather than use calibration factors. To derive the compound-specific calibration curves, the linear regression method with a required zero intercept was applied to the results of the five standards. An example of a calibration curve is provided as Figure E.1. All of the calibration curves can be represented by the standard slope-intercept equation:

$$y = mx + b \quad (1)$$

where,

$$y \equiv \text{height ratio } (H_R) \equiv \frac{\text{height of the sample's chromatographic peak } (H_S)}{\text{height of the internal standard's chromatographic peak } (H_{IS})}$$

$$x \equiv \text{concentration ratio } (C_R) \equiv \frac{\text{concentration of the sample } (C_S)}{\text{concentration of the internal standard } (C_{IS})}$$

$$b \equiv \text{y-intercept} = 0$$

$$m \equiv \text{slope of the curve} \equiv \text{initial relative response factor (RRF)}$$

therefore,

$$H_R = (RRF) * C_R \quad (2)$$

Quantitation of detected compounds was performed using the initial calibration curves. From the sample analysis, a height ratio (H_R) was calculated from the detected compound peak height and the IS peak height. The concentration ratio (C_R) which corresponded to the H_R was determined from the curve. The concentration ratio is equivalent to the analyte concentration (C_S) in the sample divided by the analyte concentration (C_{IS}) in the IS. Since C_{IS} was known, C_S was easily computed. Because the equation for the calibration curve is known, the procedure described above can be derived from equation (2):

$$C_S = \frac{C_{IS} H_R}{RRF} \quad (3)$$

where, RRF is the relative response factor calculated from the slope of the initial calibration.

Initial calibration criteria were based on the linearity of the results of the five calibration standards. The linearity of calibration curves with reported correlation coefficients of 0.995 or greater were acceptable [HAZWRAP, July 1990]. The laboratory, however, was not required to meet this criteria; therefore, for any curve with a correlation coefficient less than 0.995, the percent relative standard deviation (RSD) was calculated from the RRF of each of the five calibration standards. Since the calibration curves derived by the laboratory were linear and passed through the origin, if the RSD was less than 20%, the curves were also considered acceptable per method SW8000 requirements. Those compounds with curves not achieving either the correlation coefficient or percent RSD initial calibration criteria were flagged as estimated (J2+/UJ2-) in the associated samples.

Verification of the calibration curves was performed within twelve hours of sample analysis through continuing calibration of the GC. The laboratory analyzed a sample of known analytes at known concentrations to determine the daily retention time window and calibration curve accuracy for each analyte. For data validation purposes, a continuing calibration RRF was calculated from the equation:

$$RRF_{cc} = \frac{H_R}{C_R} \quad (4)$$

If the RRF of an analyte in the continuing calibration did not differ by more than 15% from the initial RRF (slope) of the calibration curve, then the data required no qualification on the basis of the continuing calibration. If the continuing calibration RRF varied by greater than 15%, all positive results were estimated (J2). Negative results were estimated (J2) when the RRF decreased by greater than 15% in the continuing calibration because this could have caused analyte concentrations greater than the contract-required detection limit (CRDL) to be reported as not detected. In equation (4), C_R is constant during a calibration; therefore, the only way for the

RRF to decrease is for H_R to decrease. If H_R for an analyte in the continuing calibration is lower than predicted by the quantitation curve, it will either be at the correct level or lower during the analysis of an unknown sample. If a decreased H_R is introduced into the quantitation equation (eq. 3), the sample concentration will be reported at a lower level than is really present because C_{IS} and the initial RRF are constant. This can result in a false negative; therefore, negative results are estimated when the continuing calibration RRF decreases by more than 15% from the original.

The semivolatile analyses are validated using the Contract Laboratory Program (CLP) functional guidelines for GC/MS tuning and calibration. If an instrument tune does not meet ion abundance criteria, the associated data is unusable (R). Initial instrument calibration requires that the average RRF exceed 0.05 and the RSD not exceed 30%. For RRFs below 0.05, positive results are estimated (J2) and negative results are unusable (R) for the analyte out of criteria. Both positive and negative results are estimated (J2) for each compound which does not meet the RSD criteria. The RRF and percent deviation which are calculated for continuing calibrations correspond to the RRF and percent RSD of the initial calibration; consequently, RRFs below 0.05 and percent deviations exceeding 25% are flagged identically to the initial calibration.

Flags derived from the percent RSD criteria in an initial calibration apply to all samples until another initial calibration is performed; likewise, flags derived from a continuing calibration apply to all samples until the next continuing calibration is performed.

Internal Standard areas are also computed for the semi-volatile analysis. There are six different ISs which each represent a specific group of semivolatile compounds (Table E.1). If an IS area count is less than 50% or greater than 100% of the associated calibration standard, quantitated analytes are estimated for both positive and negative results (J2).

The GC performance for pesticides and PCBs is evaluated on the linearity of the initial calibration and on continuing calibrations. The linearity check applies to four key compounds. If the RSD exceeds 10% for a compound, then all associated positive and negative results are estimated (J2) for that compound. For continuing calibrations, a percent deviation between calibration factors is calculated. All positive results are estimated (J2) for any compound which has a percent deviation in excess of 15%.

Initial and continuing calibrations are monitored for the metals analyses. A percent recovery is calculated between the actual concentration and detected concentration of each metal. When a metal's recovery is outside 90-110% (except mercury which is 80-120%), the corresponding positive and negative data is estimated (J2).

Criteria for Laboratory Quality Control Data

Laboratory Quality Control Data consist of the results obtained from the analysis of laboratory blanks, surrogate spikes, spiked samples, and laboratory duplicate samples.

The assessment of results on blank analyses is for the purpose of determining the existence and magnitude of contamination problems. The criteria for evaluation of both laboratory and field blanks is described below. When more than one type of blank is associated with a given sample, qualification is based on the blank having the highest concentration of the contaminant.

Two rules are used for evaluating laboratory blank contamination, the 10x rule and the 5x rule. For the common laboratory contaminants methylene chloride, acetone, toluene, 2-butanone, and phthalate esters, if the concentration of the compound is greater than the CRDL but less than ten times the highest concentration found in a blank, the result is reported as non-detect. When the concentration is less than the CRDL it is reported as non-detect. When the concentration of the compound is greater than ten times the highest concentration found in any blank, the result is considered positive and no flags are used. The 5x rule applies to all compounds other than the common laboratory contaminants. This rule is applied the same as the 10x rule except that a level of five times the blank contaminant level is used.

Surrogate spike compounds are analytes added to each sample at a known concentration. The recovery of these compounds is determined to indicate laboratory performance on individual samples. The use of surrogate spikes is required for some but not all methods published by EPA.

The analytical methods for the analysis of volatile and semi-volatile organics require surrogate analyses to be performed. According to the methods, corrective action is required when any surrogate compound in the volatile fraction or any two surrogates within a base neutral (BN) or acid (A) fraction are out of specification. Corrective action is also required if any surrogate in a fraction has a recovery of less than 10 percent. If the reanalysis results are still out of specification, the compounds in the fraction corresponding to the problem surrogates are all qualified for the sample involved. The positive and negative results are estimated (J) unless the surrogate recovery is less than 10% in which case the negative results are unusable (R).

Matrix spike samples and laboratory duplicates are used to assess analytical accuracy and precision, respectively. The accuracy of the analytical results is evaluated upon the basis of percent recovery (PR) of matrix spiking compounds in matrix spike (MS) and matrix spike duplicates (MSD) at a minimum of one sample per 20 samples of similar matrix. The acceptance range for the percent recovery for each matrix spiking compound is presented in the QAPP and in the analytical method used. The recovery of spiking compounds is an indication of the effect of the sample matrix upon the accuracy of the analysis results.

Spike recoveries for metals must be within the limits of 75 to 125%. If the recovery exceeds 125% the positive results are estimated (J4). If the recovery is less than 75% positive and negative results are estimated (J4). At recoveries below 30% negative results are unusable (R).

Precision is evaluated for a set of samples of similar matrix by the analysis and comparison of MS and MSD samples. The RPD of the values obtained for the MS and MSD samples should be less than the criteria specified in the QAPP or in the analytical method. When the RPD values obtained do not meet the acceptance criteria, either a blank spike or laboratory control sample (LCS) is analyzed as done for the accuracy corrective action. Also, if surrogate recovery values are within the acceptance criteria, no further corrective action is required and the QC data are considered to be of good quality.

For the metals analyses, the LCS is designed to serve as a monitor of the efficiency of the digestion and analysis procedure. If the control windows are exceeded, all data associated with the LCS should be reanalyzed.

Criteria for Detection Limit Compliance

Adherence to the target compound detection limits listed in Revisions 0 and 2 of the QAPP was the primary objective for compliance. For quantitation of certain compounds or analytes, the detection limit is increased according to the dilution and the increased detection limit is reported by the laboratory with the analytical results. In many cases, when dilution is required for the quantitation of only a few compounds on a target list, the normal detection limits are reported for all compounds except those quantitated from the diluted sample.

Criteria for Field Quality Control Data

Field quality control samples include equipment rinseate blanks, source water blanks, and trip blanks. Rinseate blanks are a water rinse using deionized, analyte-free water following the decontamination of the field sampling equipment. Rinseate blanks were collected at a frequency of one every other day per matrix per sampling event and analyzed for the parameters determined in the samples during that event. Source water blanks consist of samples of the potable water and high pressure liquid chromatography (HPLC) water used in decontamination. A blank from each source was collected for each sampling event.

The QAPP also requires the collection of one trip blank for every cooler of samples requiring volatile organics analysis (VOA). The trip blank is filled at the laboratory with deionized, analyte-free water, sealed and accompanies the VOA sample vials at all times. Trip blanks were not opened in the field.

To assess representativeness of the sample collection procedures, the QAPP required that coded field duplicates were collected at a frequency of 10% per matrix per event.

If the data collected during the RI did not meet the criterion contained in the QAPP and discussed above, it was flagged to indicate the limitations associated with it. The various flags used to qualify the data are discussed in the Summary of Data Flags subsection presented earlier in this section.

Completeness

The completeness of the data will be evaluated by reviewing the data collected and determining if any data gaps exist for completing the RI. If data gaps are identified the data will be judged to be incomplete. The completeness of individual sampling rounds will not be assessed. Completeness will be determined by evaluating all the data collected during the RI.

EVALUATION OF LABORATORY QA/QC

The following subsections are a discussion of the instances in which the laboratory OA/QC criteria used to evaluate the data were not satisfied. In such instances the irregularities are noted and the necessary qualifications of the data are discussed. Professional judgment has been used in some instances when rigorous application of the QA/QC criteria might render valid data unusable. Such instances have likewise been noted and discussed. When the QA/QC criteria (as outlined in subsection E.2) are satisfied, they are not mentioned in the ensuing discussion.

The laboratory presented both the analytical and the QA/QC data in designated sample delivery groups (SDGs); therefore, the laboratory SDG numbers have been used in grouping the following evaluation of the laboratory QA/QC. Tables E.65 and E.69 list the SDG numbers from 1989 and 1990 and the corresponding samples.

Retention times (RT) from continuing calibrations were frequently reported outside of their calibrated retention time windows. This occurred repeatedly for the same compounds by the same margin of time. It was apparent that a shift had occurred in the column and that new retention time windows should have been established. The laboratory has reported that RT windows were in fact established at the time of each continuing calibration using the continuing calibration RTs for each compound and the initial calibration RT standard deviations as specified in SW846 method 8000 [1987]. The laboratory, however, did not report these RT windows. Instead, they reported the RT windows calculated during the initial calibration although the other windows were reportedly utilized by the automated GC. In addition, the laboratory has assured that a visual inspection of all chromatograms was made to determine the identity of peaks detected near but outside of the established retention time windows. In all of the case narratives the laboratory has included the statement "sample chromatograms were evaluated by a chemist to verify identification of all detected peaks." Qualification of the results was not necessary as a result of the above RT discussion.

1989 Soil Samples

Volatile Organics

General:

One GC was used as the primary column for the SW8010/SW8020 analyses for all samples collected in the 1989 field effort. The same set of initial calibration curves for quantitation were used throughout the two weeks of laboratory analysis. The 5-point calibration curves for chloromethane, vinyl chloride, 2-chloroethyl vinyl ether, bromoform, and chlorobenzene did not achieve correlation coefficients of 0.995 nor were the RSDs less than 20%; therefore, these five compounds were estimated (J2+/UJ2-) for all 1989 samples.

Neither initial or continuing calibrations were performed for 1,1,1,2-tetrachloroethane. All 1989 1,1,1,2-tetrachloroethane results are unusable (R). Results for 1,1,1,2-tetrachloroethane have not been included in the data summary tables. The analyte 2-chloroethyl vinyl ether was included in both the initial and continuing calibration; however, the results were on occasion not reported for the continuing calibration. In these instances, 2-chloroethyl vinyl ether results were considered unusable (R).

89-9534:

The surrogate recoveries of bromochloromethane in the SW8010 analysis and trifluorotoluene in the SW8020 analysis of samples VF5-SB1-SS1 0-1', VF5-SB1-SS2 3.5-5.5', VF5-SB2-SS1 0-2.0', VF5-SB4-SS1 0-2.5', and VF5-SB4-SS2 3.5-6.0' were high. No halogenated volatiles (SW8010) were detected; therefore, no data qualification was required as a result of high bromochloromethane recoveries. The positive detection of toluene in sample VF5-SB1-SS2 3.5.-5.5' and toluene and xylenes in sample VF5-SB1-SS1 0-1.0' were estimated (J4), as a result of the high trifluorotoluene recovery.

In eight soil samples collected at site 5 (VF5-SB1-SS1 0-1.0', VF5-SB1-SS2 3.5-5.5', VF5-SB2-SS1 0-2.0', VF5-SB2-SS2 3.5-5.5', VF5-SB2-SS3 5.5-8.0', VF5-SB3-SS1 3.5-6.0', VF5-SB4-SS1 0-2.5', and VF5-SB4-SS2 3.5-6.0'), 1,2 dichlorobenzene results were estimated (J2+/UJ2-) as a result of a 33% loss in RRF. Estimation of positive results for chloromethane, bromoform, benzene, toluene, ethylbenzene, m-xylene, and o-xylene as a result of increased RRFs of more than 15% yielded J2 flags for toluene and xylenes in samples VF5-SB1-SS1 0-1.0', VF5-SB2-SS2 3.5-5.5' and VF5-SB3-SS1 5.5-8.0' as wells as J2 flags for toluene in samples VF5-SB1-SS2 3.5-5.5' and VF5-SB2-SS3 3.5-5.5'. In all eight samples, 2-chloroethyl vinyl ether results were rejected (R) as a result of an unreported continuing calibration.

89-9546:

The surrogate recoveries of bromochloromethane were high in samples VF5-SB6-SS1 3.5-6.0′, VF5-SB8-SS1 0-2.0′, VF5-SB8-SS2 3.5-6.0′, VF5-SB9-SS1 3.5-6.0′, VF5-SB10-SS1 3.5-6.0′, and VF5-SB11-SS1 3.5-6.0′. There were, however, no SW8010, halogenated volatiles, detected; therefore, no data qualification was necessary.

The surrogate recoveries of trifluorotoluene were high in samples VF5-SB6-SS1 3.5-6.0′, VF5-SB9-SS1 3.5-6.0′, and VF5-SB10-SS1 3.5-6.0′. As a result, the positive toluene results were estimated (J4) in all three samples.

Samples VF5-SB9-SS1 3.5-6.0′, VF5-SB10-SS1 3.5-6.0′, and VF5-SB11-SS1 3.5-6.0′ had positive and negative results for vinyl chloride and 1,2-dichlorobenzene estimated (J2+/UJ2-) as a result of a decrease in RRF in excess of 15%. Chloromethane, bromoform, benzene, toluene, ethylbenzene, and o-xylene had increases in RRF of greater than 15%; therefore, positive toluene detections were estimated (J2) in the three samples. 2-chloroethyl vinyl ether results were considered unusable (R) since continuing calibration results were unreported.

In samples VF5-SB5-SS1 3.5-6.0′, VF5-SB6-SS1 3.5-6.0′, VF5-SB7-SS1 3.5-6.0′, VF5-SB8-SS1 0-2.0′, and VF5-SB8-SS2 3.5-6.0′, the results for chloromethane, vinyl chloride, chloroethane, 1,1-dichloroethylene, 1,1-dichloroethane, trans-1,2-dichloroethylene, 1,1,1-trichloroethane, tetrachloroethylene, 1,2-dichlorobenzene, and 1,3-dichlorobenzene were estimated (J2+/UJ2-) as a result of a loss of RRF in excess of 15%. Increases in RRF of greater than 15% were recorded for bromoform, benzene, toluene, ethylbenzene, m-xylene, and o-xylene. Increased RRFs resulted in the estimation of positive toluene results in all five samples and of positive xylene results in samples VF5-SB5-SS1 3.5-6.0′, VF5-SB8-SS1 0-2′, and VF5-SB8-SS2 3.5-6.0′.

89-9580 and 89-9606:

All of the volatiles analyses for soil samples at site 1 were performed on three days (11/20-22/89) under two different continuing calibrations (11/20 7:43 pm and 11/21/ 7:35 pm). Those analyses performed on November 20 were flagged by the November 20 calibration; those analyses performed on November 22 were flagged according to the November 21 calibration; and those analyses performed November 21 were flagged based on both calibrations since time of analysis was not provided and either continuing calibration could apply. The following table lists the flagging requirements as a result of excessive decreases in RRF and excessive increases in RRF. For each sample, the appropriate continuing calibration is referenced.

Calibration
11/20/89

Loss in RRF (J2+/UJ2-)
- vinyl chloride
- chloroethane
- 1,1-dichloroethylene
- 1,1-dichloroethane
- trans-1,2-dichloroethylene
- 1,2-dichloroethane
- 1,2-dichloropropane
- cis-1,3-dichloropropylene
- trichloroethylene
- dibromochloromethane
- 1,1,2-trichloroethane
- trans-1,3-dichloropropylene
- 2-chloroethyl vinyl ether
- tetrachloroethylene
- 1,2-dichlorobenzene
- 1,3-dichlorobenzene
- 1,4-dichlorobenzene

Increase in RRF ($J2^+$)
- bromoform
- benzene
- ethylbenzene
- o-xylene

11/21/89

Loss in RRF (J2+/UJ2-)
- vinyl chloride
- chloroethane
- 1,1-dichloroethylene
- 1,1-dichloroethane
- trans-1,2-dichloroethylene
- chloroform
- 1,2-dichloroethane
- 1,2-dichloropropane
- 1,2-dichlorobenzene
- 1,3-dichlorobenzene
- 1,4-dichlorobenzene

Increase in RRF (J2+)
- bromoform
- benzene
- toluene
- ethylbenzene
- o-xylene

Sample	**Analysis**
VF1-SB19-SS1 0-2.0	Both
VF1-SB19-SS2 5.5-8.0	Both
VF1-SB35-SS2 5.5-8.0	Both
VF1-SB20-SS1 0-2.5	Both
VF1-SB20-SS2 5.5-8.0	8010-Both; 8020-11/20
VF1-SB21-SS1 0-2.5	Both
VF1-SB21-SS2 5.5-8.0	Both
VF1-SB36-SS2 5.5-8.0	Both
VF1-SB22-SS1 0-2.5	Both
VF1-SB22-SS2 5.5-8.0	11/20
VF1-SB37-SS2 5.5-8.0	11/20
VF1-SB28-SS1 0-2.5	11/20
VF1-SB28-SS2 5.5-8.0	Both
VF1-SB23-SS1 0-2.5	Both
VF1-SB23-SS2 5.5-8.0	11/20
VF1-SB23-SS3 10.0-12.5	11/20
VF1-SB25-SS1 0-2.0	Both
VF1-SB25-SS2 5.5-8.0	Both
VF1-SB26-SS1 1.0-2.0	Both
VF1-SB26-SS2 5.5-8.0	Both
VF1-SB27-SS1 0-2.0	Both
VF1-SB27-SS2 5.5-8.0	Both
VF1-SB24-SS1 0-2.0	Both
VF1-SB24-SS2 5.5-8.0	Both
VF1-SB29-SS1 0-2.0	Both
VF1-SB29-SS2 5.5-8.0	11/21
VF1-SB30-SS1 0-2.0	11/21
VF1-SB30-SS2-5.5-8.0	11/21
VF1-SB38	11/21
VF1-SB31-SS1 0-2.0	11/21
BF1-SB31-SS2 5.5-8.0	11/21

As a result of an increased RRF, only the positive data for toluene in samples VF1-SB19-SS1 0-2.0′ and VF1-SB19-SS2 5.5-8.0′ actually received J2 flags.

Semi-Volatile Organics

89-09580 and 89-09606:

As a result of response factors with RSDs exceeding 30% in the initial calibration, the positive and negative results are estimated (J2+/UJ2-) as follows:

Initial Calibration Date	Compounds Estimated	Samples
11/9/89	pyrene benzo(a)anthracene benzo(b)fluoranthene	VF1-SB26-SS1 1.0-2.0 VF1-SB26-SS2 5.5-8.0 VF1-SB27-SS1 0-2.0 VF1-SB29-SS2 5.5-8.0 VF1-SB30-SS1 0-2.0 VF1-SB30-SS2 5.5-8.0 VF1-SB31-SS2 0-2.0
11/19-20/89	2,4-dinitrophenol di-n-butylphthalate 3,3′-dichlorobenzidine	VF1-SB19-SS2 5.5-8.0 VF1-SB20-SS2 5.5-8.0 VF1-SB35-SS2 5.5-8.0 VF1-SB22-SS1 0-2.5 VF1-SB37-SS2 5.5-8.0 VF1-SB28-SS2 5.5-8.0
11/22/89	3,3′-dichlorobenzidine	VF1-SB21-SS1 0-2.0 VF1-SB23-SS2 5.5-8.0 VF1-SB28-SS1 0-2.5
11/27/89	indeno (1,2,3-cd) pyrene dibenz (a,h) anthracene benzo (g,h,i) perylene	VF1-SB19-SS1 0-2.0 VF1-SB20-SS1 0-2.5 VF1-SB22-SS2 5.5-8.0 VF1-SB23-SS1 0-2.5 VF1-SB23-SS3 10.0-12.5 VF1-SB21-SS2 5.5-8.0 VF1-SB36-SS2 5.5-8.0
12/4/89	2,4-dinitrophenol	VF1-SB24-SS1 0-2.0 VF1-SB24-SS2 5.5-8.0 VF1-SB25-SS1 0-2.0 VF1-SB25-SS2 5.5-8.0 VF1-SB27-SS2 5.5-8.0 VF1-SB29-SS1 0-2.0 VF1-SB31-SS1 5.5-8.0

Response factors in continuing calibrations frequently exceeded the acceptable 25% deviation from the initial. Both positive and negative data have been estimated (J2+/UJ2-) when this occurred. The following table summarizes the flagging action:

Continuing Calibration Date	Compounds Exceeding 25% Deviation	Samples Flagged
11/21/89	hexachlorocyclopentadiene	VF1-SB20-SS2 5.5-8.0
	3,3'-dichlorobenzidine	VF1-SB22-SS1 0-2.5
	pyrene	VF1-SB19-SS2 5.5-8.0
	benzo(k)fluoranthene	VF1-SB35-SS2 5.5-8.0
	bis(2-chloroisopropyl) ether	
	n-nitroso-di-n-propylamine	
	2,4-dinitrophenol	
	4-nitrophenol	
	4,6-dinitro-2-methylphenol	
11/22/89	nitrobenzene	VF1-SB26-SS1 1.0-2.0
	isophorone	VF1-SB26-SS2 5.5-8.0
	2,4-dimethylphenol	VF1-SB27-SS1 0-2.0
	1,2,4-trichlorobenzene	VF1-SB29-SS2 5.5-8.0
	naphthalene	VF1-SB30-SS1 0-2.0
	bis(ethyl)ether	VF1-SB30-SS2 5.5-8.0
	n-nitroso-di-n-propylamine	VF1-SB31-SS2 5.5-8.0
	2,4-dinitrophenol	
	4-dinitrophenol	
	4,6-dinitro-2-methylphenol	
	pyrene	
	butylbenzylphthalate	
11/25/89	4-nitrophenol	VF1-SB21-SS1 0-2.5
	hexachlorobenzene	VF1-SB23-SS2 5.5-8.0
	3,3'-dichlorobenzidine	VF1-SB28-SS1 0-2.5
	benzo(b)fluoranthene	
	indeno(1,2,3-cd)pyrene	
	dibenz(a,h)anthracene	
	butylbenzylphthalate	
	bis(2-ethylhexyl)phthalate	
11/28/89	di-n-butylphthalate	VF1-SB21-SS2 5.5-8.0
	3,3'-dichlorobenzidine	VF1-SB36-SS2 5.5-8.0
		VF1-SB37-SS2 5.5-8.0
		VF1-SB28-SS2 5.5-8.0

Continuing Calibration Date	Compounds Exceeding 25% Deviation	Samples Flagged
11/30/89	bis(2-chloroisopropyl) ether	VF1-SB23-SS1 0-2.5
	n-nitroso-di-n-propylamine	VF1-SB23-SS3 10.0-12.5
	2,4-dinitrophenol	VF1-SB22-SS2 5.5-8.0
	4-nitrophenol	
	2,4-dinitrotoluene	
	3,3'-dichlorobenzidine	
	butylbenzylphthalate	
	bis(2-ethylhexyl)phthalate	
12/5/89	hexachlorobenzene	VF1-SB24-SS2 5.5-8.0
	di-n-butylphthalate	VF1-SB29-SS1 0-2.0
	3,3'-dichlorobenzidine	
	indeno(1,2,3-cd)pyrene	
	dibenz(a,h)anthracene	
	benzo(g,h,i)perylene	
	2,4,5-trichlorophenol	
	2,4-dinitrophenol	
	4-nitrophenol	
	4,6-dinitro-2-methylphenol	

In the continuing calibrations on 11/28/89 and 11/30/89, the response factor for 3,3'-dichlorobenzidine did not attain the minimum required level of 0.05; therefore, all results for 3,3'-dichlorobenzidine were rejected in the following seven samples:

VF1-SB21-SS2	5.5-8.0
VF1-SB36-SS2	5.5-8.0
VF1-SB37-SS2	5.5-8.0
VF1-SB28-SS2	5.5-8.0
VF1-SB22-SS2	5.5-8.0
VF1-SB23-SS1	0-2.5
VF1-SB23-SS3	10.0-12.5

Positive and negative results are estimated (J2+/UJ2-) for the analytes which were quantitated from an IS which failed area count criteria. The six semivolatile IS and the 1989 Target Compound List (TCL) compounds they represent are provided in Table E.1. The IS's failing criteria are listed below for each sample:

Sample	Unacceptable IS Calibrations
VF1-SB22-SS1 0-2.5	IS6
VF1-SB21-SS10-2.5	IS2, IS3
VF1-SB20-SS10-2.5	IS6
VF1-SB19-SS10-2.0	IS6
VF1-SB21-SS25.5-8.0	IS2, IS3, IS4, IS5, IS6
VF1-SB36-SS25.5-8.0	IS2, IS3, IS4, IS5, IS6
VF1-SB37-SS25.5-8.0	IS2, IS3, IS4, IS5, IS6
VF1-SB28-SS25.5-8.0	IS3, IS4, IS5, IS6
VF1-SB23-SS10-2.5	IS3
VF1-SB23-SS3 10.0-12.5	IS1, IS2, IS3, IS4, IS5, IS6
VF1-SB30-SS2 5.5-8.0	IS6
VF1-SB26-SS11.0-2.0	IS6
VF1-SB29-SS25.5-8.0	IS6
VF1-SB26-SS25.5-8.0	IS5, IS6
VF1-SB27-SS10-2.0	IS5, IS6
VF1-SB30-SS10-2.0	IS5, IS6
VF1-SB38-ES	IS1, IS2, IS3, IS4, IS5, IS6
VF1-SB24-SS1 0-2.0	IS3
VF1-SB31-SS1 0-2.0	IS6
VF1-SB25-SS2 5.5-8.0	IS6
VF1-SB24-SS2 5.5-8.0	IS3, IS4, IS5, IS6
VF1-SB29-SS1 0-2.0	IS4

High surrogate recoveries were measured for 2-fluorobiphenyl in sample VF1-SB19-SS2 5.5-8.0, VF1-SB24-SS2 5.5-8.0, and VF1-SB29-SS1 0-2.0. Furthermore, low surrogate recoveries of 2-fluorophenol were measured in VF1-SB23-SS1 0-2.5, VF1-SB23-SS3 10.0-12.5, and the matrix spike. Data qualification was not required for either infraction.

Pesticides/PCBs

89-9534:

The RT for aldrin in the continuing calibration was outside of the acceptable RT window. The results for all seven Site 4 soil samples were flagged (NJ4+/UJ4-) for aldrin. As indicated by the flag, all results are considered to be estimated, and had positive results been reported, the identification would have been considered tentative.

Inorganics

There were no identified laboratory QA/QC irregularities for inorganics in soil.

1989 Water Samples

Volatile Organics

General:

One GC was used as the primary column for the SW8010/SW8020 analyses for all samples collected in the 1989 field effort. The same set of initial calibration curves for quantitation were used throughout the two weeks of laboratory analysis. The 5-point calibration curves for chloromethane, vinyl chloride, 2-chloroethy vinyl ether, bromoform, and chlorobenzene did not achieve correlation coefficient of 0.995 nor were the RSDs less than 20%; therefore, these five compounds were estimated (J2+/UJ2-) for all 1989 samples.

Neither initial or continuing calibrations were performed for 1,1,1,2-tetrachloroethane. All 1989 1,1,1,2-tetrachloroethane results are unusable (R). Results for 1,1,1,2-tetrachloroethane have not been included in the data summary tables.

89-9534:

For samples VF1-MW5-W1-ES, VF1-MW6-W1-ES, VF1-MW7-W1-ES, and VF1-MW8-W1-ES, chloromethane, vinyl chloride, chloroethane, 1,1-dichloroethylene, trans-1,2-dichloroethylene, 1,2-dichlorobenzene, 1,3-dichlorobenzene, and 1,4-dichlorobenzene results were estimated in the positive and negative (J2+/UJ2-) as a result of a loss of RRF of greater than 15% in the continuing calibration. There was in addition, a greater than 15% increase in RRF for carbon tetrachloride, bromoform, benzene, toluene, ethylbenzene, and m-xylene. The positive results for benzene, toluene, and xylenes were estimated (J2) in sample VF1-MW5-W1-ES while benzene and xylenes were estimated (J2) in sample VF1-MW8-W1-ES.

A loss of RRF greater than 15% in the continuing calibration for sample VF3/6-MW6-W1-ES dictated the estimation (J2+/UJ2-) of results for 1,2-dichlorobenzene, and 1,3-dichlorobenzene. Positive results for benzene and toluene were estimated (J2) as a result of an increase in RRF exceeding 15%. Chloromethane, ethylbenzene, m-xylene, and o-xylene would also have had positive results estimated for the same reason.

89-9546, 89-9580, and 89-9606:

Samples VF10-SW1-W1-ES, VF10-SW2-W1-ES, VF10-SW4-W1-ES, VF10-MW7-W1-ES, VF10-MW5-W1-ES, VF10-MW20-W1-ES, VF3/6-MW2-W1-ES, and VF3/6-MW4-W1-ES had results for vinyl chloride, trans-1,2-dichloroethylene 1,2-dichloroethane, 1,2-dichlorobenzene, 1,3-dichlorobenzene, and 1,4-dichlorobenzene estimated (J2+/UJ2-) as a result of a loss of RRF in excess of 15% from the initial calibration. If the compounds bromoform, benzene, toluene, ethylbenzene, xylene, or o-xylene had been detected, the positive results would have been estimated as a result of an increase in RRF in excess of 15%.

89-9848:

Samples VF10-MW6-W1-ES, VF5-MW1-W1-ES, VF5-MW20-W1-ES, VF3/6-MW3-M1-ES, and VF3/6-MW5-W1-ES had results for vinyl chloride and 1,2-dichlorobenzene estimated as a result of a loss of RRF greater than 15% in the continuing calibration. Additionally, there was an increase in RRF of greater than 15% for chloromethane, bromoform, benzene, toluene, ethylbenzene, and o-xylene. The positive results for benzene, ethylbenzene, and xylene were estimated (J2) in sample VF3/6-MW5-W1-ES. 2-chloroethyl vinyl either results were considered unusable (R) since continuing calibration results were unreported.

Semi-Volatiles

89-9534:

The 30% RSD limit was exceeded in the initial calibration for 2,4-dinitrophenol and bis(2-ethylhexyl)phthalate. All results for these two compounds in samples VF1-MW5-W1-ES, VF1-MW6-W1-ES, VF1-MW7-W1-ES and VF1-MW8-W1-ES have been estimated (J2+/UJ2-).

89-9546:

2,4-dinitrophenol and bis(2-ethylhexyl)phthalate were estimated (J2+/UJ2-) in sample VF10-SW1-W1-ES as a result of RSDs in the initial calibration in excess of 30%.

2,4-dinitrophenol, hexachlorobenzene, 3,3'-dichlorobenzidine, benzo(b) fluoranthene, indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene, and bis(2-ethylhexyl)phthalate were estimated (J2+/UJ2-) for sample VF10-SW2-W1-ES as a result of a continuing calibration RRF which changed more than 25% from the initial calibration.

Area count criteria for IS1, IS2, IS3, and IS4 were not met for sample VF10-SW2-W1-ES; therefore, the corresponding compounds (as specified in Table E.1) have been estimated (J2+/UJ2-).

89-9580:

Hexachlorocyclopentadiene, 2,4-dinitrophenol, 4-nitrophenol, and 2,4-dinitrotoluene were estimated (J2+/UJ2-) in samples VF10-SW4-W1-ES and VF10-MW7-W1-ES as a result of RSDs in excess of 30% in the initial calibration.

In samples VF10-MW5-W1-ES and VF10-MW20-W1-ES, only 3,3'-dichlorobenzidine was estimated (J2+/UJ2-) as a result of excessive RSDs in the initial calibration; however, 4-nitrophenol, hexachlorobenzene, benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene, butylbenzylphthalate, and bis(2-ethyhexyl)phthalate as well as 3,3'-dichlorobenzidine were estimated (J2+/UJ2-)as a result of a loss of RRF in the continuing calibration of more than 25%.

Internal standard area count criteria were not met as follows and the corresponding compounds in Table were flagged as estimated (J2+/UJ2-):

Sample	IS
VF10-MW7-W1-ES	IS4, IS5, IS6
VF10-SW4-W1-ES	IS4
VF10-MW5-W1-ES	IS1, IS2, IS3, IS4, IS5
VF10-MW20-W1-ES	IS1, IS2, IS3

The surrogate recovery of 2-fluorophenol in sample VF10-MW7-W1-ES did not reach the minimum limit. Data qualification was not required as a result of this infraction.

89-9848:

Pyrene, benzo(a)anthracene, and benzo(b)fluoranthene were estimated (J2+/UJ2-) for sample VF10-MW6-W1-ES as a result of RSDs exceeding 30% in the initial calibration. In addition, the change of RRF in excess of 25% in the continuing calibration resulted in the flagging of 1,2,4-trichlorobenzene, butylbenzylphthalate, bis(2-ethylhexyl)phthalate, indeno(1,2,3-cd)pyrene, dibenz(a,h)-anthracene, benzo(g,h,i)perylene, bis(2-chloroethyl)ether, bis(2-chloroisopropyl)-ether, and n-nitroso-di-n-propylamine as estimated (J2+/UJ2-). Internal standard area counts for IS5 and IS6 did not meet criteria for sample VF10-MW6-W1-ES and the corresponding compounds from Table E.1. were estimated (J2+/UJ2-).

Pesticides/PCBs

Pesticides and PCBs were not analyzed in the ground and surface water samples collected during this round. They were only analyzed in the two field source blanks.

Inorganics

89-9534:

Arsenic was detected in the water method blank at 20μg/L. If arsenic had been detected in any groundwater sample at less than 100 μg/L, the detection limit would have been raised.

89-9580 and 89-9848:

Arsenic exceeded the maximum allowable recovery during continuing calibration. Samples VF10-SW4-W1-ES, VF10-MW5-W1-ES, VF10-MW6-W1-ES, VF10-MW7-W1-ES, and VF10-MW20-W1-ES had arsenic results estimated (J2+/UJ2-).

1990 Soil Samples

Volatile Organics

General:

Neither initial or continuing calibrations were performed for benzyl chloride, bromobenzene, 1-chlorohexane, chlorotoluene, dibromomethane, dichlorodifluoromethane, 1,1,1,2-tetrachloroethane, and trichloropropane. All 1990, method SW8010 results for these eight compounds are unusable (R). Results for these eight compounds have not been included in the data summary tables.

SO-11565:

No flags were applied to volatile samples in this package as a result of either initial or continuing calibrations. If either 1,2-dichlorobenzene or 1,4-dichlorobenzene had been detected, the positive results would have been estimated as a result of an increase in RRF in excess of 15%.

SO-12912:

The 43% surrogate recovery of trifluoro-toluene in sample VF3/6-SB1-SS1 0-1′ failed to meet the 70% minimum recovery limit. This resulted in the estimation of positive and negative results (J4+/UJ4-) for all SW8020 compounds for this sample.

Samples VF3/6-SB1-SS1 0-1′, VF3/6-SB2-SS1 0-1′, VF3/6-SB3-SS1 0-6″, and VF3/6-SB4-SS1 0-6″ were analyzed on instrument VG-1 with an initial calibration from 6/25/90. Calibrations for 1,2-dichlorobenzene and 1,4-dichlorobenzene for method SW8020 did not meet either the 0.995 correlation coefficient criteria or the 20% RSD criteria. They were estimated (J2+/UJ2-) in all four samples.

As a result of continuing calibration RRF losses exceeding 15%, 1,2-dichlorobenzene and 1,3-dichlorobenzene were estimated (J2+/UJ2-) in the same four samples.

SO-12965:

The 11 samples in package SO-12965 were analyzed by method SW8020 on instrument VG-2 calibrated initially 9/13/90. No data qualification was required as a result of either the initial or continuing calibrations.

SO-13171:

Soil holding times were exceeded for both SW8010 and SW8020 analyses for samples VF10-SB1-SS1 1-2′, VF10-SB2-SS1 1-2′, and VF10-SB3-SS1 1-2′. Each was analyzed in 15 days - 1 day beyond the 14 day holding time limit. All volatile compounds for the 3 samples were estimated (J3+/UJ3-).

The seven soil samples included in package SO-13171 were analyzed for volatile organics on instrument VG-2 calibrated initially on 9/13/90. Calibrations for chloromethane and bromomethane did not meet either the 0.995 correlation coefficient criteria or the 20% RSD criteria. The compounds were estimated (J2+/UJ2-) in all seven samples: VF9-SB1-SS1 1-2′, VF9-SB2-SS1 1-2′, VF9-SB3-SS1 1-2′, VF2-SB2-SS2 1-2′, VF10-SB1-SS1 1-2′, VF10-SB2-SS1 1-2′, and VF10-SB3-SS1 1-2′.

Both chloromethane and vinyl chloride were flagged as J2+/UR- in all seven soil samples as a result of response factor deviations exceeding 100%. In addition, bromoform was estimated (J2+/UJ2-) as a result of RRF loss of 42% in the continuing calibration. Increases in the RRF greater than 15% were recorded for bromomethane, chloroethane, and methylene chloride; however, there were no positive results in the samples which required estimation. The results for 2-chloroethyl vinyl ether were rejected (R+/UR-) due to an unreported continuing calibration.

SO-13196:

Samples VF2-SB5-SS1 1-2′, VF2-SB4-SS1 1-2′, VF2-SB3-SS1 1-2′, and VF2-SB1-SS1 1-2′ were analyzed for volatile organics on instrument VG-1 calibrated initially on 10/29/90. Chloromethane, bromomethane, and bromoform had calibrations which neither met the 0.995 correlation coefficient criteria nor the 20% RSD criteria. The compounds were estimated (J2+/UJ2-).

Chloromethane was flagged as J2+/UR- in all four soil samples as a result of a RRF deviation exceeding 100% in the continuing calibration. Chloroethane, 1,1-dichloroethylene, 1,1-dichloroethane, trans-1,2-dichloroethylene, 1,1,1-trichloroethane, carbon tetrachloride, 1,2-dichloropropane, cis-1,3-dichloropropylene, trichloroethylene, 1,1,2,2-tetrachloroethane, chlorobenzene, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, toluene, ethylbenzene, m-xylene, and o-xylene results had increases in RRF exceeding 15% in the continuing calibration. This resulted in flagging the positive xylenes result for sample VF2-SB4-SS1 1-2′ with a J2. The results for 2-chloroethyl vinyl ether were rejected (R+/UR-) since the continuing calibration information was not provided.

Xylenes were detected and confirmed in sample VF2-SB4-SS1 1-2′; however, the second column confirmation analysis was performed ten days after the original analysis and seven days after the holding time expired. Since the second column is used only for confirmation and not quantitation, confirmed results are unaffected; furthermore, results for compounds detected in neither column are unaffected. The problem arises when a compound is detected in the original column, but was not confirmed in the second column. The results for these compounds are rejected (R) due to the elapsed time between analyses and the expired holding time at the time of the second column analysis. Both benzene and toluene were detected originally in sample VF2-SB4-SS1 1-2′ but were reported as undetected based on the confirmation column; therefore, the results have been rejected.

SO-13540:

The soil holding times were exceeded for the SW8020 (aromatic volatiles) analysis for all eight soil samples in the package:

VF3/6-SB11-SS1 5-6′	(24 days)
VF3/6-SB11-SS11 5-6′	(24 days)
VF3/6-SB12-SS1 3-4′	(27 days)
VF3/6-SB13-SS1 5-6′	(24 days)
VF3/6-SB14-SS1 5-6′	(24 days)
VF3/6-SB15-SS1 7-8′	(27 days)
VF3/6-SB16-SS1 5-6′	(27 days)
VF3/6-SB16-SS1 5-6′	(27 days)

The holding times exceeded the 14 day limit by either 10 days or 13 days and all positive and negative data for SW8020 compounds were estimated (J3+/UJ3-). Instrument calibration criteria were achieved.

The eight soil samples in package SO-13540 were analyzed by method SW8020 on instrument VG-2 initially calibrated on 9/13/90. No qualification of the data was required as a result of either the initial calibration or the continuing calibration; however, if positive results had been detected for benzene or toluene in samples VF3/6-SB11-SS1 5-6′; VF3/6-SB11-SS11 5-6′, VF3/6-SB13-SS1 5-6′, or VF3/6-SB14-SS1 5-6′, or for benzene in samples VF3/6-SB12-SS1 3-4′, VF3/6-SB15-SS1 7-8′, VF3/6-SB16-SS1 5-6′, or VF3/6-SB16-SS11 5-6′, estimation of the results would have been required.

Semi-Volatile Organics

SO-13171:

2,4-dinitrophenol had a RSD exceeding 30% for the initial calibration used for the 7 soil samples in the package. Results for 2,4-dinitrophenol were estimated (J2+/UJ2-) in all seven samples:

VF9-SB1-SS1 1-2′
VF9-SB2-SS1 1-2′
VF9-SB3-SS1 1-2′
VF2-SB2-SS1 1-2′
VF10-SB1-SS1 1-2′
VF10-SB2-SS1 1-2′
VF10-SB3-SS1 1-2′

The continuing calibration for VF9-SB3-SS1 1-2′ and VF10-SB3-SS1 1-2′ had hexachlorocyclopentadiene, 2,4-dinitrophenol, and 3,3′-dichlorobenzidine with RRFs which deviated more than 25% from the initial calibration. They were flagged (J2+/UJ2-)in the two samples.

Isophorone and 2,4-dinitrophenol exceeded the 25% continuing calibration criteria for samples VF9-SB1-SS1 1-2', VF9-SB2-SS1 1-2', VF2-SB2-SS1 1-2', VF10-SB1-SS1 1-2', and VF10-SB2-SS1 1-2'. Both the positive and negative data were estimated (J2+/UJ2-) for these compounds in the five samples.

SO-13196:

2,4-dinitrophenol had a RSD exceeding the 30% initial calibration criteria. Results for 2,4-dinitrophenol were flagged (J2+/UJ2-) in samples VF2-SB1-SS1 1-2', VF2-SB3-SS1 1-2, VF2-SB4-SS1 1-2', and VF2-SB5-SS1 1-2'.

The continuing calibration for VF2-SB4-SS1 1-2' and VF2-SB5-SS1 1-2' had hexachlorocyclopentadiene, 2,4-dinitrophenol, and benzo(g,h,i) perylene with RRFs which deviated more than 25% from the initial calibration. They were flagged (J2+/UJ2-) in the two samples. Furthermore, isophorone and 2,4-dinitrophenol exceeded the 25% continuing calibration criteria for samples VF2-SB1-SS1 1-2' and VF2-SB3-SS1 1-2' and were flagged as estimated (J2+/UJ2-).

The matrix spike and matrix spike duplicate recoveries of 4-nitrophenol exceeded the accepted range of 10-80%. Data qualification was not required because 4-nitrophenol was not detected in any sample in this package.

Pesticides/PCBs

SO-13171:

The linearity check for endrin for the second column exceeded the RSD 10% limit; however, this column was only used for confirmation so no corrective action was needed.

4,4'-DDD was detected at a level below the quantitation limit in sample VF9-SB2-SS1 1-2'. It should have been estimated (J) so the flag has been added.

The dibutylchlorendate (DBC) surrogate recovery was designated as an asterisk in the data sheet for VF9-SB2-SS1 1-2'. The laboratory reported that this was due to a matrix interference in which an unknown compound coeluted with the DBC to yield a 500% recovery.

SO-13196:

The linearity check for endrin for the second column exceeded the RSD limit of 10%; however, this column was only used for confirmation so no corrective action was required.

Alphachlordane was reported at the detection limit in sample VF2-SB1-SS1 1-2'; however, none was present in the confirmation column. The presumptive evidence flag (N) was applied to alpha chlordane in this sample.

Inorganics

SO-13196:

The spike recovery of mercury was less than the 75% minimum. Mercury results are estimated (J4+/UJ4-) for samples VF2-SB1-SS1 1-2', VF2-SB3-SS1 1-2', VF2-SB4-SS1 1-2', and VF2-SB5-SS1 1-2'.

SO-13540:

The spike recovery of lead exceeded the 125% maximum which resulted in the estimation (J2) of positive results. Lead was detected and estimated in all eight soil borings.

1990 Water Samples

Volatile Organics

General:

Neither initial or continuing calibrations were performed for benzyl chloride, bromobenzene, 1-chlorohexane, chlorotoluene, dibromomethane, dichlorodifluoromethane, 1,1,1,2-tetrachloroethane, and trichloropropane. All 1990 SW8010 results for these eight compounds are unusable (R). Results for these eight compounds have not been included in the data summary tables.

SO-11480:

Samples VF1-MW5-1X-ES and VF3/6-MW6-X1-ES were analyzed on instrument VG-1 with an initial calibration from 6/25/90. Calibrations for 1,2-dichlorobenzene and 1,4-dichlorobenzene from method SW8020 and for chloromethane, bromomethane, bromoform, and chlorobenzene from method SW8010 did not meet either the 0.995 correlation coefficient requirement or the 20% RSD requirement. The compounds were estimated (J2+/UJ2-) in both samples. Also, results for chloroethyl vinyl ether were flagged J2+/UR- because the calibration curve was unacceptable. It had a correlation coefficient of only 0.813 and a percent RSD of 76.6.

Results for 1,2-dichloroethane, 2-chloroethyl vinyl ether, 1,2-dichlorobenzene, and o-xylene were estimated (J2+/UJ2-) in both samples as a result of a loss of RRF in excess of 15% in the continuing calibration. Positive results for vinyl chloride, chloroethane, trichlorofluoromethane, toluene, and ethylbenzene would have been estimated if they had been detected in either sample because RRF increased by more than 15%.

SO-12409:

Samples VF1-MW5-2X-ES and VF3/6-MW6-2X-ES were analyzed on instrument VG-1 initially calibrated 6/25/90. Calibrations for 1,2-dichlorobenzene and 1,4-dichlorobenzene from method SW8020 and chloromethane, bromomethane, bromoform, and chlorobenzene from method SW8010 did not meet either the 0.995

correlation coefficient requirement or the 20% RSD requirement. The compounds were estimated J2+/UJ2- in both samples. In addition, results for 2-chloroethyl vinyl ether were flagged J2+/UR- because the calibration curve was unacceptable. The RSD exceeded 75% and the correlation coefficient was only 0.813.

Positive and negative results were estimated (J2+/UJ2-) in both of the package samples for the compounds methylene chloride, 1,2-dichloroethane, dibromochloromethane, 1,1,2-trichloroethane, trans-1,3-dichloropropylene, 2-chloroethyl vinyl ether, bromoform, 1,1,2,2-tetrachloroethane, tetrachloroethylene, and 1,2-dichlorobenzene as a result of a loss of RRF in the continuing calibration exceeding 15%. If bromomethane, vinyl chloride, or 1,4-dichlorobenzene had been detected, the positive results would have been estimated.

SO-12821:

Samples VF1-MW12-1X-ES and VF1-MW25-1X-ES were analyzed on instrument VG-1 calibrated initially on 6/25/90. Calibrations for SW8010 compounds chloromethane, bromomethane, bromoform and chlorobenzene and SW8020 compounds 1,2-dichlorobenzene and 1,4-dichlorobenzene did not meet either the 0.995 correlation coefficient criteria or the 20% RSD criteria. The compounds were estimated (J2+/UJ2-) in both samples. In addition, results for 2-chloroethyl vinyl ether were flagged J2+/UR- as a result of an unacceptable initial calibration curve. The RSD exceeded 75% and the correlation coefficient was only 0.813.

Results for chloromethane, chloroethane, cis-1,3-dichloropropylene, 2-chloroethyl vinyl ether, and 1,2-dichlorobenzene were estimated (J2+/UJ2-) in both samples as a result of a loss of RRF in excess of 15% in the continuing calibration. If vinyl chloride had been detected, the positive results would have been estimated due an increase in RRF of 20%.

SO-13059 and SO-13092:

All seven samples in packages SO-13059 and SO-13092 were analyzed for volatile organics on instrument VG-1 calibrated initially on 10/29/90. Calibrations for chloromethane, bromomethane, and bromoform did not meet either the 0.995 correlation coefficient requirement or the 20% RSD requirement. The compounds were estimated (J2+/UJ2-) in the five samples analyzed by method SW8010: VF2-MW1-W2-ES, VF7-MW6-W2-ES, VF9-MW1-W2-ES, VF7-MW2-W2-ES, and VF1-ET1-W2-ES.

Results for 2-chloroethyl vinyl ether were estimated (J2+/UJ2-) in samples VF2-MW1-W2-ES, VF7-MW6-W2-ES, VF9-MW1-W2-ES, VF7-MW2-W2-ES, and VF1-ET1-W2-ES as a result of a loss in RRF in excess of 15%. Had chloromethane, 1,2-dichlorobenzene, 1,3-dichlorobenzene, or 1,4-dichlorobenzene been detected in any of the samples in either package, the positive results would have been estimated as a result of a greater than 15% increase in the RRF in the continuing calibration.

SO-13125:

The five samples in package SO-13125 were analyzed for volatile organics on instrument VG-1 initially calibrated on 10/29/90. Calibrations for chloromethane, bromomethane, and bromoform did not meet either the 0.995 correlation coefficient requirement or the 20% RSD requirement. The compounds were estimated (J2+/UJ2-) in all five samples: VF7-MW1-W2-ES, VF7-MW3-W2-ES, VF7-MW4-W2-ES, VF7-MW5-W2-ES, and VF7-MW7-W2-ES.

Results for vinyl chloride and methylene chloride were estimated (J2+/UJ2-) for each of the package SO-13125 samples as a result of a loss in RRF of greater than 15% in the continuing calibration. If 1,2-dichlorobenzene had been detected in the package, the positive results would have been estimated as a result of an increase in RRF of greater than 15%. As a result of a lack of continuing calibration information for 2-chloroethyl vinyl ether, the results have been rejected (R+/UR-) throughout the package.

SO-13139:

All five samples in package SO-13139 were analyzed for volatile organics or instrument VG-1 calibrated initially on 10/29/90. Calibrations for chloromethane, bromomethane, and bromoform did not meet either the 0.995 correlation coefficient criteria or the 20% RSD criteria. The compounds were estimated (J2+/UJ2-) in the three samples analyzed by method SW8010: VF9-MW3-W2-ES, VF9-MW2-W2-ES, and VF92-BBW1-W2-ES.

Results for 2-chloroethyl vinyl ether were estimated in samples VF9-MW3-W2-ES, VF9-MW2-W2-ES, and VF92-BBW1-W2-ES as a result of a loss in RRF in the continuing calibration exceeding 15%. Increase in RRF of greater than 15% were recorded for chloromethane, chloroethane, cis-1,3-dichloropropylene, 1,2-dichlorobenzene, and 1,4-dichlorobenzene; however, data qualification was not necessary in the absence of positive data.

SO-13146:

The four samples in package SO-13146 were analyzed for volatile organics on instrument VG-1 calibrated initially 10/29/90. Calibrations for chloromethane, bromomethane, and bromoform did not meet either the 0.995 correlation coefficient criteria or the 20% RSD criteria. The compounds were estimated (J2+/UJ2-) in samples VF2-MW3-W2-ES and VF2-MW5-W2-ES which were analyzed by method SW8010.

Benzene, toluene, and ethylbenzene had decreases in RRF exceeding 15% in the continuing calibration. The results of these compounds were estimated (J2+/UJ2-) in samples VF2-MW3-W2-ES, VF2-MW5-W2-ES, VF3/6-MW3-W2-

ES, and VF3/6-MW6-W2-ES. The RRF of chloromethane increased 25% in the continuing calibration; however, there were no positive chloroethane results to estimate. The continuing calibration for 2-chloroethyl vinyl ether were not provided; therefore, the results were rejected (R+/UR-).

SO-13171:

The nine liquid samples included in package SO-13171 were analyzed for volatile organics on instrument VG-2 initially calibrated 9/13/90. Calibrations for chloromethane and bromomethane did not meet either the 0.995 correlation coefficient criteria or the 20% RSD criteria. The compounds were estimated (J2+/UJ2-) for the eight samples analyzed by method SW8010: VF10-MW1-W2-ES, VF10-MW2-W2-ES, VF10-MW3-W2-ES, VF10-MW4-W2-ES, VF10-MW5-W2-ES, VF10-MW6-W2-ES, VF10-MW7-W2-ES and VF10-MW8-W2-ES.

The samples from package SO-13171 were analyzed on three different days operating under three different continuing calibrations. Chloromethane and vinyl chloride results were flagged J2+/UR- in all SO-13171 samples as a result of RRFs which deviated by more than 100% in all three continuing calibrations, as were bromomethane in sample VF10-MW8-W2-ES for the same reason. The results of bromoform in samples VF10-MW1-W2-ES, VF10-MW2-W2-ES, VF10-MW3-W2-ES, VF10-MW4-W2-ES, VF10-MW7-W2-ES, and VF5-MW1-W2-ES were estimated (J2+/UJ2-) as a result of a loss in RRF in excess of 15%; the results of bromomethane, chloroethane, methylene chloride, 1,1-dichloroethane, chloroform, carbon tetrachloride, 1,2-dichloropropane, trichloroethylene, 1,3-dichlorobenzene, and 1,4-dichlorobenzene would have been estimated if positive as a result of an increase in RRF. Correspondingly, for sample VF10-MW8-W2-ES, the results for 1,1-dichloroethane, trans-1,2-dichloroethylene, chloroform, 1,1,1-trichloroethane, carbon tetrachloride, dibromochloromethane, 1,1,2-trichloroethane, trans-1,3-dichlorpropylene, and bromoform were estimated (J2+/UJ2-); the results for chloroethane, 1,1,2,2-tetrachloroethane, and tetrachloroethylene would have been estimated if they had been positive. Likewise, for samples VF10-MW5-W2-ES and VF10-MW6-W2-ES bromoform was estimated (J2+/UJ2-); positive results for bromomethane, chloroethane, and methylene chloride would have been estimated. The results for 2-chloroethyl vinyl ether were rejected (R) for all samples in package SO-13171 since continuing calibration data was not provided.

SO-13196:

Samples VF3/6-MW5-W2-ES and VF3/6-MW8-W2-ES were analyzed for volatile organics on instrument VG-1 calibrated initially on 10/29/90. All method SW8020 compounds satisfied initial calibration requirements and neither sample was analyzed by method SW8010.

The positive results for chlorobenzene, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, toluene, ethylbenzene, o-xylene, and m-xylene were estimated (J+) where present due to an increase in RRF exceeding 15%. This resulted in flags for ethylbenzene and xylenes in sample VF3/6-MW8-W2-ES.

SO-13488 and SO-13513:

The nine samples included in packages SO-13488 and SO-13513 were analyzed by instrument VG-1 calibrated initially on 10/29/90. Calibrations for chloromethane, bromomethane, and bromoform did not meet either the 0.995 correlation coefficient criteria or the 20% RSD criteria. The compounds were estimated (J2+/UJ2-) for the six samples analyzed by methods SW8010: VF1-MW1-W2-ES, VF2-MW2-W2-ES, VF1-MW4-W2-ES, VF1-ET2-W2-ES, and VF1-ET6-W2-ES.

The samples from the two packages were analyzed on three different days operating under three different continuing calibrations. In some instances the SW8010 and SW8020 methods were run on different days on one sample. Chloromethane results were rejected for samples VF1-MW4-W2-ES, VF2-MW2-W2-ES, VF1-ET2-W2-ES, and VF1-ET6-W2-ES as a result of a RRF deviation exceeding 100% in the continuing calibration. In sample VF1-MW1-W2-ES, results for bromomethane, methylene chloride, 1,1,2,2-tetrachloroethane, and chlorobenzene were estimated (J2+/UJ2-) as a result of a loss of RRF exceeding 15%; furthermore, if positive results for chloromethane, 1,2-dichlorobenzene, or 1,4-dichlorobenzene had been reported, they would have been estimated as a result of an increase in RRF exceeding 15%. Sample VF2-MW4-W2-ES was analyzed by both method SW8010 and SW8020 on 11/14/90; therefore, bromomethane results were estimated J2+/UJ2- resulting from a 23% loss in RRF and positive chloromethane, cis-1,3-dichloropropylene, 1,2-dichlorobenzene, and 1,4-dichlorobenzene results would have been estimated as a result of increases in RRF of greater than 15%. Samples VF8-MW1-W2-ES, VF1-ET2-W2-Es, and VF1-ET6-W2-ES were also analyzed by method SW8020 on 11/14/90 and, consequently, had positive 1,2-dichlorobenzene or 1,4-dichlorobenzene results been detected, they would have been estimated. Methylene chloride results were estimated, (J2+/-UJ2-) in samples VF1-MW4-W2-ES, VF2-MW2-W2-ES, VF1-ET2-W2-ES and VF1-ET6-W2-ES as a result of a 30% loss in RRF in the continuing calibration. Positive results for dibromomethane, 1,1,2-trichloroethane, trans-1,3-dichloropropylene, and 1,2-dichlorobenzene would also have been estimated if detected as a result of excessive increases in RRF; likewise, 1,2-dichlorobenzene positive results would have been estimated in samples VF3/6-MW1-W2-ES and VF3/6-MW9-W2-ES. Results for 2-chloroethyl vinyl ether were rejected (R+/UR-) in the six samples analyzed by method SW8010 as a result of a lack of continuing calibration data.

SO-13540:

The seven liquid samples included in package SO-13540 were analyzed for volatile organics on instrument VG-2 initially calibrated 9/13/90. Calibrations for chloromethane and bromomethane did not meet either the 0.995 correlation coefficient criteria or the 20% RSD criteria. The compounds were estimated (J2+/UJ2-) for all seven samples: VF1-ET7-W2-ES, VF1-MW2-W2-ES, VF1-MW3-W2-ES, VF1-MW6-W2-ES, VF1-MW7-W2-ES, VF1-MW12-W2-ES, and VF1-MW13-W2-ES.

Although the laboratory ascertains that a continuing calibration was performed on 11/15/90 (the day all seven samples were analyzed), they have been unable to produce the results. Rather than reject all results, the two continuing calibrations from the nearest days preceding and following 11/15/90 were reviewed. The data qualifications were very consistent throughout. The following table displays the continuing calibration results from 11/13/90, 11/14/90, 12/1/90 and 12/4/90 with a RRF deviation magnitude greater than 15% and records how flags were applied to the seven samples analyzed on 11/15/90.

	11/13/90	11/14/90	12/1/90	12/4/90	Flag
chloromethane	1430	370	169	600	J2+UR-
bromomethane	38	48	--	43	J2+
vinyl chloride	709	370	208	423	J2+UR-
chloroethane	34	24	--	35	J2+
methylene chloride	27	31	22	22	J2+
1,1-dichloroethylene	27	19	--	30	J2+
1,1-dichloroethane	16	--	--	15	J2+
1,1,1-trichloroethane	18	--	21	18	J2+
carbon tetrachloride	36	28	38	35	J2+
trichloroethylene	15	17	16	16	J2+
bromoform	-36	-16	--	--	J2+/UJ2-
1,1,2,2-tetrachloroethane	--	17	23	21	J2+
tetrachloroethylene	--	17	23	21	J2+
cis-1,3-dichloropropylene	--	--	25	--	J2+
1,2-dichloropropane	--	--	25	--	J2+
benzene	--	--	15	18	J2+
ethylbenzene	-17	--	--	--	J2+

Positive data was estimated (J2+) for benzene and ethylbenzene in samples VF1-ET7-W2-ES and VF1-MW3-W2-ES. No continuing calibration data was provided for 2-chloroethyl vinyl ether in any of the four continuing calibrations reviewed; therefore, the results were rejected (R+/UR-).

SO-13573:

The six samples included in package SO-13573 were analyzed by instrument VG-2 calibrated initially 9/13/90. Calibrations for chloromethane and bromomethane did not meet either the 0.995 correlation coefficient criteria or the 20% RSD criteria. The compounds were estimated (J2+/UJ2-) for all six samples: VF1-MW5-W2-ES, VF1-MW8-W2-ES, VF1-MW9-W2-ES, VF1-MW10-W2-ES, VF1-MW11-W2-ES, and VF1-MW14-W2-ES.

The samples were analyzed on 11/13/90 and 11/14/90 under two different continuing calibrations. In some instances the SW8010 and SW8020 methods were run on different days on one sample. Chloromethane and vinyl chloride results were flagged J2+/UR- for all samples due RRF deviations over 100%. As a result of RRF losses in excess of 15% in the continuing calibration, bromoform results were estimated (J2+/UJ2-) in samples VF1-MW5-W2-ES, VF1-MW9-W2-ES, VF1-MW14-W2-ES, VF1-MW8-W2-ES, VF1-MW10-W2-ES, and VF1-MW11-W2-ES; ethylbenzene results were estimated (J2+/UJ2-) in sample VF1-MW8-W2-ES. Increases of greater than 15% in the RRF would have caused positive results for bromomethane, chloroethane, methylene chloride, 1,1-dichloroethylene, carbon tetrachloride, and trichloroethylene to be estimated in any of the six samples. In addition, positive 1,1-dichloroethane and 1,1,1-trichloroethane results would have been estimated for samples VF1-MW8-W2-ES, VF1-MW10-W2-ES and VF1-MW11-W2-ES, and positive 1,1,2,2-tetrachloroethane and tetrachloroethylene results would have been estimated in samples VF1-MW5-W2-ES, VF1-MW9-W2-ES, and VF1-MW14-W2-ES. Results for 2-chloroethyl vinyl ether were rejected (R+/UR-) in all six samples as a result of the absence of continuing calibration data.

SO-13592 and SO-13904:

The ten samples included in packages SO-13592 and SO-13904 were analyzed for volatile organics on instrument VG-1 calibrated initially 10/29/90. Calibrations for chloromethane, bromomethane, and bromoform did not meet either the 0.995 correlation coefficient criteria or the 20% RSD criteria. The compounds were estimated (J2+/UJ2-) in all ten samples.

The samples were analyzed on 11/15/90, 11/16/90, and 11/19/90 under three different continuing calibrations. For sample VF1-BPW2-W2-ES the SW8010 and SW8020 analyses were also run under different continuing calibrations. Results for chloromethane were flagged J2+/UR- in samples VF1-BPW1-W2-ES, VF1-BPW7-W2-ES, VF2-SW1-W2-ES, VF2-SW2-W2-ES, VF2-SW3-W2-ES, VF2-SW4-W2-ES, and VF2-SW5-W2-ES as a result of a RRF deviation in the continuing calibration of 143%. As a result of a loss in RRF in excess of 15%, methylene chloride and 2-chloroethyl vinyl ether results were estimated (J2+/UJ2-) in samples VF1-BPW1-W2-ES, VF1-BPW7-W2-ES, VF2-SW3-W2-ES, VF2-SW4-W2-ES and VF2-SW5-W2-ES; bromomethane and methylene chloride results were estimated in samples VF1-BPW2-W2-ES and VF1-BPW4-W2-ES; and methylene chloride results were estimated in samples VF2-SW1-W2-ES, and VF2-SW2-W2-ES. The following table lists the compounds which would have been estimated if positive data had been reported.

Compounds	Samples
dibromochloromethane 1,1,2-trichloroethane trans-1-3-dichloropropylene bromoform 1,2-dichlorobenzene	VF1-BPW1-W2-ES VF1-BPW7-W2-ES VF2-SW3-W2-ES VF2-SW4-W2-ES VF2-SW5-W2-ES
1,2-dichlorobenzene	VF1-BPW2-W2-ES Method SW8020 VF3/6-TW1-W2-ES
chloromethane cis-1,3-dichloropropylene 1,2-dichlorobenzene	VF1-BPW2-W2-ES Method SW8010 VF1-BPW4-W2-ES
dibromochloromethane 1,1,2-trichloroethane trans-1,3-dichloropropylene 1,2-dichlorobenzene	VF2-SW1-W2-ES VF2-SW2-W2-ES

Results for 2-chloroethyl vinyl ether were rejected (R+/UR-) in samples VF2-SW1-W2-ES, VF2-SW2-W2-ES, VF1-BPW2-W2-ES, and VF1-BPW4-W2-ES as a result of the absence of continuing calibration data.

Semi-Volatile Organics

SO-13059 and SO13092:

All three acid surrogate recoveries in the method blank were 0%. The reanalysis of the method blank yielded the same results. The laboratory attributed this to a failure to add the acid surrogates to the blank. The laboratory control samples analyzed with this batch did have the acid surrogates added and acceptable recoveries were achieved. Furthermore, the samples and equipment rinseate had acceptable acid surrogate recoveries. Since the individual sample analyses, field QC analyses, and additional laboratory QC analyses had no acid surrogate recovery problems, further corrective action is not required.

Bis(2-ethylhexyl)phthalate was detected in the method blank at 30 μg/L. Data qualification in accordance with the 10x rule raised the detection limits in samples VF7-MW6-W2-ES, VF9-MW1-W2-ES, VF7-MW2-W2-ES, and VF1-ET1-W2-ES to 18U, 12U, 42U, and 67U respectively.

SO-13125, SO-13139, and SO-13146:

Bis(2-ethylhexyl)phthalate was detected in the method blank at 240 μg/L. Corrective action in accordance with the 10x rule raised detection limits in samples VF9-MW2-W2-ES and VF2-MW5-W2-ES to 25U and 110U respectively.

SO-13171:

The MS/MSD is rejected for semi-volatile liquids in this package as a result of an improper instrument tune. Two of the ion abundance criteria were below the allowed ranges. No flags have been applied to the data.

The positive and negative data were estimated (J2+/UJ2-) in samples VF10-MW1-W2-ES and VF10-MW2-W2-ES for 4-chloroaniline and 3-nitroaniline as a result of RSDs exceeding 30% in the initial calibration. In addition, bis(2-chloroisoprophyl)ether, 3-nitroaniline, and 3,3-dichlorobenzidine were estimated (J2+/UJ2-) in the same samples as a result of a change of RRF in excess of 25% in the continuing calibration.

In samples VF10-MW3-W2-ES, VF10-MW4-W2-ES, VF10-MW5-W2-ES, VF10-MW6-W2-ES, VF10-MW7-W2-ES, and VF10-MW8-W2-ES, the analyte 2,4-dinitrophenol has been estimated (J2+/UJ2-) as a result of an initial RSD in excess of 30%.

SO-13488 and SO-13513:

2,4-dinitrophenol exceeds the 30% initial RSD limit; therefore, it has been estimated (J2+/UJ2-) in samples VF1-MW4-W2-ES, VF1-MW1-W2-ES, VF2-MW4-W2-ES, VF2-MW2-W2-ES, VF1-ET2-W2-ES, and VF1-ET6-W2-ES.

Continuing calibration percent deviations exceeded 25% for hexachlorocyclopentadiene, 2,4-dinitrophenol, 4-nitroaniline, and 3,3′-dichlorobenzidine for samples VF1-MW1-W2-ES, VF1-MW4-W2-ES, and VF2-MW2-W2-ES. It also exceeded 25% for hexachlorocyclopentadiene, 2,4-dinitrophenol, and benzo(g,h,i) perylene for samples VF2-MW4-W2-ES, VF1-ET2-W2-ES, and VF1-ET6-W2-ES. The compounds in these samples were estimated in the positive and negative (J2+/UJ2-).

The fifty base neutrals in sample VF1-MW4-W2-ES were estimated for positive data and rejected for negative data (J4+/UR-) as a result of a surrogate recovery of d-5 nitrobenzene below 10%.

The surrogate recovery of 2,4,6-tribromophenol exceeded the 123% limit in the MS; however, this resulted in no flags.

SO-13540 and SO-13573:

The following 10 samples had the positive and negative data for 2,4-dinitrophenol estimated (J2+/UJ2-) as a result of initial RSDs exceeding 30%:

VF1-MW2-W2-ES
VF1-MW6-W2-ES
VF1-MW7-W2-ES
VF1-MW8-W2-ES
VF1-MW9-W2-ES
VF1-MW10-W2-ES
VF1-MW12-W2-ES
VF1-MW13-W2-ES
VF1-MW14-W2-ES
VF1-ET7-W2-ES

In addition, the 30% RSD limit was exceeded during the initial calibration for dimethylphthalate, 4-chlorophenyl-phenylether, and benzo(k)fluoranthene for samples VF1-MW3-W2-ES, VF1-MW5-W2-ES, and VF1-MW11-W2-ES. They were flagged (J2+/UJ2-).

The continuing calibration for samples VF1-MW8-W2-ES, VF1-MW9-W2-ES, and VF1-MW10-W2-ES had seven compounds which deviated from the initial by more than 25%. Ideno(1,2,3-cd)pyrene, dibenz(a,h)anthracene, benzo(g,h,i) perylene, 2,4,5-trichlorophenol, pyrene, butylbenzlphthalate and 3,3-dichlorobenzidine were estimated for positive and negative data (J2+/UJ2-).

The compounds hexachlorocyclopentadiene, 3-nitroaniline, 4-nitroaniline, 3,3'-dichlorobenzidine, benzo(k)fluoranthene exceeded the 25% deviation limit for the continuing calibration for samples VF1-MW2,W2-ES, VF1-MW6-W2-ES, VF1-MW7-W2-ES, VF1-MW12-W2-ES, VF1-MW13-W2-ES, VF1-MW14-W2-ES, and VF1-ET7-W2-ES, were estimated (J2+/UJ2-).

The continuing calibrations for dimethylphthalate, 4-chlorophenyl-phenylether, and benzo(k)fluoranthene exceed the 25% deviation limit for samples VF1-MW3-W2-ES, VF1-MW5-W2-ES, and VF1-MW11-W2-ES. The data was already estimated as a result of the initial calibration.

The MSD recoveries for pentachlorophenol and 4-chloro-3-methylphenol exceeded the upper limits of their recovery ranges. No flags were applied.

SO-13592 and SO-13904:

The following nine samples had the positive and negative data for hexachloroethane and fluorene estimated (J2+/UJ2-) as a result of initial RSDs exceeding 30%:

VF1-BPW1-W2-ES
VF1-BPW4-W2-ES
VF1-BPW7-W2-ES
VF2-SW1-W2-ES
VF2-SW2-W2-ES
VF2-SW3-W2-ES
VF2-SW4-W2-ES
VF2-SW5-W2-ES

Excessive RSDs in the initial calibration for VF1-BPW2-W2-ES resulted in the estimation (J2+/UJ2-) of dimethylphthalate, 4-chlorophenyl-phenylether, and benzo(k) fluoranthene.

Additional compounds were estimated as a result of continuing calibrations with RRFs which deviated by more than 25% from the initial. Positive and negative results were estimated (J2+/UJ2-) for benzoic acid, 3-nitroaniline, 2,4-dinitrophenol, 4-nitrophenol, 4-nitroaniline, and 4,6-dinitro-2-methylphenol, and fluorene in samples VF1-BPW1-W2-ES, VF1-BPW4-W2-ES, and VF1-BPW7-W2 ES; benzoic acid, 3,3′-dichlorobenzidine, hexachloroethane, and fluorene for samples VF2-SW1-W2-ES, VF2-SW2-W2-ES, VF2-SW3-W2-ES, VF2-SW4-W2-ES, and VF2-SW5-W2-ES; and 4-nitrophenol, hexachloroethane, 2,6-dinitrotoluene, chrysene, and 4-chlorophenyl-phenylether for sample VF1-BPW2-W2-ES.

The method blank surrogate recovery of phenol-d5 exceeded its upper acceptable limit of 94%, and surrogate 2-fluorobiphenyl did not meet its minimum recovery of 43% in sample VF2-SW2-W2-ES. In both cases only one surrogate in one fraction of the semi-volatile analysis did not meet criteria; therefore, no corrective action or data qualification was required.

The MS of 2,4-dinitrotoluene and MSD of 4-nitrophenol exceeded their maximum recovery limits of 96% and 80% respectively. Neither required flagging of the data. The RPD for pyrene exceeded the 31% limit; however, this, too, required no action.

The IS area was out of range for IS6 for sample VF1-BPW2-W2-ES. The corresponding compounds listed in Table E.1 have been estimated (J2+/UJ2-).

Pesticides/PCBs

SO-13059:

The calibration factor for 4,4′-DDT deviates in the continuing calibration by more than 15% from the initial calibration. Had 4,4′-DDT been detected in this package, it would have been flagged as estimated.

SO-13092:

The surrogate recovery for DBC in sample VF7-MW2-W2-ES was below the minimum recovery limit of 24%. The DBC surrogate recovery limits are for advisory purposes only; therefore, qualification of the data was not warranted.

SO-13125, SO-13139, and SO-13146:

The calibration factor for aldrin in the continuing calibration deviates by more than 15% from the initial calibration. Had aldrin been detected in these packages, it would have been flagged as estimated.

The MSD acceptable recovery ranges were exceeded for gamma-BHC and endrin. In addition, the RPD for gamma-BHC exceeded its 15% limit. No qualification of the data resulted from these items.

SO-13513:

The linearity check for 4,4′-DDT exceeded the 10% RSD limit. Had 4,4′-DDT been detected in this package samples, it would have been flagged as estimated.

The calibration factor for methoxychlor and endrin in the continuing calibration deviate from the initial by more than 15%. Had either compound been detected, it would have been flagged as estimated.

SO-13905:

The calibration factors for toxaphene and alpha-chlordane in the continuing calibration deviate from the initial by more than 15% Had either compound been detected, it would have been flagged as estimated.

Inorganics:

General:

Positive and negative data for silver were estimated (J4+/UJ4-) in all liquid samples as a result of matrix spike recoveries, which repeatedly failed to meet the minimum recovery limit of 75%. In samples VF9-MW2-W2-ES, VF9-MW3-W2-ES, and VF92-BBW1-W2-ES the silver results are rejected (R+/UR-) because the spike recovery of silver was 0%. The laboratory attributed the lack of recovery to inadvertently not spiking the sample with silver; however, the results are still rejected since silver results had a history of trouble.

SO-13146, SO-13488, and SO-13513:

The RPD for thallium, arsenic, selenium, and lead between the MS and MSD exceeded the 20% control limit; however, no data qualification is required on this count. In addition, the arsenic MSD recovery exceeded the 125% limit which resulted in the estimation of positive results (J4). Arsenic results were flagged only in sample VF1-MW4-W2-ES.

SO-13171:

The matrix spike recoveries for zinc and copper exceeded the 125% limit. Corrective action requires flagging the positive results as estimated (J4). This resulted in the estimation of zinc in samples VF10-MW2-W2-ES, VF10-MW6-W2-ES, VF10-MW7-W2-ES, and VF10-MW8-W2-ES.

SO-13592 and SO-13904:

The matrix spike duplicate recovery for lead exceeded the 125% limit. Positive data is qualified as estimated (J4). Samples VF1-BPW1-W2-ES, VF1-BPW7-W2-ES, VF2-SW2-W2-ES, and VF2-SW4-W2-ES from the two packages required this flag.

Accuracy, Precision, Completeness of Laboratory Data

Accuracy, as previously discussed, involves the analysis of spiked samples and an evaluation of the recovery of the spiked compound. Accuracy was computed using the percent recoveries from matrix spikes and matrix spike duplicates. All of the analytes for each analysis met percent recovery limits for MS/MSD 100 percent of the time except as follows: pesticides/PCBs in 1989 soils - 91.7%, lead in 1990 soils - 87.5%, semivolatiles in 1990 soils - 97.0%, priority pollutant metals in 1990 soils - 98.1%, pesticides/PCB in 1990 water - 93.8%, semivolatiles in 1990 water - 97.1% and priority pollutant metals in 1990 water - 91.7%.

Precision was computed using the RPD between the matrix spike and matrix spike duplicate. The RPDs were within limits 100% of the time except as follows for 1990 water samples: pesticides/PCB's - 93.8%, semivolatiles - 98.3%, and priority pollutant metals - 90.0%.

Data which was considered sufficient for the completion of the RI was considered valid in the computation of completeness. Estimated data was generally useable. Less than 1 percent of the data was qualified with an "R" or "N" flag. Both of these categories were unquestionably unusable.

FIELD QC RESULTS

1989

As part of the 1989 field effort, trip blanks, source water blanks, and equipment rinseate blanks were collected to assess the potential for the introduction of contaminants to the samples during sample collection. The results of the analysis of the field QC samples are summarized in Tables E.27 through E.29. Tables E. 62 through E.64 show which field samples are associated with which field QC samples. Trip blanks were shipped with all liquid samples; however, they were generally not included with soil samples. This oversight has a minimal effect on data quality since a detection was measured in only one trip blank and the same compound was also detected in other field QC samples. Also equipment rinseates were not collected from soil sampling equipment, but this oversight, too, does not effect the validity of soils data.

Chloroform was detected in one trip blank, one equipment rinseate, and both source blanks--potable water and HPLC. All other field QC samples were free from organic contamination. The presence of chlorinated compounds (*i.e.*, chloroform) indicates contamination as a result of sample handling, most probably, in the laboratory during preparation procedures. This is further supported by the detection of chloroform in all three varieties of field QC samples. Thus, chloroform contamination is unlikely to be indicative of contamination at the sites. The detection level of chloroform was raised to up to 2.75 µg/L in samples VF1-MW6-W1-ES, VF1-MW8-W1-ES, VF10-MW5-W1-ES, VF10-MW20-W1-ES, VF10-MW6-W1-ES, and VF5-MW1-W1-ES.

Mercury and Zinc were the only other detected compounds in field QC samples. They were detected at concentrations of 0.23 µg/L in VF-ERB3-ES and 80 µg/L in VF-ERB1-ES, respectively. Six field samples also had mercury concentrations at levels near 0.23 µg/l. Mercury detection levels were raised in corresponding samples by flagging results as undetected (U) in samples VF10-SW1-W1-ES, VF10-SW2-W1-ES, VF10-SW4-W1-ES, VF10-MW5-W1-ES, VF10-MW7-W1-ES, and VF10-MW20-W1-ES. Zinc detection levels were likewise raised in samples VF1-MW5-W1-ES, VF1-MW6-W1-ES, and VF1-MW7-W1-ES.

As part of the field investigation , duplicate samples were collected to assess the precision of the field data. Tables E.58 and E.59 present the results of the duplicate analyses as well as the calculated RPDs. Overall the RPDs are considered good precision (<20% for water, <35% for soil). One pair of water samples exceeded these informal limits; however, the elevated RPD does not affect data quality.

1990

As part of the 1990 field effort, trip blanks, source water blanks and equipment rinseate blanks were collected to assess the potential for the introduction of contaminants to the samples during sample collection. The results of the analysis of the field QC samples are summarized in Tables E.30 through E.32. Tables E.66 through E.68 show which investigation samples are associated with which field QC samples. Compounds were detected in two equipment rinseates and three source water blanks. Nothing was detected in the trip blanks.

The common laboratory contaminant bis(2-ethylhexyl)phthalate was the only compound detected in the HPLC source water blank and the two equipment rinseate blanks. As a result of the source water blank detection, the reported bis(2-ethylhexyl) phthalate concentrations in VF10-MW1-W2, VF10-MW2-W2, and VF10-MW5-W2 were flagged as not detected (U) in accordance with the 10x rule. In sample VF10-MW3-W2 and VF10-MW6-W2, bis(2-ethylhexyl)phthalate was estimated below the contract required detection limit (CRDL) by the laboratory. In these two samples bis(2-ethylhexyl)phthalate was reported as not detected at the CRDL (10U). As discussed earlier bis(2-ethylhexyl)phthalate was found in laboratory blanks; therefore, it is felt that the results are indicative of laboratory contamination and that the compound was not introduced into the samples in the field. No other organic compounds were detected in the rinseate blanks. The potable water blanks, VF-FB3 and VF-FB5 contained chloroform and bromodichloromethane. These compounds are often present in chlorinated water supplies; however, none of these compounds were detected in any of the investigative samples. The presence of these compounds in the potable water blanks did not affect data quality.

Copper, nickel, and zinc were detected in the two potable water blanks. The presence of these compounds in the potable water blanks did not affect data quality.

As part of the field investigation, duplicate samples were collected to assess the precision of the field data. Tables E.60 and E.61 present the results of the duplicate analyses as well as the calculated RPDs. For soils the RPDs for volatile organics were excellent and for the other constituents only one of the three lead RPDs was particularly high at 76.9%. Given the variability of the soils matrix, these results are quite satisfactory. For water duplicates, the RPDs for all of the organics were very good (<20%) with the exception of 31% for toluene in one instance. This toluene RPD was, however, calculated from two quantities which differed by less than one half of the contract required detection limit. Therefore, the 31% RPD is in fact very good. The majority of the inorganic RPDs were also good; however, the zinc and copper RPDs for the base production well duplicate were 86 and 77% respectively. This may have been due to the construction of the well and the length of time required to collect a filtered metal sample. The duplicate sample had the higher dissolved metal concentrations and was collected from water which had remained in the well for a longer time after purging (approximately 1/2 hours). These differences were not judged to affect data quality.

SUMMARY

Overall, the quality of the data is good; furthermore, the precision, accuracy, and completeness are considered sufficient to meet the data objectives for the Volk RI Report. The data, however, do have numerous qualifications as a result of procedural, reporting and analytical irregularities which did not conform to quality assurance criteria. Highlights of the preceding laboratory QA/QC subsection are summarized below by the reason for data qualification.

(1) Samples were not analyzed within holding times.

- 1989 - All semivolatile analytes in samples from the Site 10 wells MW-5 and MW- 7 were estimated.
- 1990 - All SW8020 analytes in six soil samples and two duplicates at Site 3/6 were estimated.

- 1990 - All volatile analytes in samples from the Site 10 wells MW-5 and MW-6 and the three Site 10 soil borings were estimated.
- 1990 - Results for benzene and toluene were rejected in one Site 2 soil sample as a result of a second column which was analyzed after its holding time and did not confirm the first column results.

(2) The initial or continuing calibrations were either not performed or not provided.

- 1989 - Results in all SW8010 analyses for 1,1,1,2-tetrachloroethane were rejected.
- 1990 - Results in all SW8010 analyses for benzylchloride, bromobenzene, 1-chlorohexane, chlorotoluene, dibromomethane, dichlorodiffuoromethane, 1,1,1,2-tetrachloroethane, and trichloropropane were rejected.
- 1989 - Results for approximately 60% of the SW8010 analyses for 2-chloroethyl vinyl ether at Sites 5 and 10 were rejected.
- 1990 - Results for approximately 80% of the SW8010 analyses for 2-chloroethyl vinyl ether from all sites were rejected.

(3) Initial calibration criteria were not achieved.

- 1989 - Results in all volatile analyses for chloromethane, vinyl chloride, 2-chloroethyl vinyl ether, bromoform, and chlorobenzene were estimated.
- 1990 - Results were estimated for chloromethane and bromomethane in all SW8010 analyses; for bromoform in most SW8010 analyses; for chlorobenzene in several SW8010 analyses; and for 1,2-dichlorobenzene and 1,4-dichlorobenzene in several SW8020 analyses.
- 1990 - Results for 2-chloroethyl vinyl ether were rejected in several SW8010 analyses.
- 1989, 1990 - Results for between 0 and 4 miscellaneous analytes were estimated in all semi-volatile analyses. The specific analytes changed frequently.

(4) Continuing calibration criteria were not achieved.

- 1989 - Results for all SW8010 analytes except bromodichloromethane, carbon tetrachloride, and 1,1,1-trichloroethane were estimated in most Site 1 soil samples.
- 1989 - Results for 1,2-dichlorobenzene, 1,3-dichlorobenzene, and 1,4-dichlorobenzene were estimated in all Site 1 samples analyzed by method SW8020.
- 1989 - Results for numerous and assorted volatile and semi-volatile analytes were estimated in addition to those already listed.
- 1990 - Results for over 50% of the SW8010 analytes, chloromethane and vinyl chloride, were rejected in Site 1 samples.
- 1990 - Results for chloromethane in all SW8010 analyses of Site 2, Site 9, and Site 10 soil samples were rejected. Vinyl chloride results were also rejected in all Site 9 and Site 10 soil samples and in one Site 2 soil sample.
- 1990 - Results for chloromethane and vinyl chloride in all SW8010 analyses of Site 10 groundwater samples were rejected.
- 1990 - Results for numerous and assorted volatiles and semi-volatiles were estimated.
- 1989 - Results for arsenic were estimated in five Site 10 water samples.

(5) Internal standard area count criteria were not achieved.

- 1989 - Nearly 30% of the semi-volatile internal standards were out of criteria and the corresponding analytes were estimated in the respective samples.
- 1990 - The results for the semi-volatile analytes corresponding to perylene-d_{12} were estimated in one base production well sample.

(6) Laboratory quality control data did not achieve criteria.

- 1989 - Positive toluene and xylenes results were estimated in five Site 5 soil samples as a result of high surrogate recoveries.
- 1990 - Results for all SW8020 analytes were estimated in one site 3/6 soil sample as a result of a low surrogate recovery.
- 1990 - Mercury results were estimated in four Site 2 soil samples as a result of a low surrogate recovery.

- 1990 - Positive lead results were estimated in eight Site 3/6 soil samples as a result of a high spike recovery.
- 1990 - Positive results were estimated and negative results were rejected for the semi-volatile, base neutral analytes in sample VF1-MW4-W2 as a result of a surrogate recovery below 10%.
- 1990 - Results for silver were estimated in all water samples as a result of spike recoveries which repeatedly failed to meet the minimum criteria.
- 1990 - Positive arsenic results were estimated in VF1-MW4-W2 as a result of a high spike recovery.
- 1990 - Positive zinc results were estimated in four site 10 groundwater samples as a result of a high spike recovery.
- 1990 - Positive lead results were estimated in two base production well samples and two Site 2 surface water samples as a result of a high spike recovery.

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TABLE E.1
SEMIVOLATILE INTERNAL STANDARDS WITH CORRESPONDING TARGET ANALYTES ASSIGNED FOR QUANTITATION
VOLK FIELD ANGB, WI

1,4-Dichlorobenzene-d_4	Naphthalene-d_8	Acenaphthene-d_{10}	Phenanthrene-d_{10}	Chrysene-d_{12}	Perylene-d_{12}
Phenol	Nitrobenzene	Hexachlorocyclopentadiene	4,6-Dinitro-2-methylphenol	Pyrene	Di-n-octylphthalate
bis(2-Chloroethyl)ether	Isophorone	2,4,6-Trichlorophenol	N-nitrosodi-phenylamine	Butylbenzyl phthalate	Benzo(b)fluoranthe
ne					
2-Chlorophenol	2-Nitrophenol	2,4,5-Trichlorophenol	1,2-Diphenylhydrazine	3,3'-Dichlorobenzidine	Benzo(k)fluoranthen
e					
1,3-Dichlorobenzene	2,4-Dimethyl-phenol	2-Chloronaphthalene	4-Bromphenyl phenyl ether	Benzo(a)anthracene	Benzo(a)pyrene
1,4-Dichlorobenzene	Benzoic acid	2-Nitroaniline	Hexachlorobenzene	bis(2-ethylhexyl)phthalate	Indeno(1,2,3-
cd)pyrene					
Benzyl Alcohol	bis(2-Chloroethoxy)	Dimethyl phthalate	Pentachlorophenol	Chrysene	Dibenz(a,h)anthrace
ne					
1,2-Dichlorobenzene	methane	Acenaphthylene	Phenanthrene		Benzo(g,h,i)perylene
2-Methylphenol	2,4-Dichlorophenol	3-Nitroaniline	Anthracene		
bis(2-Chloroisopropyl)ether	1,2,4-Trichlorobenzene	Acenaphthene	Di-n-butyl phthalate		
4-Methylphenol	Naphthalene	2,4-Dinitrophenol	Fluoranthene		
N-nitroso-Di-n-propylamine	4-Chloroaniline	4-Nitrophenol			
	Hexachlorobutadiene	Dibenzofuran			
Hexachloroethane	4-Chloro-3-methyl-phenol	2,4-Dinitrotoluene			
		2,6-Dinitrotoluene			
	2-Methylnaphthalene	Diethyl Phthalate			
		4-Chlorophenyl phenyl ether			
		Fluorene			
		4-Nitroaniline			

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TABLE E.2
1989 TARGET COMPOUNDS AND ANALYTICAL DETECTION LIMITS[1]
VOLK FIELD ANGB, WI

	Practical Quantitation Limit Water Samples (μg/L)	Practical Quantitation Limit Soil Samples (μg/kg)
SW8010 - Purgeable Halocarbons[2,4]		
Bromodichloromethane	1	5.0
Bromoform	2	5.0
Carbon Tetrachloride	1.2	5.0
Chloroethane	5.2	5.0
Chloroform	0.5	2.5
2-Chloroethyl Vinyl Ether	1.3	5.0
Chloromethane	0.8	4.0
Dibromochloromethane	0.9	4.0
1,1-Dichloroethane	0.7	3.5
1,2-Dichloroethane	0.3	1.5
1,1-Dichloroethylene	1.3	5.0
Trans-1,2-Dichloroethylene	1.0	5.0
1,2-Dichloropropane	0.4	2.0
1,3-Dichloropropylene	3.4	5.0
1,1,1,2-Tetrachloroethane	0.3	1.5
Tetrachloroethylene	0.3	1.5
1,1,1-Trichloroethane	0.3	1.5
1,1,2-Trichloroethane	0.2	1.0
Trichloroethylene	1.2	5.0
Vinyl Chloride	1.8	5.0
SW8020 - Purgeable Aromatic Hydrocarbons[2,4]		
Benzene	1	5.0
Chlorobenzene	2	5.0
1,2-Dichlorobenzene	4	5.0
1,3-Dichlorobenzene	4	5.0
1,4-Dichlorobenzene	3	5.0
Ethyl Benzene	2	5.0
Toluene	2	5.0
Xylenes (o, m, p isomers)	2	5.0
CLP SOW Semi-Volatile Organics[3]		
Acenaphthene	10	330
Acenapthylene	10	330
Anthracene	10	330
Benzo(a)anthracene	10	330
Benzo(b)fluoranthene	10	330
Benzo(k)fluoranthene	10	330
Benzo(g,h,i)perylene	10	330
Benzo(a)pyrene	10	330
Butyl benzyl phthalate	10	330
bis(2-chloroethoxy)methane	10	330
bis(2-chloroethyl)ether	10	330
bis(2-chloroisopropyl)ether	10	330
bis(2-ethylhexyl)phthalate	10	330
2-Chloronaphthalene	10	330

TABLE E.2 (CONTINUED)
1989 TARGET COMPOUNDS AND ANALYTICAL DETECTION LIMITS[1]
VOLK FIELD ANGB, WI

	Practical Quantitation Limit Water Samples (µg/L)	Practical Quantitation Limit Soil Samples (µg/kg)
CLP SOW Semi-Volatile Organics[3] (Continued)		
Chrysene	10	330
Dibenzo(a,h)anthracene	10	330
Di-n-butylphthalate	10	330
3,3'-Dichlorobenzidine	20	660
Diethylphthalate	10	330
2,4-Dinitrotoluene	10	330
2,6-Dinitrotoluene	10	330
Di-n-octylphthalate	10	330
Hexachlorobenzene	10	330
Hexachlorocyclopentadiene	10	330
Hexachloroethane	10	330
Indeno(1,2,3-cd)pyrene	10	330
Isophorone	10	330
Naphthalene	10	330
Nitrobenzene	10	330
N-Nitrosodiphenylamine	10	330
N-Nitrosodi-n-propylamine	10	330
Phenanthrene	10	330
Pyrene	10	330
1,2,4-Trichlorobenzene	10	330
4-Chloro-3-methylphenol	10	330
4-Chlorophenol	10	330
2,4-Dichlorophenol	10	330
2,4-Dimethylphenol	10	330
2,4-Dinitrophenol	50	1600
2-Methyl-4,6-Dinitrophenol	50	1600
2-Nitrophenol	10	330
4-Nitrophenol	50	1600
Pentachlorophenol	50	1600
Phenol	10	330
2,4,5-Trichlorophenol	10	330
2,4,6-Trichlorophenol	10	330
CLP SOW - Pesticides and PCBs[3]		
Aldrin	0.05	8.0
Alpha-BHC	0.05	8.0
Beta-BHC	0.05	8.0
Delta-BHC	0.05	8.0
Gamma-BHC	0.05	8.0
Chlordane	-	-
4,4'-DDD	0.10	16.0
4,4'-DDE	0.10	16.0
4,4'-DDT	0.10	16.0
Dieldrin	0.10	16.0
Endosulfan I	0.05	8.0
Endosulfan II	0.10	16.0
Endosulfan Sulfate	0.10	16.0

TABLE E.2 (CONTINUED)
1989 TARGET COMPOUNDS AND ANALYTICAL DETECTION LIMITS[1]
VOLK FIELD ANGB, WI

	Practical Quantitation Limit Water Samples ($\mu g/L$)	Practical Quantitation Limit Soil Samples ($\mu g/kg$)
CLP SOW - Pesticides and PCBs[3] (Continued)		
Endrin	0.10[1]	16.0
Endrin aldehyde	-	-
Heptachlor	0.05	8.0
Heptachlor epoxide	0.05	8.0
Kepone	-	-
Methoxychlor	0.5	80
Toxaphene	1.0[1]	160.0
PCB-1016	0.5	80
PCB-1221	0.5	80
PCB-1232	0.5	80
PCB-1242	0.5	80
PCB-1248	0.5	80
PCB-1254	1.0	160
PCB-1260	1.0	160
E418.1 - Total Petroleum Hydrocarbons	1,000	10,000
SW9071 - Oil and Grease	1,000	10,000
INORGANICS[3]		
E160.1 - Total Dissolved Solids	5,000	NA
Antimony (SW7040)	50	5,000
Arsenic (SW7060)	10	1,000
Beryllium (SW7090)	5	500
Cadmium (SW7131)	5	500
Chromium (SW7191)	10	1,000
Copper (SW7210)	10	1,000
Lead (SW7421)	5	500
Mercury (SW7470/7471)	0.2	30
Nickel (SW7521)	10	1,000
Selenium (SW7740)	5	500
Silver (SW6010)	10	1,000
Thallium (SW7841)	5	500
Zinc (SW6010)	10	1,000

1 Specific quantitation limits are highly matrix dependent. The quantitation limits listed here in are provided for guidance and may not always have been achievable.

2 Practical Quantitation Limits for soils are not the same as those reported in the 1989 QAPP. These are the actual values reported by the lab. In all cases, this limit is equal to or better than the Practical Quantitation Limits requested in the 1990 QAPP.

3 Practical Quantitaion Limits for soils are those requested in the QAPP. Due to the variability of the soil matrix, the limit for any given sample may be either better or worse. The sample specific detection limits never exceed the listed Practical Quantitation limits by more than 20 percent after adjustment for dilution factors.

4 Reported practical quantitation limit for soils is at a dilution of 5.

TABLE E.3
1990 TARGET COMPOUNDS AND ANALYTICAL DETECTION LIMITS[1]
VOLK FIELD ANGB, WI

	Practical Quantitation Limit Water Samples ($\mu g/L$)	Practical Quantitation Limit Soil Samples ($\mu g/kg$)
SW8010 - Purgeable Halocarbons[4]		
Benzyl Chloride	1.0	5.0
Bromobenzene	1.0	5.0
Bromodichloromethane	1.0	5.0
Bromoform	1.0	5.0
Bromomethane	1.0	5.0
Carbon Tetrachloride	1.0	5.0
Chlorobenzene	1.0	5.0
Chloroethane	1.0	5.0
Chloroform	1.0	5.0
1-Chlorohexane	1.0	5.0
2-Chloroethyl Vinyl Ether	1.0	5.0
Chloromethane	1.0	5.0
Chlorotoluene	1.0	5.0
Dibromochloromethane	1.0	5.0
Dibromomethane	1.0	5.0
1,2-Dichlorobenzene	1.0	5.0
1,3-Dichlorobenzene	1.0	5.0
1,4-Dichlorobenzene	1.0	5.0
Dichlorodifluoromethane	1.0	5.0
1,1-Dichloroethane	1.0	5.0
1,2-Dichloroethane	1.0	5.0
1,1-Dichloroethylene	1.0	5.0
Trans-1,2-Dichloroethylene	1.0	5.0
Dichloromethane	1.0	5.0
1,2-Dichloropropane	1.0	5.0
Trans-1,3-Dichloropropylene	1.0	5.0
1,1,2,2-Tetrachloroethane	1.0	5.0
1,1,1,2-Tetrachloroethane	1.0	5.0
Tetrachloroethylene	1.0	5.0
1,1,1-Trichloroethane	1.0	5.0
1,1,2-Trichloroethane	1.0	5.0
Trichloroethylene	1.0	5.0
Trichlorofluoromethane	1.0	5.0
Trichloropropane	1.0	5.0
Vinyl Chloride	1.0	5.0
SW8020 - Purgeable Aromatic Hydrocarbons[4]		
Benzene	0.66	5.0
Chlorobenzene	1.0	5.0
1,2-Dichlorobenzene	1.0	5.0
1,3-Dichlorobenzene	1.0	5.0
1,4-Dichlorobenzene	1.0	5.0
Ethyl Benzene	1.0	5.0
Toluene	0.8	5.0
Xylenes (o, m, p isomers)	1.0	5.0

TABLE E.3 (CONTINUED)
1990 TARGET COMPOUNDS AND ANALYTICAL DETECTION LIMITS[1]
VOLK FIELD ANGB, WI

	Practical Quantitation Limit Water Samples (μg/L)	Practical Quantitation Limit Soil Samples (μg/kg)
CLP SOW Semi-Volatile Organics		
1,2,4-Trichlorobenzene	10	330
1,2-Dichlorobenzene	10	330
1,3-Dichlorobenzene	10	330
1,4-Dichlorobenzene	10	330
2,4,5-Trichlorophenol	50	1600
2,4,6-Trichlorophenol	10	330
2,4-Dichlorophenol	10	330
2,4-Dimethylphenol	10	330
2,4-Dinitrophenol	50	1600
2,4-Dinitrotoluene	10	330
2,6-Dinitrotoluene	10	330
2-Chloronaphthalene	10	330
2-Chlorophenol	10	330
2-Methylnaphthalene	10	330
2-Methylphenol	10	330
2-Nitroaniline	50	1600
2-Nitrophenol	10	330
3,3'-Dichlorobenzidine	20	660
3-Nitroaniline	50	1600
4,6-Dinitro-2-methylphenol	50	1600
4-Bromophenyl-phenylether	10	330
4-Chloro-3-methylphenol (para-chloro-meta-cresol	10	330
4-Chloroaniline	10	330
4-Chlorophenyl-phenyl ether	10	330
4-Methylphenol	10	330
4-Nitroaniline	50	1600
4-Nitrophenol	50	1600
Acenaphthene	10	330
Acenapthylene	10	330
Anthracene	10	330
Benzo(a)anthracene	10	330
Benzo(a)pyrene	10	330
Benzo(b)fluoranthene	10	330
Benzo(g,h,i)perylene	10	330
Benzo(k)fluoranthene	10	330
Benzoic acid	50	1600
Benzyl alcohol	10	330
bis(2-chloroethoxy)methane	10	330
bis(2-chloroethyl)ether	10	330
bis(2-chloroisopropyl)ether	10	330
bis(2-ethylhexyl)phthalate	10	330
Butylbenzylphthalate	10	330
Chrysene	10	330
Di-n-butylphthalate	10	330
Di-n-octylphthalate	10	330
Dibenz(a,h)anthracene	10	330
Dibenzofuran	10	330
Diethylphthalate	10	330
Dimethylphthalate	10	330
Fluoranthene	10	330
Fluorene	10	330
Hexachlorobenzene	10	330

TABLE E.3 (CONTINUED)
1990 TARGET COMPOUNDS AND ANALYTICAL DETECTION LIMITS[1]
VOLK FIELD ANGB, WI

	Practical Quantitation Limit Water Samples (μg/L)	Practical Quantitation Limit Soil Samples (μg/kg)
CLP SOW Semi-Volatile Organics[3] (Continued)		
Hexachlorobutadiene	10	330
Hexachlorocyclopentadiene	10	330
Hexachloroethane	10	330
Indeno(1,2,3-cd)pyrene	10	330
Isophorone	10	330
N-Nitroso-di-n-propylamine	10	330
N-nitrosodiphenylamine	10	330
Naphthalene	10	330
Nitrobenzene	10	330
Pentachlorophenol	50	1600
Phenanthrene	10	330
Phenol	10	330
Pyrene	10	330
CLP SOW - Pesticides and PCBs		
Aldrin	0.05	8.0
Alpha-BHC	0.05	8.0
Beta-BHC	0.05	8.0
Delta-BHC	0.05	8.0
Gamma-BHC	0.05	8.0
Alpha Chlordane	0.5	80
Gamma Chlordane	0.5	80
4,4'-DDD	0.10	16.0
4,4'-DDE	0.10	16.0
4,4'-DDT	0.10	16.0
Dieldrin	0.10	16.0
Endosulfan I	0.05	8.0
Endosulfan II	0.10	16.0
Endosulfan Sulfate	0.10	16.0
Endrin Ketone	0.10	16.0
Endrin	0.10	16.0
Heptachlor	0.05	8.0
Heptachlor epoxide	0.05	8.0
Methoxychlor	0.5	80
Toxaphene	1.0	160.0
PCB-1016	0.5	80
PCB-1221	0.5	80
PCB-1232	0.5	80
PCB-1242	0.5	80
PCB-1248	0.5	80
PCB-1254	1.0	160
PCB-1260	1.0	160
E418.1 - Total Petroleum Hydrocarbons	1,000	10,000
SW9071 - Oil and Grease	1,000	10,000

TABLE E.3 (CONTINUED)

1990 TARGET COMPOUNDS AND ANALYTICAL DETECTION LIMITS[1]

VOLK FIELD ANGB, WI

	Practical Quantitation Limit Water Samples (μg/L)	Practical Quantitation Limit Soil Samples (μg/kg)
INORGANICS3		
E160.1 - Total Dissolved Solids	5,000	NA
13 Priority Pollutant Metals(2)		
Antimony (SW6010)	50	5,000
Arsenic (SW7060)	10	1,000
Beryllium (SW6010)	5	500
Cadmium (SW6010)	5	500
Chromium (SW6010)	10	1,000
Copper (SW6010)	10	1,000
Lead (SW7421)	5	500
Mercury (SW7470/7471)(3)	0.2	15
Nickel (SW6010)	10	1,000
Selenium (SW7740)	5	500
Silver (SW6010)	10	1,000
Thallium (SW7841)	5	1,000
Zinc (SW6010)	10	1,000

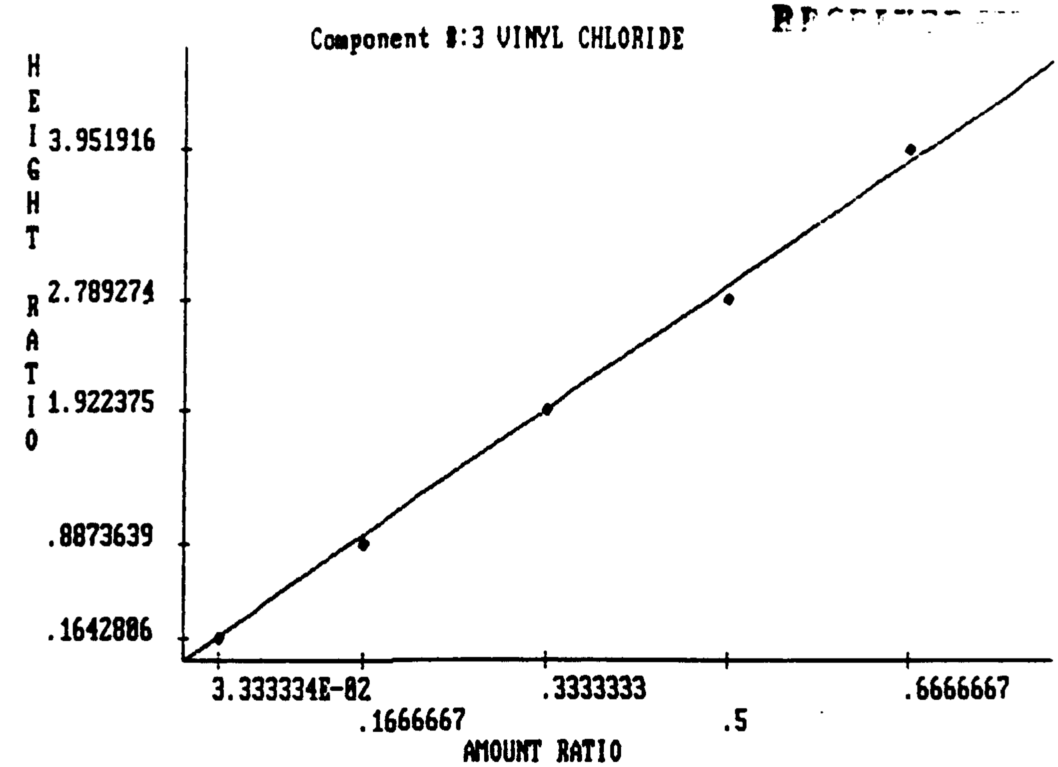
1 Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always have been achievable.

2 The extraction method for soil is SW3050, except for mercury. The extraction method for water is SW4030, except for mercury.

3 Analytical methods shown are for water and soil respectively.

4 Reported practical quantitation limits for soils is at a dilution of 5.

FIGURE E.1
EXAMPLE OF A VOLATILE ORGANIC
INITIAL CALIBRATION CURVE
VOLK FIELD ANGB, WI



Component 3 = VINYL CHLORIDE
INTERNAL STANDARD CALIBRATION

LEVEL	AMOUNT	HEIGHT	AMOUNT Ratio	HEIGHT Ratio
1	1.0000	16183	0.0333	0.1643
2	5.0000	97852	0.1667	0.8874
3	10.0000	219787	0.3333	1.9224
4	15.0000	333151	0.5000	2.7893
5	20.0000	449479	0.6667	3.9519

Y = SLOPE * X + INTERCEPT

Height ratio = 5.7804E+00 * Amt ratio + 0.0000E+00
Amt ratio = 1.7300E-01 * Height ratio + 0.0000E+00
R squared = 0.9971

TABLE E.4
SITE 1, FIRE TRAINING AREA
SUMMARY OF SOIL ANALYTICAL RESULTS, 1989
VOLK FIELD ANGB, WI

Parameter	VF1 SB13*	VF1 SB16 COMP	VF1 SB17 SS1 (1.0-3.0)	VF1 SB17 SS2 (4.0-6.0)	VF1 SB18 SS1 (1.0-3.0)	VF1 SB18 SS2 (4.0-6.0)
Date Sampled	11/02/89	11/02/89	11/02/89	11/02/89	11/02/89	11/02/89
ICP Dissolved Metals - SW6010(ug/kg)						
General	U	U	U	U	U	U
Chromium	2300	2000	3200	1400	4600	1400
Copper	1700	1200	1400	1000U	10000	U
Nickel	1000U	1000U	1000U	1000U	1100	U
Zinc	3800	3400	3900	1000U	44000	6700
Thallium - SW7841(ug/kg)	920U	860U	930U	920U	1000U	880U
Arsenic - SW7060(ug/kg)	920U	860U	920U	940U	1000U	880U
Mercury - SW7470/7471(ug/kg)	30U	30U	30U	30U	30U	30U
Selenium - SW7740(ug/kg)	460U	430U	460U	470U	500U	440U
Lead - SW7421(ug/kg)	1200	1600	2000	670	100000	12000

* VF1 SB13 is a duplicate of VF1 SB16

TABLE E.4 (cont'd)
SITE 1, FIRE TRAINING AREA
SUMMARY OF SOIL ANALYTICAL RESULTS, 1989
VOLK FIELD ANGB, WI

Parameter	VF1 SB19 SS1 (0-2.0)	VF1 SB19 SS2 (5.5-8.0)	VF1 SB35 SS2 (5.5-8.0)(a)	VF1 SB20 SS1 (0-2.5)	VF1 SB20 SS2 (5.5-8.0)
Date Sampled	11/07/89	11/07/89	11/07/89	11/07/89	11/07/89
Halogenated Volatiles - SW8010(ug/kg)					
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0
General	UJ2	UJ2	UJ2	UJ2	UJ2
Bromodichloromethane	U	U	U	U	U
Carbon Tetrachloride	U	U	U	U	U
1,1,1-Trichloroethane	U	U	U	U	U
Aromatic Volatiles - SW8020(ug/kg)					
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U
Chlorobenzene	UJ2	UJ2	UJ2	UJ2	UJ2
1,2-Dichlorobenzene	UJ2	UJ2	UJ2	UJ2	UJ2
1,3-Dichlorobenzene	UJ2	UJ2	UJ2	UJ2	UJ2
1,4-Dichlorobenzene	UJ2	UJ2	UJ2	UJ2	UJ2
Toluene	11J2	5.5J2	U	U	5.5
Total Petroleum Hydrocarbons E418.1(ug/kg)	U	U	U	U	U
Semivolatile Organics - CLP SOW(ug/kg)					
DETECTION LEVEL MULTIPLIER	1.06	1.06	1.03	1.12	1.03
General	U	U	U	U	U
Benzo(B)fluoranthene	UJ2	U	U	UJ2	U
Benzo(k)fluoranthene	UJ2	UJ2	UJ2	UJ2	UJ2
Benzo(a)pyrene	UJ2	U	U	UJ2	U
Benzo(g,h,i)perylene	UJ2	U	U	UJ2	U
Dibenzo(a,h)anthracene	UJ2	U	U	UJ2	U
Dibutyl phthalate	U	UJ2	UJ2	U	UJ2
3,3-Dichlorobenzidine	U	UJ2	UJ2	U	UJ2
Di-n-octylphthalate	UJ2	U	U	UJ2	U
Hexachlorocyclopentadiene	U	UJ2	UJ2	U	UJ2
Indeno (1,2,3-cd) pyrene	UJ2	U	U	UJ2	U
2,4-Dinitrophenol	U	UJ2	UJ2	U	UJ2
Pyrene	U	UJ2	UJ2	U	UJ2
bis(2-Chloroisopropyl)ether	U	UJ2	UJ2	U	UJ2
N-nitroso-di-n-propylamine	U	UJ2	UJ2	U	UJ2
4-Nitrophenol	U	UJ2	UJ2	U	UJ2
4,6-Dinitro-2-methylphenol	U	UJ2	UJ2	U	UJ2
Lead - SW7421(ug/kg)	2200	2700	2200	3700	920

(a) - Duplicate of VF1-SB19-SS2

TABLE E.4 (cont'd)
SITE 1, FIRE TRAINING AREA
SUMMARY OF SOIL ANALYTICAL RESULTS, 1989
VOLK FIELD ANGB, WI

Parameter	VF1 SB21 SS1 (0-2.5)	VF1 SB21 SS2 (5.5-8.0)	VF1 SB36 SS2 (5.5-8.0)(b)	VF1 SB22 SS1 (0-2.5)	VF1 SB22 SS2 (5.5-8.0)	VF1 SB37 SS2 (5.5-8.0)(c)
Date Sampled	11/07/89	11/07/89	11/07/89	11/07/89	11/07/89	11/07/89
Halogenated Volatiles - SW8010(ug/kg)						
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0	1.0
General	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2
Bromodichloromethane	U	U	U	U	U	U
Carbon Tetrachloride	U	U	U	U	U	U
Chloroform	UJ2	UJ2	UJ2	UJ2	U	U
1,1,1-Trichloroethane	U	U	U	U	U	U
Aromatic Volatiles - SW8020(ug/kg)						
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U	U
Chlorobenzene	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2
1,2-Dichlorobenzene	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2
1,3-Dichlorobenzene	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2
1,4-Dichlorobenzene	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2
Total Petroleum Hydrocarbons-E418.1(ug/kg	U	U	U	U	U	U
Semivolatile Organics - CLP SOW(ug/kg)						
DETECTION LEVEL MULTIPLIER	1.06	1.06	1.03	1.06	1.06	1.03
General	UJ2	UJ2	UJ2	U	U	UJ2
Anthracene	U	UJ2	UJ2	U	U	UJ2
Benzo(a)anthracene	U	UJ2	UJ2	U	U	UJ2
Benzo(B)fluoranthene	UJ2	UJ2	UJ2	UJ2	U	UJ2
Benzo(k)fluoranthene	U	UJ2	UJ2	UJ2	U	UJ2
Benzo(a)pyrene	U	UJ2	UJ2	UJ2	U	UJ2
Benzo(g,h,i)perylene	U	UJ2	UJ2	UJ2	UJ2	UJ2
Butylbenzylphthalate	UJ2	UJ2	UJ2	U	UJ2	UJ2
bis(2-Chloroethyl) ether	U	U	U	U	U	U
bis(2-Chloroisopropyl) ether	U	U	U	UJ2	UJ2	U
Chrysene	U	UJ2	UJ2	U	U	UJ2
Dibenzo(a,h)anthracene	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2
Dibutyl phthalate	U	UJ2	UJ2	UJ2	U	UJ2
3,3-Dichlorobenzidine	UJ2	UR	UR	UJ2	UR	UR
2,4-Dinitrotoluene	UJ2	UJ2	UJ2	U	UJ2	UJ2
Di-n-octylphthalate	U	UJ2	UJ2	UJ2	U	UJ2
Bis(2-ethylhexyl)phthalate	UJ2	UJ2	UJ2	U	UJ2	UJ2
Hexachlorocyclopentadiene	UJ2	UJ2	UJ2	UJ2	U	UJ2
Hexachloroethane	U	U	U	U	U	U
Indeno (1,2,3-cd) pyrene	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2
N-Nitrosodiphenylamine	U	UJ2	UJ2	U	U	UJ2
N-Nitrosodi-N-Propylamine	U	U	U	UJ2	UJ2	U
Phenanthrene	U	UJ2	UJ2	U	U	UJ2
Pyrene	U	UJ2	UJ2	UJ2	U	UJ2
2-Chlorophenol	U	U	U	U	U	U
2,4-Dinitrophenol	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2
2-Methyl-4,6-dinitrophenol	U	UJ2	UJ2	UJ2	U	UJ2
4-Nitrophenol	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2
Pentachlorophenol	U	UJ2	UJ2	U	U	UJ2
Phenol	U	U	U	U	U	U
Lead - SW7421(ug/kg)	4300	1300	1300	1800	1200	1100

(b) - Duplicate of VF1-SB21-SS2.

(c) - Duplicate of VF1-SB22-SS2.

TABLE E.4 (cont'd)
SITE 1, FIRE TRAINING AREA
SUMMARY OF SOIL ANALYTICAL RESULTS, 1989
VOLK FIELD ANGB, WI

Parameter	VF1 SB23 SS1 (0-2.5)	VF1 SB23 SS2 (5.5-8.0)	VF1 SB23 SS3 (10.0-12.5)	VF1 SB24 SS1 (0-2.0)	VF1 SB24 SS2 (5.5-8.0)
Date Sampled	11/07/89	11/07/89	11/07/89	11/07/89	11/07/89
Halogenated Volatiles – SW8010(ug/kg)					
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0
General	UJ2	UJ2	UJ2	UJ2	UJ2
Bromodichloromethane	U	U	U	U	U
Carbon Tetrachloride	U	U	U	U	U
Chloroform	UJ2	U	U	UJ2	UJ2
1,1,1-Trichloroethane	U	U	U	U	U
Aromatic Volatiles – SW8020(ug/kg)					
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U
Chlorobenzene	UJ2	UJ2	UJ2	UJ2	UJ2
1,2-Dichlorobenzene	UJ2	UJ2	UJ2	UJ2	UJ2
1,3-Dichlorobenzene	UJ2	UJ2	UJ2	UJ2	UJ2
1,4-Dichlorobenzene	UJ2	UJ2	UJ2	UJ2	UJ2
Total Petroleum Hydrocarbons–E418.1(ug/kg)	485000	U	U	660,000	1,000,000
Semivolatile Organics – CLP SOW(ug/kg)					
DETECTION LEVEL MULTIPLIER	1.12	1.06	1.06	1.06	1.06
General	U	U	UJ2	U	UJ2
Acenapthene	UJ2	U	UJ2	UJ2	UJ2
Acenaphthylene	UJ2	U	UJ2	UJ2	UJ2
Benzo(B)fluoranthene	U	UJ2	UJ2	U	UJ2
Benzo(g,h,i)perylene	UJ2	U	UJ2	U	UJ2
Butylbenzylphthalate	UJ2	UJ2	UJ2	U	UJ2
bis(2-Chloroethoxy)methane	U	U	UJ2	U	U
bis(2-Chloroethyl)ether	U	U	UJ2	U	U
bis(2-Chloroisopropyl) ether	UJ2	U	UJ2	U	U
2-Chloronaphthalene	UJ2	U	UJ2	UJ2	UJ2
Dibenzo(a,h)anthracene	UJ2	UJ2	UJ2	U	UJ2
3,3-Dichlorobenzidine	UR	UJ2	UR	U	UJ2
Diethyl Phthalate	UJ2	U	UJ2	UJ2	UJ2
2,4-Dinitrotoluene	UJ2	U	UJ2	UJ2	UJ2
2,6-Dinitrotoluene	UJ2	U	UJ2	UJ2	UJ2
Bis(2-ethylhexyl)phthalate	UJ2	UJ2	UJ2	650	1100J2
Hexachlorobenzene	U	UJ2	UJ2	U	UJ2
Hexachlorobutadiene	U	U	UJ2	U	U
Hexachlorocyclopentadiene	UJ2	U	UJ2	UJ2	UJ2
Hexachloroethane	U	U	UJ2	U	U
Indeno(1,2,3-cd)pyrene	UJ2	UJ2	UJ2	U	UJ2
Isophorone	U	U	UJ2	U	U
Naphthalene	U	U	UJ2	U	U
Nitrobenzene	U	U	UJ2	U	U
N-Nitrosodi-N-Propylamine	UJ2	U	UJ2	U	U
1,2,4-Trichlorobenzene	U	U	UJ2	U	U
4-Chloro-3-methylphenol	U	U	UJ2	U	U
2-Chorophenol	U	U	UJ2	U	U
2,4-Dichlorophenol	U	U	UJ2	U	U
2,4-Dimethylphenol	U	U	UJ2	U	U
2,4-Dinitrophenol	UJ2	U	UJ2	UJ2	UJ2
2-Nitrophenol	U	U	UJ2	U	U
4-Nitrophenol	UJ2	UJ2	UJ2	UJ2	UJ2
Phenol	U	U	UJ2	U	U
2,4,5-Trichlorophenol	UJ2	U	UJ2	UJ2	UJ2
2,4,6-Trichlorophenol	UJ2	U	UJ2	UJ2	UJ2
Lead – SW7421(ug/kg)	4400	2000	1300	7600	3300

TABLE E.4 (cont'd)
SITE 1, FIRE TRAINING AREA
SUMMARY OF SOIL ANALYTICAL RESULTS, 1989
VOLK FIELD ANGB, WI

Parameter	VF1 SB25 SS1 (0-2.0)	VF1 SB25 SS2 (5.5-8.0)	VF1 SB26 SS1 (1.0-2.0)	VF1 SB26 SS2 (5.5-8.0)	VF1 SB27 SS1 (0-2.0)
Date Sampled	11/28/89	11/28/89	11/08/89	11/08/89	11/08/89
Halogenated Volatiles - SW8010(ug/kg)					
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0
General	UJ2	UJ2	UJ2	UJ2	UJ2
Bromodichloromethane	U	U	U	U	U
Carbon Tetrachloride	U	U	U	U	U
1,1,1-Trichloroethane	U	U	U	U	U
Aromatic Volatiles - SW8020(ug/kg)					
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U
Chlorobenzene	UJ2	UJ2	UJ2	UJ2	UJ2
1,2-Dichlorobenzene	UJ2	UJ2	UJ2	UJ2	UJ2
1,3-Dichlorobenzene	UJ2	UJ2	UJ2	UJ2	UJ2
1,4-Dichlorobenzene	UJ2	UJ2	UJ2	UJ2	UJ2
Total Petroleum Hydrcarbons E418.1(ug/kg)	730,000	1,350,000	20,000	36,000	U
Semivolatile Organics - CLP SOW(ug/kg)					
DETECTION LEVEL MULTIPLIER	1.03	1.06	1.0	1.06	1.04
General	U	U	U	U	U
Benzo(a)Anthracene	U	U	UJ2	UJ2	UJ2
Benzo(B)fluoranthene	U	UJ2	UJ2	UJ2	UJ2
Benzo(k)fluoranthene	U	UJ2	UJ2	UJ2	UJ2
Benzo(a)pyrene	U	UJ2	UJ2	UJ2	UJ2
Benzo(g,h,i)perylene	U	UJ2	UJ2	UJ2	UJ2
Butylbenzylphthalate	U	U	UJ2	UJ2	UJ2
Chrysene	U	U	U	UJ2	UJ2
Dibenzo(a,h)anthracene	U	UJ2	UJ2	UJ2	UJ2
3,3-Dichlorobenzidine	U	U	U	UJ2	UJ2
Di-n-octylphthalate	U	UJ2	UJ2	UJ2	UJ2
bis(2-ethylhexyl)phthalate	U	U	U	UJ2	UJ2
Indeno (1,2,3-cd) pyrene	U	UJ2	UJ2	UJ2	UJ2
Isophorone	U	U	UJ2	UJ2	UJ2
Naphthalene	U	U	UJ2	UJ2	UJ2
Nitrobenzene	U	U	UJ2	UJ2	UJ2
Pyrene	U	U	UJ2	UJ2	UJ2
1,2,4-Trichlorobenzene	U	U	UJ2	UJ2	UJ2
2,4-Dimethylphenol	U	U	UJ2	UJ2	UJ2
2,4-Dinitrophenol	UJ2	UJ2	UJ2	UJ2	UJ2
bis(2-Chloroethyl)ether	U	U	UJ2	UJ2	UJ2
N-nitroso-di-n-propylamine	U	U	UJ2	UJ2	UJ2
4-Nitrophenol	U	U	UJ2	UJ2	UJ2
4,6-Dinitro-2-methylphenol	U	U	UJ2	UJ2	UJ2
Lead - SW7421(ug/kg)	37000	15000	18000	4200	1700

TABLE E.4 (cont'd)
SITE 1, FIRE TRAINING AREA
SUMMARY OF SOIL ANALYTICAL RESULTS, 1989
VOLK FIELD ANGB, WI

Parameter	VF1 SB27 SS2 (5.5-8.0)	VF1 SB38 (5.5-8.0)(d)	VF1 SB28 SS1 (0-2.5)	VF1 SB28 SS2 (5.5-8.0)	VF1 SB29 SS1 (0-2.0)
Date Sampled	11/08/89	11/08/89	11/07/89	11/07/89	11/08/89
Halogenated Volatiles - SW8010(ug/kg)					
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0
General	UJ2	UJ2	UJ2	UJ2	UJ2
Bromodichloromethane	U	U	U	U	U
Carbon Tetrachloride	U	U	U	U	U
Chloroform	UJ2	UJ2	U	UJ2	UJ2
Dibromochloromethane	UJ2	U	UJ2	UJ2	UJ2
1,3_Dichloropropylene	UJ2	U	UJ2	UJ2	UJ2
Tetrachloroethene	UJ2	U	UJ2	UJ2	UJ2
1,1,1-Trichloroethane	U	U	U	U	U
1,1,2-Trichloroethane	UJ2	U	UJ2	UJ2	UJ2
Trichloroethene	UJ2	U	UJ2	UJ2	UJ2
Aromatic Volatiles - SW8020(ug/kg)					
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U
Chlorobenzene	UJ2	UJ2	UJ2	UJ2	UJ2
1,2-Dichlorobenzene	UJ2	UJ2	UJ2	UJ2	UJ2
1,3-Dichlorobenzene	UJ2	UJ2	UJ2	UJ2	UJ2
1,4-Dichlorobenzene	UJ2	UJ2	UJ2	UJ2	UJ2
Total Petroleum Hydrocarbons E418.1(ug/kg)	U	U	U	U	380000
Semivolatile Organics - CLP SOW(ug/kg)					
DETECTION LEVEL MULTIPLIER	1.06	1.03	1.03	1.06	1.03
General	U	UJ2	U	UJ2	U
Anthracene	U	UJ2	U	UJ2	UJ2
Benzo(B)fluoranthene	U	UJ2	UJ2	UJ2	U
Benzo(g,h,i)perylene	U	UJ2	U	UJ2	UJ2
bis(2-Chloroetoxy)methane	U	UJ2	U	U	U
bis(2-Chloroethyl) ether	U	UJ2	U	U	U
bis(2-Chloroisopropyl)ether	U	UJ2	U	U	U
Dibenzo(a,h)anthracene	U	UJ2	UJ2	UJ2	UJ2
Dibutyl phthalate	U	UJ2	U	UJ2	UJ2
3,3-Dichlorobenzidine	U	UJ2	UJ2	UR	UJ2
Hexachlorobenzene	U	UJ2	UJ2	UJ2	UJ2
Hexachlorobutadiene	U	UJ2	U	U	U
Hexachloroethane	U	UJ2	U	U	U
Indeno (1,2,3-cd) pyrene	U	UJ2	UJ2	UJ2	UJ2
Isophorone	U	UJ2	U	U	U
Naphthalene	U	UJ2	U	U	U
Nitrobenzene	U	UJ2	U	U	U
N-Nitrosodiphenylamine	U	UJ2	U	UJ2	UJ2
N-Nitrosodi-N-Propylamine	U	UJ2	U	U	U
Phenanthrene	U	UJ2	U	UJ2	UJ2
1,2,4-Trichlorobenzene	U	UJ2	U	U	U
4-Chloro-3-methylphenol	U	UJ2	U	U	U
2-Chlorophenol	U	UJ2	U	U	U
2,4-Dichlorophenol	U	UJ2	U	U	U
2,4-Dimethylphenol	U	UJ2	U	U	U
2,4-Dinitrophenol	UJ2	UJ2	U	UJ2	UJ2
2-Methyl-4,6-dinitrophenol	U	UJ2	U	UJ2	UJ2
2-Nitrophenol	U	UJ2	U	U	U
4-Nitrophenol	U	UJ2	UJ2	UJ2	UJ2
Pentachlorophenol	U	UJ2	U	UJ2	UJ2
Phenol	U	UJ2	U	U	U
Butylbenzylphthalate	U	UJ2	UJ2	UJ2	U
bis(2-Ethylhexyl)phthalate	U	UJ2	UJ2	UJ2	U
2,4,5-Trichlorophenol	U	UJ2	U	UJ2	UJ2
Lead - SW7421(ug/kg)	1200	1200	2700	1500	1700

(d) - Duplicate of VF1-SB27-SS2.

TABLE E.4 (cont'd)
SITE 1, FIRE TRAINING AREA
SUMMARY OF SOIL ANALYTICAL RESULTS, 1989
VOLK FIELD ANGB, WI

Parameter	VF1 SB29 SS2 (5.5-8.0)	VF1 SB30 SS1 (0-2.0)	VF1 SB30 SS2 (5.5-8.0)	VF1 SB31 SS1 (0-2.0)	VF1 SB31 SS2 (5.5-8.0)
Date Sampled	11/08/89	11/08/89	11/08/89	11/08/89	11/08/89
Halogenated Volatiles - SW8010(ug/kg)					
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0
General	UJ2	UJ2	UJ2	UJ2	UJ2
Bromodichloromethane	U	U	U	U	U
Carbon Tetrachloride	U	U	U	U	U
Dibromochloromethane	U	U	U	U	U
1,3-Dichloropropylene	U	U	U	U	U
Tetrachloroethene	U	U	U	U	U
1,1,1-Trichloroethane	U	U	U	U	U
1,1,2-Trichloroethane	U	U	U	U	U
Trichloroethene	U	U	U	U	U
Aromatic Volatiles - SW8020(ug/kg)					
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U
Chlorobenzene	UJ2	UJ2	UJ2	UJ2	UJ2
1,2-Dichlorobenzene	UJ2	UJ2	UJ2	UJ2	UJ2
1,3-Dichlorobenzene	UJ2	UJ2	UJ2	UJ2	UJ2
1,4-Dichlorobenzene	UJ2	UJ2	UJ2	UJ2	UJ2
Total Petroleum Hydrocarbons E418.1(ug/kg)	20000	24000	26000	28000	U
Semivolatile Organics - CLP SOW(ug/kg)					
DETECTION LEVEL MULTIPLIER	1.06	1.06	1.06	1.06	1.06
General	U	U	U	U	U
Benzo(a)Anthracene	UJ2	UJ2	UJ2	U	UJ2
Benzo(B)fluoranthene	UJ2	UJ2	UJ2	UJ2	UJ2
Benzo(k)fluoranthene	UJ2	UJ2	UJ2	UJ2	U
Benzo(a)pyrene	UJ2	UJ2	UJ2	UJ2	U
Benzo(g,h,i)perylene	UJ2	UJ2	UJ2	UJ2	U
Butylbenzylphthalate	UJ2	UJ2	UJ2	U	UJ2
Chrysene	U	UJ2	U	U	U
Dibenzo(a,h)anthracene	UJ2	UJ2	UJ2	UJ2	U
3,3-Dichlorobenzidine	U	UJ2	U	U	U
Di-n-octylphthalate	UJ2	UJ2	UJ2	UJ2	U
bis(2-ethylhexyl)phthalate	U	UJ2	U	U	U
Indeno (1,2,3-cd) pyrene	UJ2	UJ2	UJ2	UJ2	U
Isophorone	UJ2	UJ2	UJ2	U	UJ2
Naphthalene	UJ2	UJ2	UJ2	U	UJ2
Nitrobenzene	UJ2	UJ2	UJ2	U	UJ2
Pyrene	UJ2	UJ2	UJ2	U	UJ2
1,2,4-Trichlorobenzene	UJ2	UJ2	UJ2	U	UJ2
2,4-Dichlorophenol	U	U	U	UJ2	U
2,4-Dimethylphenol	UJ2	UJ2	UJ2	U	UJ2
bis(2-Chloroethyl)ether	UJ2	UJ2	UJ2	U	UJ2
N-nitroso-di-n-propylamine	UJ2	UJ2	UJ2	U	UJ2
2,4-Dinitrophenol	UJ2	UJ2	UJ2	U	UJ2
4-Nitrophenol	UJ2	UJ2	UJ2	U	UJ2
4,6-Dinitro-2-methylphenol	UJ2	UJ2	UJ2	U	UJ2
Lead - SW7421(ug/kg)	780	2700	1700	2200	750

TABLE E.5
SITE 1, FIRE TRAINING AREA
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS, 1989
VOLK FIELD ANGB, WI

Parameter	VF1-MW5	VF1-MW6	VF1-MW7	VF1-MW8
Date Sampled	11/02/89	11/03/89	11/03/89	11/04/89
Halogenated Volatiles - SW8010(ug/L)				
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0
General	U	U	U	U
Bromoform	UJ2	UJ2	UJ2	UJ2
Chloroethane	UJ2	UJ2	UJ2	UJ2
Chloroform	U	1.2U	U	1.6U
2-Chloroethylvinyl Ether	UJ2	UJ2	UJ2	UJ2
Chloromethane	UJ2	UJ2	UJ2	UJ2
1,1-Dichloroethene	UJ2	UJ2	UJ2	UJ2
Trans-1,2-Dichloroethene	UJ2	UJ2	UJ2	UJ2
Trichloroethene	U	U	U	19
Vinyl Chloride	UJ2	UJ2	UJ2	UJ2
Aromatic Volatiles - SW8020(ug/L)				
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0
General	UJ2	UJ2	UJ2	UJ2
Benzene	12J2	U	U	3.4J2
Ethylbenzene	U	U	U	U
Toluene	4.6J2	U	U	U
Xylenes	2.6J2	U	U	3.6J2
Total Petroleum Hydrocarbons - E418.1(ug/L)	U	U	U	U
Total Dissolved Solids - E160.1(ug/L)	UJ3	170	64	53
Semivolatile Organics - CLP SOW(ug/L)				
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0
General	U	U	U	U
Diethyl Phthalate	U	U	U	12
bis(2-ethylhexyl)phthalate	UJ2	UJ2	UJ2	UJ2
2,4-Dinitrophenol	UJ2	UJ2	UJ2	UJ2
ICP Dissolved Metals - SW6010(ug/L)				
General	U	U	U	U
Copper	13	U	U	U
Zinc	30U	39U	80U	87
Thallium - SW7841(ug/L)	U	U	U	U
Arsenic - SW7060(ug/L)	U	U	U	U
Mercury - SW7470/7471(ug/L)	U	U	U	U
Selenium - SW7740(ug/L)	U	U	U	U
Lead - SW7421(ug/L)	U	13	24	5.6

TABLE E.6
SITE 1, FIRE TRAINING AREA
SUMMARY OF GROUNDWATER SAMPLE RESULTS, 1990
VOLK FIELD ANGB, WI

Parameter	VF1-MW1	VF1-MW2	F1-MW13	VF1-MW3	VF1-MW4	VF1-MW5 1X	VF1-MW5 2X	VF1-MW5
Date Sampled	11/05/90	11/07/90	11/07/90	11/07/90	11/05/90	09/25/90	10/02/90	11/08/90
Halogenated Volatiles – SW8010(ug/L)								
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	100.0	100.0	1.0	1.0	1.0
General	U	U	U	U	U	U	U	U
Bromoform	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2
Bromomethane	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2
Chlorobenzene	UJ2	U	U	U	U	UJ2	UJ2	U
2-Chloroethylvinyl Ether	UR	UR	UR	UR	UR	UR	UR	UR
Chloromethane	UJ2	UR	UR	UR	UR	UJ2	UJ2	UR
Dibromochloromethane	U	U	U	U	U	U	UJ2	U
1,2-Dichlorobenzene	U	U	U	U	U	UJ2	UJ2	U
1,2-Dichloroethane	U	U	U	U	U	UJ2	UJ2	U
Dichloromethane	UJ2	U	U	U	UJ2	U	UJ2	U
1,3-Dichloropropylene	U	U	U	U	U	U	UJ2	U
1,1,2,2-Tetrachloroethane	UJ2	U	U	U	U	U	UJ2	U
Tetrachloroethene	U	U	U	U	U	U	UJ2	U
1,1,2-Trichloroethane	U	U	U	U	U	U	UJ2	U
Trichloroethene	1.7	U	U	U	U	U	U	U
Vinyl Chloride	U	UR	UR	UR	U	U	U	UR
Aromatic Volatiles – SW8020(ug/L)								
DETECTION LEVEL MULTIPLIER	1.0	1	1.0	100	100.0	1.0	1.0	1.0
Benzene	37	U	U	2,600J2	1,800	U	U	U
Chlorobenzene	UJ2	U	U	U	U	U	U	U
1,2-Dichlorobenzene	U	U	U	U	U	UJ2	UJ2	U
1,3-Dichlorobenzene	U	U	U	U	U	U	U	U
1,4-Dichlorobenzene	U	U	U	U	U	UJ2	UJ2	U
Ethylbenzene	5.3	U	U	150J2	370	U	U	U
Toluene	2.7	1.3	0.95	1,200	770	U	U	U
Xylenes	1.7	U	U	140	1100	UJ2	U	U
Total Petroleum Hydrocarbons E418.1(ug/L)	U	U	2,300	1,600	5,200	NA	NA	U
Semivolatile Organics – CLP SOW(ug/L)								
DETECTION LEVEL MULTIPLIER	1	1	1	10	1	—	—	1
Base Neutral General	U	U	U	U	UR	NA	NA	U
Acid General	U	U	U	U	U	NA	NA	U
Benzo(k)flouranthene	U	UJ2	UJ2	UJ2	UR	NA	NA	UJ2
3,3'-Dichlorobenzidine	UJ2	UJ2	UJ2	U	UR	NA	NA	U
Hexachlorocyclopentadiene	UJ2	UJ2	UJ2	U	UR	NA	NA	U
Naphthalene	8J	U	U	U	92J4	NA	NA	U
2,4-Dinitrophenol	UJ2	UJ2	UJ2	U	UJ2	NA	NA	U
Dimethylphthalate	U	U	U	UJ2	UR	NA	NA	UJ2
2-Methylnaphthalene	U	U	U	U	38J4	NA	NA	U
4-Chlorophenyl-phenyl ether	U	U	U	UJ2	UR	NA	NA	UJ2
3-Nitroaniline	U	UJ2	UJ2	U	UR	NA	NA	U
4-Nitroaniline	UJ2	UJ2	UJ2	U	UR	NA	NA	U
ICP Dissolved Metals – SW6010(ug/L)								
General	U	U	U	U	U	NA	NA	U
Nickel	U	U	U	U	11.4	NA	NA	U
Silver	UJ4	UJ4	UJ4	UJ4	UJ4	NA	NA	UJ4
Zinc	U	41.6	U	U	U	NA	NA	16.5
Dissolved Thallium – SW7841(ug/L)	U	U	U	U	U	NA	NA	U
Dissolved Arsenic – SW7060(ug/L)	U	U	U	U	10.5J	NA	NA	U
Dissolved Mercury – SW7470(ug/L)	U	U	U	U	U	NA	NA	U
Dissolved Selenium – SW7740(ug/L)	U	U	U	U	U	NA	NA	U
Dissolved Lead – SW7421(ug/L)	U	U	U	U	U	NA	NA	U
Total Dissolved Solids – E160.1(ug/L)	67,000	59,000	63,000	120,000	330,000	NA	NA	17,000

* Duplicate for VF1-MW2.

TABLE E.6 (cont'd)
SITE 1, FIRE TRAINING AREA
SUMMARY OF GROUNDWATER SAMPLE RESULTS, 1990
VOLK FIELD ANGB, WI

Parameter	VF1-MW6	VF1-MW7	VF1-MW8	VF1-MW9	VF1-MW14*	VF1-MW10	VF1-MW11
Date Sampled	11/07/90	11/07/90	11/08/90	11/08/90	11/08/90	11/08/90	11/08/90
Halogenated Volatiles - SW8010(ug/L)							
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U	U	U
Bromoform	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2
Bromomethane	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2
2-Chloroethylvinyl Ether	UR	UR	UR	UR	UR	UR	UR
Chloromethane	UR	UR	UR	UR	UR	UR	UR
Vinyl Chloride	UR	UR	UR	UR	UR	UR	UR
Aromatic Volatiles - SW8020(ug/L)							
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U	U	U
Benzene	U	U	8.1	U	U	U	U
Chlorobenzene	U	U	UR	U	U	U	U
Ethylbenzene	U	U	UJ2	U	U	U	U
Total Petroleum Hydrocarbons E418.1(ug/L)	4,000	2,400	U	U	U	U	U
Semivolatile Organics - CLP SOW(ug/L)							
DETECTION LEVEL MULTIPLIER	1	1	1	1	1	1	1
Base Neutral General	U	U	U	U	U	U	U
Acid General	U	U	U	U	U	U	U
Benzo(k)flouranthene	UJ2	UJ2	U	U	UJ2	U	UJ2
Benzo(g,h,i)perylene	U	U	UJ2	UJ2	U	UJ2	U
Dibenzo(a,h)anthracene	U	U	UJ2	UJ2	U	UJ2	U
Hexachlorocyclopentadiene	UJ2	UJ2	U	U	UJ2	U	U
Indeno(1,2,3-cd)pyrene	U	U	UJ2	UJ2	U	UJ2	U
2,4-Dinitrophenol	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2	U
Pentachlorophenol	U	U	13J	U	U	U	U
Dimethylphthalate	U	U	U	U	U	U	UJ2
4-Chlorophenyl-phenyl ether	U	U	U	U	U	U	UJ2
2,4,5-Trichlorophenol	U	U	UJ2	UJ2	U	UJ2	U
Pyrene	U	U	UJ2	UJ2	U	UJ2	U
Butylbenzylphthalate	U	U	UJ2	UJ2	U	UJ2	U
3,3'-Dichlorobenzidine	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2	U
3-Nitroaniline	UJ2	UJ2	U	U	UJ2	U	U
4-Nitroaniline	UJ2	UJ2	U	U	UJ2	U	U
ICP Dissolved Metals - SW6010(ug/L)							
General	U	U	U	U	U	U	U
Nickel	U	U	U	U	U	U	U
Silver	UJ4	UJ4	UJ4	UJ4	UJ4	UJ4	UJ4
Zinc	11.3	21.2	16.4	18.8	16.5	36.8	16.8
Dissolved Thallium - SW7841(ug/L)	U	U	U	U	U	U	U
Dissolved Arsenic - SW7060(ug/L)	U	U	U	U	U	U	U
Dissolved Mercury - SW7470(ug/L)	U	U	U	U	U	U	U
Dissolved Selenium - SW7740(ug/L)	U	U	U	U	U	U	U
Dissolved Lead - SW7421(ug/L)	U	U	U	U	U	U	U
Total Dissolved Solids E160.1(ug/L)	28,000	51,000	37,000	30,000	22,000	38,000	28,000

* Duplicate for VF1-MW9.

TABLE E.6 (cont'd)
SITE 1, FIRE TRAINING AREA
SUMMARY OF GROUNDWATER SAMPLE RESULTS, 1990
VOLK FIELD ANGB, WI

Parameter	VF1-MW12 1X	VF1-MW25 1X*	VF1-MW12	VF1-ET1	VF1-ET2	VF1-ET6	VF1-ET7
Date Sampled	10/10/90	10/10/90	11/07/90	10/24/90	11/06/90	11/06/90	11/07/90
Halogenated Volatiles - SW8010(ug/L)							
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U	U	U
Bromoform	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2
Bromomethane	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2
Chlorobenzene	UJ2	UJ2	U	U	U	U	U
Chloroethane	UJ2	UJ2	U	U	U	U	U
2-Chloroethylvinyl Ether	UR	UR	UR	UJ2	UR	UR	UR
Chloromethane	UJ2	UJ2	UR	UJ2	UJ2	UJ2	UR
1,2-Dichlorobenzene	UJ2	UJ2	U	U	U	U	U
Dichloromethane	U	U	U	U	UJ2	UJ2	U
1,3-Dichloropropylene	UJ2	UJ2	U	U	U	U	U
Vinyl Chloride	U	U	UR	U	U	U	UR
Aromatic Volatiles - SW8020(ug/L)							
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0	1.0	25
General	U	U	U	U	U	U	U
Benzene	U	U	U	U	U	U	87J2
1,2-Dichlorobenzene	UJ2	UJ2	U	U	U	U	U
1,4-Dichlorobenzene	UJ2	UJ2	U	U	U	U	U
Ethylbenzene	U	U	U	U	U	U	54J2
Toluene	U	U	U	U	U	U	200
Xylenes	U	U	U	U	U	U	230
Total Petroleum Hydrocarbons E418.1(ug/L)	NA	NA	1400	U	U	2700	U
Semivolatile Organics - CLP SOW(ug/L)							
DETECTION LEVEL MULTIPLIER	—	—	1.0	1.0	1.0	1.0	1
General	NA	NA	U	U	U	U	U
Benzo(k)flouranthene	NA	NA	UJ2	U	U	U	UJ2
Benzo(g,h,i)perylene	NA	NA	U	U	UJ2	UJ2	U
bis(2-ethylhexyl)phthalate	NA	NA	U	67U	U	U	U
Hexachlorocyclopentadiene	NA	NA	UJ2	U	UJ2	UJ2	UJ2
Naphthalene	NA	NA	U	U	U	U	8J
2,4-Dinitrophenol	NA	NA	UJ2	U	UJ2	UJ2	UJ2
3,3'-Dichlorobenzidine	NA	NA	UJ2	U	U	U	UJ2
3-Nitroaniline	NA	NA	UJ2	U	U	U	UJ2
4-Nitroaniline	NA	NA	UJ2	U	U	U	UJ2
ICP Dissolved Metals - SW6010(ug/L)							
General	NA	NA	U	U	U	U	U
Silver	NA	NA	UJ4	UJ4	UJ4	UJ4	JJ4
Zinc	NA	NA	20.7	19.3	U	22.6	14.1
Dissolved Thallium - SW7841(ug/L)	NA	NA	U	U	U	U	U
Dissolved Arsenic - SW7060(ug/L)	NA	NA	U	U	U	U	U
Dissolved Mercury - SW7470(ug/L)	NA	NA	U	U	U	U	U
Dissolved Selenium - SW7740(ug/L)	NA	NA	U	U	U	U	U
Dissolved Lead - SW7421(ug/L)	NA	NA	U	U	U	U	U
Total Dissolved Solids E160.1(ug/L)	NA	NA	42,000	42,000	45,000	73,000	67,000

* Duplicate for VF1-MW12-1X.

TABLE E.7
BASE PRODUCTION WELLS AND BASE BOUNDARY WELL SUMMARY OF GROUNDWATER SAMPLE RESULTS, 1990
VOLK FIELD ANGB, WI

Parameter	VF1-BPW-1	VF1-BPW-2	VF1-BPW-4	VF1-BPW-7*	VF92-MW1
Date Sampled	11/09/90	11/09/90	11/09/90	11/09/90	10/26/90
Halogenated Volatiles - SW8010(ug/L)					
DETECTION LEVEL MULTIPLIER	1.0	5.0	1.0	1.0	1.0
General	U	U	U	U	U
Bromoform	UJ2	UJ2	UJ2	UJ2	UJ2
Bromomethane	UJ2	UJ2	UJ2	UJ2	UJ2
Chloroform	U	86	U	U	U
2-Chloroethylvinyl Ether	UJ2	UR	UR	UJ2	UJ2
Chloromethane	UR	UJ2	UJ2	UR	UJ2
Dichloromethane	UJ2	UJ2	UJ2	UJ2	U
Vinyl Chloride	U	U	U	U	U
Aromatic Volatiles - SW8020(ug/L)					
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U
Total Petroleum Hydrocarbons E418.1(ug/L)	U	U	U	U	U
Semivolatile Organics - CLP SOW(ug/L)					
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U
Benzo(B)flouranthene	U	UJ2	U	U	U
Benzo(k)flouranthene	U	UJ2	U	U	U
Benzo(a)pyrene	U	UJ2	U	U	U
Benzo(g,h,i)perylene	U	UJ2	U	U	U
Dibenzo(a,h)anthracene	U	UJ2	U	U	U
Di-n-octylphthalate	U	UJ2	U	U	U
Hexachloroethane	UJ2	UJ2	UJ2	UJ2	U
Indeno(1,2,3-cd)pyrene	U	UJ2	U	U	U
2,4-Dinitrophenol	UJ2	U	UJ2	UJ2	U
2-Methyl-4,6-dinitrophenol	UJ2	U	UJ2	UJ2	U
4-Nitrophenol	UJ2	UJ2	UJ2	UJ2	U
Benzoic Acid	UJ2	U	UJ2	UJ2	U
Dimethylphthalate	U	UJ2	U	U	U
Fluorene	UJ2	U	UJ2	UJ2	U
3-Nitroaniline	UJ2	U	UJ2	UJ2	U
4-Chlorophenyl-phenyl ether	U	UJ2	U	U	U
4-Nitroaniline	UJ2	U	UJ2	UJ2	U
2,6-Dinitrotoluene	U	UJ2	U	U	U
Chrysene	U	UJ2	U	U	U
ICP Dissolved Metals - SW6010(ug/L)					
General	U	U	U	U	U
Copper	120	U	U	269	U
Silver	UJ4	UJ4	UJ4	UJ4	UR
Zinc	28.9	1160	U	72.2	U
Dissolved Thallium - SW7841(ug/L)	U	U	U	U	U
Dissolved Arsenic - SW7060(ug/L)	U	U	U	U	U
Dissolved Mercury - SW7470(ug/L)	U	U	U	U	U
Dissolved Selenium - SW7740(ug/L)	U	U	U	U	U
Dissolved Lead - SW7421(ug/L)	25.5J4	U	U	27.9J4	U
Total Dissolved Solids - E160.1(ug/L)	37,000	40,000	230,000	30,000	150,000

* Duplicate for VF1-BPW-1

TABLE E.8
SITE 2, FORMER LANDFILL C
SUMMARY OF SOIL SAMPLE RESULTS, 1990
VOLK FIELD ANGB, WI

Parameters	VF2-SB1 (0'-1')	VF2-SB2 (0'-1')	VF2-SB3 (0'-1')	VF2-SB4 (0'-1')	VF2-SB5 (0'-1')
Date Sampled	10/30/90	10/29/90	10/30/90	10/30/90	10/30/90
Halogenated Volatiles - SW8010(ug/kg)					
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U
Bromoform	UJ2	UJ2	UJ2	UJ2	UJ2
Bromomethane	UJ2	UJ2	UJ2	UJ2	UJ2
2-Chloroethylvinyl Ether	UR	UR	UR	UR	UR
Chloromethane	UR	UR	UR	UR	UR
Vinyl Chloride	U	UR	U	U	U
Aromatic Volatiles - SW8020(ug/kg)					
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U
Benzene	U	U	U	UR	U
Toluene	U	U	U	UR	U
Xylenes	U	U	U	9.1J2	U
Organochlorine Pesticides & PCB's - CLP SOW(ug/kg)					
DETECTION LEVEL MULTIPLIER	2.12	2.12	1.02	1.05	1.05
General	U	U	U	U	U
4,4'-DDD	17J	U	U	U	U
4,4'-DDE	38	U	U	U	U
4,4'-DDT	28J	22J	U	U	U
Alpha Chlordane	84N	U	U	U	U
Semivolatile Organics - CLP SOW(ug/kg)					
DETECTION LEVEL MULTIPLIER	1.09	1.05	1.06	1.06	1.06
General	U	U	U	U	U
Benzo(a)Anthracene	U	270J	U	U	U
Benzo(B)fluoranthene	260J	570	U	230J	U
Benzo(k)fluoranthene	260J	580	U	210J	U
Benzo(a)pyrene	230J	590	U	U	U
Benzo(g,h,i)perylene	U	410	U	UJ2	UJ2
Chrysene	240J	310J	U	U	U
Dibenzo(a,h)anthracene	U	180J	U	U	U
Hexachlorocyclopentadiene	U	U	U	UJ2	UJ2
Indeno(1,2,3-cd)pyrene	U	350	U	U	U
Isophorone	UJ2	UJ2	UJ2	U	U
Pyrene	390	420	U	210J	U
2,4-Dinitrophenol	UJ2	UJ2	UJ2	UJ2	UJ2
Fluoranthene	U	420	U	U	U
ICP Metals - SW6010(mg/kg)					
General	U	U	U	U	U
Chromium	4.2	2.3	1.4	2.5	1.2
Copper	3.9	3.7	1.0U	3.6	1.2
Nickel	1.1U	3.0	1.0U	2.9	1.1U
Zinc	23.3	12.6	2.1	7.5	4.6
Thallium - SW7841(mg/kg)	1.1U	1.1U	1.0U	1.1U	1.1U
Arsenic - SW7060(mg/kg)	1.1U	1.1U	1.0U	1.1U	1.1U
Mercury - SW7471(mg/kg)	0.011J4	0.014	0.0097UJ4	0.010UJ4	0.010UJ4
Selenium - SW7740(mg/kg)	0.55U	0.55U	0.50U	0.55U	0.55U
Lead - SW7421(mg/kg)	22	11	0.55U	3.5	0.55U

TABLE E.9
SITE 2, FORMER LANDFILL C
SUMMARY OF GROUNDWATER SAMPLE RESULTS, 1990
VOLK FIELD ANGB, WI

Parameters	VF2-MW1	VF2-MW2	VF2-MW3	VF2-MW4	VF2-MW5
Date Sampled	10/23/90	11/06/90	10/27/90	11/06/90	10/27/90
Halogenated Volatiles - SW8010(ug/L)					
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U
Bromoform	UJ2	UJ2	UJ2	UJ2	UJ2
Bromomethane	UJ2	UJ2	UJ2	UJ2	UJ2
2-Chloroethylvinyl Ether	UJ2	UR	UR	UR	UR
Chloromethane	UJ2	UJ2	UJ2	UJ2	UJ2
Dichloromethane	U	UJ2	U	U	U
Aromatic Volatiles - SW8020(ug/L)					
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U
Benzene	U	U	UJ2	U	UJ2
Ethylbenzene	U	U	UJ2	U	UJ2
Toluene	U	U	UJ2	U	UJ2
Total Petroleum Hydrocarbons E418.1(ug/L)	U	U	U	U	U
Organochlorine Pesticides & PCB's - CLP SOW(ug/L)					
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U
Semivolatile Organics - CLP SOW(ug/L)					
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U
Benzo(g,h,i)perylene	U	U	U	UJ2	U
3,3'-Dichlorobenzidine	U	UJ2	U	U	U
bis(2-ethylhexyl)phthalate	U	U	U	U	110U
Hexachlorocyclopentadiene	U	UJ2	U	UJ2	U
2,4-Dinitrophenol	U	UJ2	U	UJ2	U
4-Nitroaniline	U	UJ2	U	U	U
ICP Dissolved Metals - SW6010(ug/L)					
General	U	U	U	U	U
Silver	UJ4	UJ4	UJ4	UJ4	UJ4
Dissolved Thallium - SW7841(ug/L)	U	U	U	U	U
Dissolved Arsenic - SW7060(ug/L)	U	U	U	U	U
Dissolved Mercury - SW7470(ug/L)	U	U	U	U	U
Dissolved Selenium - SW7740(ug/L)	U	U	U	U	U
Dissolved Lead - SW7421(ug/L)	U	U	U	U	U
Total Dissolved Solids - E160.1(ug/L)	14,000	60,000	68,000	55,000	32,000

TABLE E.10
SITE 2, FORMER LANDFILL C
SUMMARY OF SURFACE WATER SAMPLE RESULTS, 1990
VOLK FIELD ANGB, WI

Parameters	*VF2-SW1	*VF2-SW2	*VF2-SW3	*VF2-SW4	*VF2-SW5
Date Sampled	11/10/90	11/10/90	11/10/90	11/10/90	11/10/90
Halogenated Volatiles - SW8010(ug/L)					
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U
Bromoform	UJ2	UJ2	UJ2	UJ2	UJ2
Bromomethane	UJ2	UJ2	UJ2	UJ2	UJ2
2-Chloroethylvinyl Ether	UR	UR	UJ2	UJ2	UJ2
Chloromethane	UR	UR	UJ2	UJ2	UJ2
Dichloromethane	UJ2	UJ2	UJ2	UJ2	UJ2
Aromatic Volatiles - SW8020(ug/L)					
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U
Total Petroleum Hydrocarbons E418.1(ug/L)	U	U	U	U	U
Organochlorine Pesticides & PCB's - CLP SOW(ug/L)					
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U
Semivolatile Organics - CLP SOW(ug/L)					
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U
3,3'-Dichlorobenzidine	UJ2	UJ2	UJ2	UJ2	UJ2
Hexachloroethane	UJ2	UJ2	UJ2	UJ2	UJ2
Benzoic acid	UJ2	UJ2	UJ2	UJ2	UJ2
Fluorene	UJ2	UJ2	UJ2	UJ2	UJ2
ICP Metals - SW6010(ug/L)					
General	U/U	U/U	U/U	U/U	U/U
Silver	UJ4/UJ4	UJ4/UJ4	UJ4/UJ4	UJ4/UJ4	UJ4/UJ4
Zinc	10.7/U	38.8/41.2	U/U	U/99.4	13.0/U
Thallium - SW7841(ug/L)	U/U	U/U	U/U	U/U	U/U
Arsenic - SW7060(ug/L)	U/U	U/U	U/U	U/U	U/U
Mercury - SW7470(ug/L)	U/U	U/0.32	U/U	U/0.34	U/U
Selenium - SW7740(ug/L)	U/U	U/U	U/U	U/U	U/U
Lead - SW7421(ug/L)	U/U	10.2J4/U	UJ/U	U/22.0J4	U/U
Total Dissolved Solids - E160.1(ug/L)	130,000	180,000	330,000	520,000	340,000

* - Dissolved and Total Inorganics were analyzed on surface water samples (Dissolved/Total).

TABLE E.11
SITE 3/6, FUEL SPILL AREA
SUMMARY OF SOIL SAMPLE RESULTS, 1990
VOLK FIELD ANGB, WI

Parameters	VF3/6-SB1 (0'-1')	VF3/6-SB1 (4'-5')	VF3/6-SB2 (0'-1')	VF3/6-SB2 (4'-5')	VF3/6-SB3 (0'-0.5')	VF3/6-SB3 (5'-6')	VF3/6-SB4 (0'-0.5')	VF3/6-SB4 (6'-7')
Date Sampled	10/14/90	10/16/90	10/14/90	10/16/90	10/14/90	10/16/90	10/14/90	10/16/90
Aromatic Volatiles – SW8020(ug/kg)								
DETECTION LEVEL MULTIPLIER	1.2	1.0	1.2	1.2	1.2	1.0	1.0	1.2
Benzene	UJ4	U	U	U	U	U	U	U
Chlorobenzene	UJ4	U	U	U	U	U	U	U
1,2-Dichlorobenzene	UJ2,J4	U	UJ2	U	UJ2	U	UJ2	U
1,3-Dichlorobenzene	UJ2,J4	U	UJ2	U	UJ2	U	UJ2	U
1,4-Dichlorobenzene	UJ2,J4	U	UJ2	U	UJ2	U	UJ2	U
Ethylbenzene	UJ4	U	U	U	U	U	U	U
Toluene	12J4	U	U	U	U	U	U	U
Xylenes	UJ4	U	U	U	U	U	U	U
Total Petroleum Hydrocarbons E418.1(ug/kg)	36,000,000	36,000	320,000	5,000,000	12000U	11000U	11000U	11000U
Lead – SW7421(mg/kg)	3.8	0.57	5.3	2.6	14	0.87	2.9	0.82

*Dulicate for the SS1 sample
of the same name.

TABLE E.11 (cont'd)
SITE 3/6, FUEL SPILL AREA
SUMMARY OF SOIL SAMPLE RESULTS, 1990
VOLK FIELD ANGB, WI

Parameters	VF3/6-SB5 (5'-6')	VF3/6 SB6-SS1 (5'-6')	VF3/6 SB6-SS11* (5'-6')	VF3/6-SB7 (5'-6')	VF3/6-SB8 (5'-6')	VF3/6-SB9 (4'-5')	VF3/6-SB10 (2'-3')
Date Sampled	10/16/90	10/16/90	10/16/90	10/17/90	10/17/90	10/17/90	10/17/90
Aromatic Volatiles - SW8020(ug/kg)							
DETECTION LEVEL MULTIPLIER	1120	1.2	1.0	1.0	1.0	1.0	1.2
Benzene	U	U	U	U	U	U	U
Chlorobenzene	U	U	U	U	U	U	U
1,2-Dichlorobenzene	U	U	U	U	U	U	U
1,3-Dichlorobenzene	U	U	U	U	U	U	U
1,4-Dichlorobenzene	U	U	U	U	U	U	U
Ethylbenzene	8,900	U	U	U	U	U	U
Toluene	U	U	U	U	U	U	U
Xylenes	U	U	U	U	U	U	U
Total Petroleum Hydrocarbons E418.1(ug/kg)	5,600,000	63,000	67,000	11000U	14,000	12,000	17,000
Lead - SW7421(mg/kg)	5.6	9.0	9.1	0.74	1.7	4.0	2.6

*Dulicate for the SS1 sample of the same name.

TABLE E.11 (cont'd)
SITE 3/6, FUEL SPILL AREA
SUMMARY OF SOIL SAMPLE RESULTS, 1990
VOLK FIELD ANGB, WI

Parameters	VF3/6 SB11-SS1 (5'-6')	VF3/6 SB11-SS11* (5'-6')	VF3/6-SB12 (3'-4')	VF3/6-SB13 (5'-6')	VF3/6-SB14 (5'-6')	VF3/6-SB15 (7'-8')	VF3/6 SB16-SS1 (5'-6')	VF3/6 SB16-SS11* (5'-6')
Date Sampled	11/07/90	11/07/90	11/07/90	11/07/90	11/07/90	11/07/90	11/07/90	11/07/90
Aromatic Volatiles – SW8020(ug/kg)								
DETECTION LEVEL MULTIPLIER	1.2	1.0	1.0	1.0	1.0	1.2	4,200	4,200
Benzene	UJ3	UJ3	UJ3	UJ3	UJ3	UJ3	UJ3	UJ3
Chlorobenzene	UJ3	UJ3	UJ3	UJ3	UJ3	UJ3	UJ3	UJ3
1,2-Dichlorobenzene	UJ3	UJ3	UJ3	UJ3	UJ3	UJ3	UJ3	UJ3
1,3-Dichlorobenzene	UJ3	UJ3	UJ3	UJ3	UJ3	UJ3	UJ3	UJ3
1,4-Dichlorobenzene	UJ3	UJ3	UJ3	UJ3	UJ3	UJ3	UJ3	UJ3
Ethylbenzene	UJ3	UJ3	UJ3	UJ3	UJ3	UJ3	UJ3	UJ3
Toluene	UJ3	UJ3	UJ3	UJ3	UJ3	UJ3	73,000J3	73,000J3
Xylenes	UJ3	UJ3	UJ3	UJ3	UJ3	UJ3	110,000J3	130,000J3
Total Petroleum Hydrocarbons E418.1(ug/kg)	38,000	55,000	35,000	51,000	44,000	56,000	3,400,000	2,300,000
Lead – SW7421(mg/kg)	1.5J4	1.1J4	2.4J4	0.65J4	0.54J4	10.0J4	1.1J4	1.1J4

*Dulicate for the SS1 sample of the same name.

TABLE E.12
SITE 3/6, FUEL SPILL AREA
SUMMARY OF GROUNDWATER SAMPLE RESULTS, 1989
VOLK FIELD ANGB, WI

Parameter	VF3/6-MW2	VF3/6-MW3	VF3/6-MW4	VF3/6-MW5	VF3/6-MW6
Date Sampled	11/08/89	11/09/89	11/08/89	11/09/89	11/04/89
Aromatic Volatiles - SW8020(ug/L)					
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0
Benzene	U	U	U	7.0J2	1.6J2
Chlorobenzene	UJ2	UJ2	UJ2	UJ2	UJ2
1,2-Dichlorobenzene	UJ2	UJ2	UJ2	UJ2	UJ2
1,3-Dichlorobenzene	UJ2	U	UJ2	U	UJ2
1,4-Dichlorobenzene	UJ2	U	UJ2	U	U
Ethylbenzene	U	U	U	2.2J2	U
Toluene	U	U	U	U	5.8J2
Xylenes	U	U	U	5.3J2	U
Total Petroleum Hydrocarbons E418.1(ug/L)	U	U	U	U	1200
Total Dissolved Solids E160.1(ug/L)	160	65	130	260	170
Dissolved Lead - SW7421(ug/L)	U	U	U	U	11

TABLE E.13
SITE 3/6, FUEL SPILL AREA
SUMMARY OF GROUNDWATER SAMPLE RESULTS, 1990
VOLK FIELD ANGB, WI

Parameters	VF3/6 MW1	VF3/6 MW2	VF3/6 MW3	VF3/6 MW4	VF3/6 MW5	VF3/6 MW6-X1	VF3/6 MW6-2X	VF3/6 MW6	VF3/6 MW7	VF3/6 MW8	VF3/6 MW9*	VF3/6 TW1
Date Sampled	11/06/90	10/26/90	10/27/90	10/24/90	10/30/90	9/26/90	10/03/90	10/27/90	10/26/90	10/30/90	11/06/90	11/09/90
Aromatic Volatiles - SW8020(ug/L)												
DETECTION LEVEL MULTIPLIER	50	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	10	100	10
Benzene	1,200	U	UJ2	U	U	U	U	UJ2	U	2,200	1,100	U
Chlorobenzene	U	U	U	U	U	U	U	U	U	U	U	U
1,2-Dichlorobenzene	U	U	U	U	U	UJ2	UJ2	U	U	U	U	U
1,3-Dichlorobenzene	U	U	U	U	U	U	U	U	U	U	U	U
1,4-Dichlorobenzene	U	U	U	U	U	UJ2	UJ2	U	U	U	U	U
Ethylbenzene	260	U	UJ2	U	U	U	U	UJ2	U	130J2	260	U
Toluene	4,900	U	UJ2	U	U	U	U	UJ2	1.2	U	4,800	170
Xylenes	1,700	U	U	U	U	UJ2	U	U	U	130J2	1,800	U
Total Petroleum Hydrocarbons E418.1(ug/L)	17,000	U	U	U	U	NA	NA	U	U	1,800	14,000	1,200
Dissolved Lead SW7421(ug/L)	U	U	U	U	U	NA	NA	U	U	U	U	U
Total Dissolved Solids E160.1(ug/L)	270,000	130,000	4,500	140,000	250,000	NA	NA	150,000	160,000	170,000	330,000	270,000

* Duplicate for VF3/6-MW1

TABLE E.14
SITE 4, TRANSFORMER FLUID DISPOSAL AREA
SUMMARY OF SOIL SAMPLE RESULTS, 1989
VOLK FIELD ANGB, WI

Parameter	VF4 SB9 SS1 (3.5–5.5)	VF4 SB9 SS2 (8.5–10.5)	VF4 SB10 SS1 (1.0–3.0)	VF4 SB10 SS2 (8.0–10.0)	VF4 SB11 SS1 (1.0–3.0)	VF4 SB11 SS2 (8.5–10.5)	VF4 SB13 SS1 (1.0–3.0)*
Date Sampled	11/02/89	11/02/89	11/02/89	11/02/89	11/02/89	11/02/89	11/02/89
Oil & Grease (9071)							
General	U	U	U	U	U	U	U
Organochlorine Pesticides & PCB's – CLP SOW(ug/kg)							
Detection Level Multiplier	1.05	1.05	1.38	1.04	1.05	1.04	1.08
General	U	U	U	U	U	U	U
Aldrin	8.4UJ4	8.4UJ4	11UJ4	8.3UJ4	8.4UJ4	8.3UJ4	8.6UJ4

* VF4 SB13 SS1 is a duplicate of VF4 SB10 SS1.

TABLE E.15
SITE 5, KC97 CRASH SITE
SUMMARY OF SOIL SAMPLE RESULTS, 1989
VOLK FIELD ANGB, WI

Parameter	VF5 SB1 SS1 (0-1.0)	VF5 SB1 SS2 (3.5-5.5)	VF5 SB2 SS1 (0-2.0)	VF5 SB2 SS2 (3.5-5.5)	VF5 SB2 SS3 (5.5-8.0)	VF5 SB3 SS1 (3.5-6.0)
Date Sampled	11/04/89	11/04/89	11/04/89	11/04/89	11/04/89	11/04/89
Halogenated Volatiles - SW8010(ug/kg)						
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U	U
Bromoform	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2
2-Chloroethylvinyl Ether	UR	UR	UR	UR	UR	UR
Chloromethane	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2
Vinyl Chloride	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2
Aromatic Volatiles - SW8020(ug/kg)						
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	40.0	1.0	1.0
General	U	U	U	U	U	U
Chlorobenzene	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2
1,2-Dichlorobenzene	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2
Toluene	15J2,J4	34J2,J4	U	1900J2	12J2	16J2
Xylenes	8.6J2,J4	U	U	2100J2	U	10J2
Total Petroleum Hydrocarbons E418.1(ug/kg)	17000	58000	U	23000	U	U
Lead - SW7421(ug/kg)	100000	25000	2500	5700	1600	6900

TABLE E.15 (cont'd)
SITE 5, KC97 CRASH SITE
SUMMARY OF SOIL SAMPLE RESULTS, 1989
VOLK FIELD ANGB, WI

Parameter	VFS SB4 SS1 (0-2.5)	VFS SB4 SS2 (3.5-6.0)	VFS SB5 SS1 (3.5-6.0)	VFS SB6 SS1 (3.5-6.0)	VFS SB7 SS1 (3.5-6.0)
Date Sampled	11/04/89	11/04/89	11/05/89	11/05/89	11/05/89
Halogenated Volatiles - SW8010(ug/kg)					
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U
Bromoform	UJ2	UJ2	UJ2	UJ2	UJ2
Chloroethane	U	U	UJ2	UJ2	UJ2
2-Chloroethylvinyl Ether	UR	UR	UJ2	UJ2	UJ2
Chloromethane	UJ2	UJ2	UJ2	UJ2	UJ2
1,1-Dichloroethane	U	U	UJ2	UJ2	UJ2
1,1-Dichloroethene	U	U	UJ2	UJ2	UJ2
Trans-1,2-Dichloroethene	U	U	UJ2	UJ2	UJ2
Tetrachloroethene	U	U	UJ2	UJ2	UJ2
1,1,1-Trichloroethane	U	U	UJ2	UJ2	UJ2
Vinyl Chloride	UJ2	UJ2	UJ2	UJ2	UJ2
Aromatic Volatiles - SW8020(ug/kg)					
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U
Chlorobenzene	UJ2	UJ2	UJ2	UJ2	UJ2
1,2-Dichlorobenzene	UJ2	UJ2	UJ2	UJ2	UJ2
1,3-Dichlorobenzene	U	U	UJ2	UJ2	UJ2
Toluene	U	U	8.8J2	13J2,J4	9.6J2
Xylenes	U	U	9.6J2	U	U
Total Petroleum Hydrocarbons E418.1(ug/kg)	U	23000	27000	25000	50000
Lead - 7421(ug/kg)	2100	950	2400	4300	2000

TABLE E.15 (cont'd)
SITE 5, KC97 CRASH SITE
SUMMARY OF SOIL SAMPLE RESULTS, 1989
VOLK FIELD ANGB, WI

Parameter	VF5 SB8 SS1 (0-2.0)	VF5 SB8 SS2 (3.5-6.0)	VF5 SB9 SS1 (3.5-6.0)	VF5 SB10 SS1 (3.5-6.0)	VF5 SB11 SS1 (3.5-6.0)
Date Sampled	11/05/89	11/05/89	11/05/89	11/05/89	11/05/89
Halogenated Volatiles - SW8010(ug/kg)					
DETECTION LEVEL MULTIPLICATION	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U
Bromoform	UJ2	UJ2	UJ2	UJ2	UJ2
Chloroethane	UJ2	UJ2	U	U	U
2-Chloroethylvinyl Ether	UJ2	UJ2	UR	UR	UR
Chloromethane	UJ2	UJ2	UJ2	UJ2	UJ2
1,1-Dichloroethane	UJ2	UJ2	U	U	U
1,1-Dichloroethene	UJ2	UJ2	U	U	U
Trans-1,2-Dichloroethene	UJ2	UJ2	U	U	U
Tetrachloroethene	UJ2	UJ2	U	U	U
1,1,1-Trichloroethane	UJ2	UJ2	U	U	U
Vinyl Chloride	UJ2	UJ2	UJ2	UJ2	UJ2
Aromatic Volatiles - SW8020(ug/kg)					
DETECTION LEVEL MULTIPLICATION	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U
Chlorobenzene	UJ2	UJ2	UJ2	UJ2	UJ2
1,2-Dichlorobenzene	UJ2	UJ2	UJ2	UJ2	UJ2
1,3-Dichlorobenzene	UJ2	UJ2	U	U	U
Toluene	15J2	36J2	7.5J2,J4	15J2,J4	6.5J2
Xylenes	11J2	6.3J2	U	U	U
Total Petroleum Hydrocarbons E418.1(ug/kg)	18000	34000	18000	16000	17000
Lead - SW7421(ug/kg)	5800	2200	6300	3500	4400

TABLE E.16
SITE 5, KC97 CRASH SITE
SUMMARY OF GROUNDWATER SAMPLE RESULTS, 1989
VOLK FIELD ANGB, WI

Parameter	VF5-MW1	VF5-MW20*
Date Sampled	11/09/89	11/09/89
Halogenated Volatiles - SW8010(ug/L)		
DETECTION LEVEL MULTIPLIER	1.0	1.0
General	U	U
Bromoform	UJ2	UJ2
Chloroform	0.55U	U
2-Chloroethylvinyl ether	UR	UR
Chloromethane	UJ2	UJ2
Vinyl chloride	UJ2	UJ2
Aromatic Volatiles - SW8020(ug/L)		
DETECTION LEVEL MULTIPLIER	1.0	1.0
General	U	U
Chlorobenzene	UJ2	UJ2
1,2-Dichlorobenzene	UJ2	UJ2
Total Petroleum Hydrocarbons - E418.1(ug/L)	U	U
Total Dissolved Solids - 160.1(mg/L)	130	140
Dissolved Lead - 7421(ug/L)	U	U

* Duplicate for VF5-MW1.

TABLE E.17
SITE 5, KC97 CRASH SITE
SUMMARY OF GROUNDWATER SAMPLE RESULTS, 1990
VOLK FIELD ANGB, WI

Parameters	VF5-MW1
Date Sampled	10/29/90
Aromatic Volatiles - SW8020(ug/L)	
DILUTION FACTOR	1
General	U
Bromoform	UJ2
Total Petroleum Hydrocarbons - E418.1(ug/L)	U
Dissolved Lead - SW7421(ug/L)	U
Total Dissolved Solids - E160.1(ug/L)	160,000

TABLE E.18
SITE 7, FORMER LANDFILL A
SUMMARY OF GROUNDWATER SAMPLE RESULTS, 1990
VOLK FIELD ANGB, WI

Parameter	VF7-MW1	VF7-MW2	VF7-MW3	VF7-MW4	VF7-MW5	VF7-MW6	VF7-MW7*
Date Sampled	10/25/90	10/24/90	10/25/90	10/25/90	10/25/90	10/23/90	10/25/90
Halogenated Volatiles - SW8010(ug/L)							
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U	U	U
Bromoform	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2
Bromomethane	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2
2-Chloroethylvinyl Ether	UR	UJ2	UR	UR	UR	UJ2	UR
Chloromethane	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2
Dichloromethane	UJ2	U	UJ2	UJ2	UJ2	U	UJ2
Vinyl Chloride	UJ2	U	UJ2	UJ2	UJ2	U	UJ2
Aromatic Volatiles - SW8020(ug/L)							
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U	U	U
Total Petroleum Hydrocarbons E418.1(ug/L)	U	U	U	U	U	U	U
Organochlorine Pesticides & PCB's - CLP SOW(ug/L)							
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U	U	U
Semivolatile Organics - CLP SOW(ug/L)							
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U	U	U
bis(2-ethylhexyl) phthalate	U	42U	U	U	U	18U	U
ICP Dissolved Metals - SW6010(ug/L)							
General	U	U	U	U	U	U	U
Copper	U	U	36.1	U	U	U	117
Nickel	U	U	U	U	U	U	17.3
Silver	UJ4	UJ4	UJ4	UJ4	UJ4	UJ4	UJ4
Zinc	U	U	26.0	U	14.6	20.0	28.0
Dissolved Thallium - SW7841(ug/L)	U	U	U	U	U	U	U
Dissolved Arsenic - SW7060(ug/L)	U	U	U	U	U	U	U
Dissolved Mercury - SW7470(ug/L)	U	U	U	U	U	U	U
Dissolved Selenium - SW7740(ug/L)	U	U	U	U	U	U	U
Dissolved Lead - SW7421(ug/L)	U	U	U	U	U	U	U
Total Dissolved Solids E160.1(ug/L)	94,000	290,000	350,000	410,000	170,000	37,000	71,000

* Duplicate for VF7-MW1.

TABLE E.19
SITE 8, F84 CRASH SITE
SUMMARY OF SOIL SAMPLE RESULTS, 1990
VOLK FIELD ANGB, WI

Parameters	VF8-SB1 (0'-2')	VF8-SB1 (4'-6')	VF8-SB2 (0'-2')	VF8-SB2 (4'-6')
Date Sampled	9/30/90	9/30/90	9/30/90	9/30/90
Aromatic Volatiles - SW8020(ug/kg)				
Detection Level Multiplier	1.2	1.2	1.2	2.4
General	U	U	U	U
Total Petroleum Hydrocarbons - E418.1(ug/kg)	U	U	U	U
Lead - SW7421(mg/kg)	3.8	2.0	7.8	6.8

TABLE E.20
SITE 8, F84 CRASH SITE
SUMMARY OF GROUNDWATER SAMPLE RESULTS, 1990
VOLK FIELD ANGB, WI

Parameters	VF8-MW1	VF8-MW1
Date Sampled	10/23/90	11/06/90
Aromatic Volatiles - SW8020(ug/L)		
Detection Level Multiplier	1.0	1.0
General	U	U
Total Petroleum Hydrocarbons - E418.1(ug/L)	U	U
Dissolved Lead - SW7421(ug/L)	U	U
Total Dissolved Solids - E160.1(ug/L)	260,000	370,000

TABLE E.21
SITE 9, FORMER LANDFILL B
SUMMARY OF SOIL SAMPLE RESULTS, 1990
VOLK FIELD ANGB, WI

Parameters	VF9-SB1 (0'-1')	VF9-SB2 (0'-1')	VF9-SB3 (0'-1')
Date Sampled	10/29/90	10/29/90	10/29/90
Halogenated Volatiles - SW8010(ug/kg)			
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0
General	U	U	U
Bromoform	UJ2	UJ2	UJ2
Bromomethane	UJ2	UJ2	UJ2
2-Chloroethylvinyl Ether	UR	UR	UR
Chloromethane	UR	UR	UR
Vinyl Chloride	UR	UR	UR
Aromatic Volatiles - SW8020(ug/kg)			
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0
General	U	U	U
Organochlorine Pesticides & PCB's - CLP SOW(ug/kg)			
DETECTION LEVEL MULTIPLIER	1.06	5.37	1.06
General	U	U	U
4,4'-DDD	U	37J	U
4,4'-DDT	U	287	U
Semivolatile Organics - CLP SOW(ug/kg)			
DETECTION LEVEL MULTIPLIER	1.06	1.09	1.09
General	U	U	U
Benzo(B)fluoranthene	U	250J	U
Chrysene	U	210J	U
3,3'-Dichlorobenzidine	U	U	UJ2
Hexachlorocyclopentadiene	U	U	UJ2
Isophorone	UJ2	UJ2	U
Phenanthrene	U	210J	U
Pyrene	U	320J	U
2,4-Dinitrophenol	UJ2	UJ2	UJ2
Fluoranthene	U	360	U
ICP Metals - SW6010(mg/kg)			
General	U	U	U
Chromium	2.5	4.1	2.7
Copper	3.6	4.2	2.5
Nickel	2.4	2.6	1.9
Zinc	6.2	22.3	13.1
Thallium - SW7841(mg/kg)	1.1U	1.1U	1.1U
Arsenic - SW7060(mg/kg)	1.1U	1.1U	1.1U
Mercury - SW7471(mg/kg)	0.0099	0.021	0.013
Selenium - SW7740(mg/kg)	0.55U	0.55U	0.55U
Lead - SW7421(mg/kg)	3.3	13	3.9

TABLE E.22
SITE 9, FORMER LANDFILL B
SUMMARY OF GROUNDWATER SAMPLE RESULTS, 1990
VOLK FIELD ANGB, WI

Parameters	VF9-MW1	VF9-MW2	VF9-MW3
Date Sampled	10/24/90	10/26/90	10/26/90
Halogenated Volatiles - SW8010(ug/L)			
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0
General	U	U	U
Bromoform	UJ2	UJ2	UJ2
Bromomethane	UJ2	UJ2	UJ2
2-Chloroethylvinyl Ether	UJ2	UJ2	UJ2
Chloromethane	UJ2	UJ2	UJ2
Aromatic Volatiles - SW8020(ug/L)			
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0
General	U	U	U
Total Petroleum Hydrocarbons E418.1(ug/L)	U	U	U
Organochlorine Pesticides &PCB's - CLP SOW(ug/L)			
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0
General	U	U	U
Semivolatile Organics - CLP SOW(ug/L)			
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0
General	U	U	U
bis(2-ethylhexyl)phthalate	12U	25U	U
ICP Dissolved Metals - SW6010(ug/L)			
General	U	U	U
Cadmium	U	U	10.2
Silver	UJ4	UR	UR
Zinc	U	U	30.8
Dissolved Thallium - SW7841(ug/L)	U	U	U
Dissolved Arsenic - SW7060(ug/L)	U	U	U
Dissolved Mercury - SW7470(ug/L)	U	U	U
Dissolved Selenium - SW7740(ug/L)	U	U	U
Dissolved Lead - SW7421(ug/L)	U	U	U
Total Dissolved Solids - E160.1(ug/L)	88,000	68,000	33,000

TABLE E.23
SITE 10, MUNITIONS BURIAL SITE
SUMMARY OF SOIL SAMPLE RESULTS, 1990
VOLK FIELD ANGB, WI

Parameter	VF10-SB1 (0'-1')	VF10-SB2 (0'-1')	VF10-SB3 (0'-1')
Date Sampled	10/28/90	10/28/90	10/28/90
Halogenated Volatiles - SW8010(ug/kg)			
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.2
General	UJ3	UJ3	UJ3
Bromoform	UJ2,J3	UJ2,J3	UJ2,J3
Bromomethane	UJ2,J3	UJ2,J3	UJ2,J3
2-Chloroethylvinyl Ether	UR	UR	UR
Chloromethane	UR	UR	UR
Vinyl Chloride	UR	UR	UR
Aromatic Volatiles - SW8020(ug/kg)			
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.2
General	UJ3	UJ3	UJ3
Organochlorine Pesticides & PCB's - CLP SOW(ug/kg)			
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.2
General	U	U	U
Semivolatile Organics - CLP SOW(ug/kg)			
DETECTION LEVEL MULTIPLIER	1.04	1.03	1.2
General	U	U	U
3,3'-Dichlorobenzidine	U	U	UJ2
Hexachlorocyclopentadiene	U	U	UJ2
Isophorone	UJ2	UJ2	U
2,4-Dinitrophenol	UJ2	UJ2	UJ2
ICP Metals - SW6010(mg/kg)			
General	U	U	U
Chromium	1.3	3.1	2.6
Copper	1.9	2.3	2.3
Nickel	1.5	1.9	1.5
Zinc	3.3	5.7	3.7
Thallium - SW7841(mg/kg)	1.0U	1.0U	1.1U
Arsenic - SW7060(mg/kg)	1.0U	1.0U	1.1U
Mercury - SW7471(mg/kg)	0.011	0.0098U	0.0097U
Selenium - SW7740(mg/kg)	0.50U	0.50U	0.55U
Lead - SW7421(mg/kg)	0.50U	1.1	0.55U

TABLE E.24
SITE 10, MUNITIONS BURIAL SITE
SUMMARY OF GROUNDWATER SAMPLE RESULTS, 1989
VOLK FIELD ANGB, WI

Parameter	VF10-MW5	VF10-MW6	VF10-MW7	VF10-MW20*
Date Sampled	11/06/89	11/10/89	11/06/89	11/06/89
Halogenated Volatiles - SW8010(ug/L)				
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0
General	U	U	U	U
Bromoform	UJ2	UJ2	UJ2	UJ2
Chloroform	1.3U	1.4U	15.0	1.4U
2-Chloroethylvinyl Ether	UJ2	UR	UJ2	UJ2
Chloromethane	UJ2	UJ2	UJ2	UJ2
1,2-Dichloroethane	UJ2	U	UJ2	UJ2
Trans-1,2-Dichloroethene	UJ2	U	UJ2	UJ2
Vinyl Chloride	UJ2	UJ2	UJ2	UJ2
Aromatic Volatiles - SW8020(ug/L)				
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0
General	U	U	U	U
Chlorobenzene	UJ2	UJ2	UJ2	UJ2
1,2-Dichlorobenzene	UJ2	UJ2	UJ2	UJ2
1,3-Dichlorobenzene	UJ2	U	UJ2	UJ2
1,4-Dichlorobenzene	UJ2	U	UJ2	UJ2
Total Petroleum Hydrocarbons - E418.1(ug/L)	U	U	U	U
Total Dissolved Solids - E160.1(ug/L)	170	78	91	180
Semivolatile Organics - COP SOW(ug/L)				
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0
General	UJ2,J3	U	UJ3	UJ2,J3
Anthracene	UJ2,J3	U	UJ2,J3	UJ3
Benzo(a)Anthracene	UJ2,J3	UJ2	UJ2,J3	UJ3
Benzo(B)fluoranthene	UJ2,J3	UJ2	UJ2,J3	UJ2,J3
Benzo(k)fluoranthene	UJ3	UJ2	UJ2,J3	UJ3
Benzo(a)pyrene	UJ3	UJ2	UJ2,J3	UJ3
Benzo(g,h,i)perylene	UJ3	UJ2	UJ2,J3	UJ3
Butylbenzylphthalate	UJ2,J3	UJ2	UJ2,J3	UJ2,J3
Chrysene	UJ2,J3	UJ2	UJ2,J3	UJ3
Dibenzo(a,h)anthracene	UJ2,J3	UJ2	UJ2,J3	UJ2,J3
Dibutyl phthalate	UJ2,J3	U	UJ2,J3	UJ3
3,3-Dichlorobenzidine	UJ2,J3	UJ2	UJ2,J3	UJ2,J3
2,4-Dinitrotoluene	UJ2,J3	U	UJ2,J3	UJ2,J3
Di-n-octylphthalate	UJ3	UJ2	UJ2,J3	UJ3
bis(2-ethylhexyl)phthalate	UJ2,J3	UJ2	UJ2,J3	12J2,J3
Hexachlorobenzene	UJ2,J3	U	UJ2,J3	UJ2,J3
Hexachlorocyclopentadiene	UJ2,J3	U	UJ2,J3	UJ2,J3
Indeno (1,2,3-cd) pyrene	UJ2,J3	UJ2	UJ2,J3	UJ2,J3
N-Nitrosodiphenylamine/	UJ2,J3	U	UJ2,J3	UJ3
Phenanthrene	UJ2,J3	U	UJ2,J3	UJ3
Pyrene	UJ2,J3	UJ2	UJ2,J3	UJ3
1,2,4-Trichlorobenzene	UJ2,J3	UJ2	UJ3	UJ2,J3
2,4-Dinitrophenol	UJ2,J3	U	UJ2,J3	UJ2,J3
2-Methyl-4,6-dinitrophenol	UJ2,J3	U	UJ2,J3	UJ3
4-Nitrophenol	UJ2,J3	U	UJ2,J3	UJ2,J3
Pentachlorophenol	UJ2,J3	U	UJ2,J3	UJ3
bis(2-Chloroethyl)ether	UJ2,J3	UJ2	UJ3	UJ2,J3
bis(2-Chloroisopropyl)ether	UJ2,J3	UJ2	UJ3	UJ2,J3
N-nitroso-di-n-propylamine	UJ2,J3	UJ2	UJ3	UJ2,J3
ICP Dissolved Metals - SW6010(ug/L)				
General	U	U	U	U
Zinc	35	12	35	59
Thallium - SW7841(ug/L)	U	U	U	U
Arsenic - SW7060(ug/L)	UJ2	UJ2	UJ2	UJ2
Mercury - SW7470/7471(ug/L)	0.27U	U	0.28U	0.28U
Selenium - SW7740(ug/L)	U	U	U	U
Lead - SW7421(ug/L)	U	U	U	U

* Duplicate for VF10-MW5.

TABLE E.25
SITE 10, MUNITIONS BURIAL SITE
SUMMARY OF GROUNDWATER SAMPLE RESULTS, 1990
VOLK FIELD ANGB, WI

Parameter	VF10 MW1	VF10 MW2	VF10 MW3	VF10 MW8*	VF10 MW4	VF10 MW5	VF10 MW6	VF10 MW7
Date Sampled	10/28/90	10/28/90	10/28/90	10/28/90	10/28/90	10/28/90	10/28/90	10/28/90
Halogenated Volatiles - SW8010(ug/L)								
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U	UJ3	UJ3	U
Bromoform	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2,J3	UJ2,J3	UJ2
Bromomethane	UJ2	UJ2	UJ2	UR	UJ2	UJ2,J3	UJ2,J3	UJ2
Carbon Tetrachloride	U	U	U	UJ2	U	UJ3	UJ3	U
Chloroform	U	U	U	UJ2	U	UJ3	UJ3	U
2-Chloroethylvinyl Ether	UR	UR	UR	UR	UR	UR	UR	UR
Chloromethane	UR	UR	UR	UR	UR	UR	UR	UR
Dibromochloromethane	U	U	U	UJ2	U	UJ3	UJ3	U
1,1-Dichloroethane	U	U	U	UJ2	U	UJ3	UJ3	U
Trans-1,2-Dichloroethene	U	U	U	UJ2	U	UJ3	UJ3	U
1,3-Dichloropropylene	U	U	U	UJ2	U	UJ3	UJ3	U
1,1,1-Trichloroethane	U	U	U	UJ2	U	UJ3	UJ3	U
1,1,2-Trichloroethane	U	U	U	UJ2	U	UJ3	UJ3	U
Vinyl Chloride	UR	UR	UR	UR	UR	UR	UR	UR
Aromatic Volatiles - SW8020(ug/L)								
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U	UJ3	UJ3	U
Benzene	U	U	42	41	30	UJ3	UJ3	U
Ethylbenzene	U	U	U	U	8.4	UJ3	UJ3	U
Xylenes	U	U	U	1.4	1.4	UJ3	UJ3	U
Total Petroleum Hydrocarbons E418.1(ug/L)	1,100	3,500	U	1,000	U	U	U	U
Semivolatile Organics - CLP SOW(ug/L)								
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U	U	U	U
bis(2-Chloroisopropyl) ether	UJ2	UJ2	U	U	U	U	U	U
3,3'-Dichlorobenzidine	UJ2	UJ2	U	U	U	U	U	U
bis(2-ethylhexyl)phthalate	18U	27U	10U	U	U	12U	10U	U
2,4-Dinitrophenol	U	U	UJ2	UJ2	UJ2	UJ2	UJ2	UJ2
3-Nitroaniline	UJ2	UJ2	U	U	U	U	U	U
4-Chloroaniline	UJ2	UJ2	U	U	U	U	U	U
ICP Dissolved Metals - SW6010(ug/L)								
General	U	U	U	U	U	U	U	U
Silver	UJ4	UJ4	UJ4	UJ4	UJ4	UJ4	UJ4	UJ4
Zinc	U	13.2J4	U	11.0J4	U	U	14.5J4	16.6J4
Dissolved Thallium - SW7841(ug/L)	U	U	U	U	U	U	U	U
Dissolved Arsenic - SW7060(ug/L)	U	U	U	U	U	U	U	U
Dissolved Mercury - SW7470(ug/L)	U	U	U	U	U	U	U	U
Dissolved Selenium - SW7740(ug/L)	U	U	U	U	U	U	U	U
Dissolved Lead - SW7421(ug/L)	U	U	U	U	U	U	U	U
Total Dissolved Solids E160.1(ug/L)	47,000	25,000	57,000	54,000	87,000	120,000	35,000	22,000

* Duplicate for VF10-MW3.

TABLE E.26
SITE 10, MUNITIONS BURIAL SITE
SUMMARY OF SURFACE WATER SAMPLE RESULTS, 1989
VOLK FIELD ANGB, WI

Parameter	VF10-SW1	VF10-SW2	VF10-SW4
Date Sampled	11/06/89	11/06/89	11/06/89
Halogenated Volatiles - SW8010(ug/L)			
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0
General	U	U	U
Bromoform	UJ2	UJ2	UJ2
2-Chloroethylvinyl Ether	UJ2	UJ2	UJ2
Chloromethane	UJ2	UJ2	UJ2
1,2-Dichloroethane	UJ2	UJ2	UJ2
Trans-1,2-Dichloroethene	UJ2	UJ2	UJ2
Vinyl Chloride	UJ2	UJ2	UJ2
Aromatic Volatiles - SW8020(ug/L)			
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0
General	U	U	U
Chlorobenzene	UJ2	UJ2	UJ2
1,2-Dichlorobenzene	UJ2	UJ2	UJ2
1,3-Dichlorobenzene	UJ2	UJ2	UJ2
1,4-Dichlorobenzene	UJ2	UJ2	UJ2
Total Petroleum Hydrocarbons - E418.1(ug/L)	2800	U	U
Total Dissolved Solids - E160.1(ug/L)	78	78	100
Semivolatile Organics - COP SOW(ug/L)			
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0
General	U	UJ2	UJ3
Anthracene	U	UJ2	UJ2,J3
Benzo(a)Anthracene	U	UJ2	UJ3
Benzo(B)fluoranthene	U	UJ2	UJ3
Benzo(k)fluoranthene	U	U	UJ3
Benzo(a)pyrene	U	U	UJ3
Benzo(g,h,i)perylene	U	U	UJ3
Butylbenzylphthalate	U	U	UJ3
Chrysene	U	U	UJ3
Dibenzo(a,h)anthracene	U	UJ2	UJ3
Dibutyl phthalate	U	UJ2	UJ2,J3
3,3-Dichlorobenzidine	U	UJ2	UJ3
2,4-Dinitrotoluene	U	UJ2	UJ2,J3
Di-n-octylphthalate	U	U	UJ3
bis(2-ethylhexyl)phthalate	UJ2	35J2	UJ3
Hexachlorobenzene	U	UJ2	UJ2,J3
Hexachlorocyclopentadiene	U	UJ2	UJ2,J3
Indeno (1,2,3-cd) pyrene	U	UJ2	UJ3
N-Nitrosodiphenylamine/	U	UJ2	UJ2,J3
Phenanthrene	U	UJ2	UJ2,J3
Pyrene	U	U	UJ3
1,2,4-Trichlorobenzene	U	UJ2	UJ3
2,4-Dinitrophenol	UJ2	UJ2	UJ2,J3
2-Methyl-4,6-dinitrophenol	U	UJ2	UJ2,J3
4-Nitrophenol	U	UJ2	UJ2,J3
Pentachlorophenol	U	UJ2	UJ2,J3
ICP Dissolved Metals - SW6010(ug/L)			
General	U	U	U
Thallium - SW7841(ug/L)	U	U	U
Arsenic - SW7060(ug/L)	U	U	UJ2
Mercury - SW7470/7471(ug/L)	0.25U	0.27U	0.29U
Selenium - SW7740(ug/L)	U	U	U
Lead - SW7421(ug/L)	U	U	U

TABLE E.27
SUMMARY OF TRIP BLANK RESULTS, 1989
VOLK FIELD ANGB, WI

Parameter	VF-TB1	VF-TB2	VF-TB3	VF-TB5 Log No: 9546-5	VF-TB5 Log No: 9580-7	VF-TB6	VF-TB8	VF-TB9	VF-TB10
Date Sampled	11/02/89	11/03/89	11/04/89	11/06/89	11/06/89	11/08/89	11/08/89	11/09/89	11/10/89
Halogenated Volatiles - SW8010(ug/L)									
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U	U	U	U	U
Chloroform	0.51	U	U	U	U	U	U	U	U
Aromatic Volatiles - SW8020(ug/L)									
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U	U	U	U	U

TABLE E.28
SUMMARY OF EQUIPMENT RINSEATE BLANK RESULTS, 1989
VOLK FIELD ANGB, WI

Parameter	VF-ERB1	VF-ERB2	VF-ERB3	VF-ERB4
Date Sampled	11/02/89	11/03/89	11/04/89	11/08/89
Halogenated Volatiles - SW8010(ug/L)				
DETECTION LEVEL MULTIPLICATION	1.0	1.0	1.0	1.0
General	U	U	U	U
Chloroform	0.53	U	U	U
Aromatic Volatiles - SW8020(ug/L)				
DETECTION LEVEL MULTIPLICATION	1.0	1.0	1.0	1.0
General	U	U	U	U
Total Petroleum Hydrocarbons - E418.1(ug/L)	U	NA	U	U
Total Dissolved Solids - E160.1(ug/L)	U	NA	U	U
Semivolatile Organics - CLP SOW(ug/L)				
DETECTION LEVEL MULTIPLICATION	1.0	1.0	1.0	1.0
General	U	NA	U	U
ICP Dissolved Metals - SW6010(ug/L)				
General	U	NA	U	NA
Zinc	80	NA	U	NA
Arsenic - SW7060(ug/L)	U	NA	U	NA
Mercury - SW7470/7471(ug/L)	U	NA	0.23	NA
Selenium - SW7740(ug/L)	U	NA	U	NA
Lead - SW7421(ug/L)	U	NA	U	U
Thallium - SW7841(ug/L)	U	NA	U	NA

TABLE E.29
SUMMARY OF FIELD BLANK RESULTS, 1989
VOLK FIELD ANGB, WI

Parameter	VF1-FB1-HPLC	VF1-FB1-PW
Date Sampled	11/03/89	11/03/89
Halogenated Volatiles - SW8010(ug/L)		
DETECTION LEVEL MULTIPLIER	1.0	5.0
General	U	U
Chloroform	0.55	45D
Aromatic Volatiles - SW8020(ug/L)		
DETECTION LEVEL MULTIPLIER	1.0	5.0
General	U	U
Total Petroleum Hydrocarbons - E418.1(ug/L)	U	U
Total Dissolved Solids - E160.1(ug/L)	U	U
Semivolatile Organics - CLP SOW(ug/L)		
DETECTION LEVEL MULTIPLIER	1.0	1.0
General	U	U
Organochlorine Pesticides & PCB's - CLP SOW(ug/L)		
DETECTION LEVEL MULTIPLIER	1.0	1.0
General	U	U
ICP Dissolved Metals - SW6010(ug/L)	U	U
Thallium - SW7841(ug/L)	U	U
Arsenic - SW7060(ug/L)	U	U
Mercury - SW7470/7471(ug/L)	U	U
Selenium - SW7740(ug/L)	U	U
Lead - SW7421(ug/L)	U	U

TABLE E.30
SUMMARY OF TRIP BLANK RESULTS, 1990
VOLK FIELD ANGB, WI

Parameter	VF-TB-1X	VF-TB1	VF-TB2	VF-TB3	VF-TB4	VF-TB5	VF-TB6	VF-TB7	VF-TB8	VF-TB9	VF-TB10
Date Sampled	09/25/90	09/30/90	10/03/90	10/10/90	10/14/90	10/16/90	10/17/90	10/23/90	10/24/90	10/25/90	10/26/90
Halogenated Volatiles - SW8010(ug/L)											
DETECTION LEVEL MULTIPLIER	1.0	—	1.0	1.0	—	—	—	1.0	1.0	1.0	1.0
General	U	NA	U	U	NA	NA	NA	U	U	U	U
Aromatic Volatiles - SW8020(ug/L)											
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U	U	U	U	U	U	U

Parameter	VF-TB11 Log #: SO-13146-	VF-TB11 Log #: O-13171-2	VF-TB12	VF-TB13	VF-TB14	VF-TB15	VF-TB16	VF-TB17	VF-TB18	VF-TB19	VF-TB20
Date Sampled	10/27/90	10/28/90	10/29/90	10/30/90	11/05/90	11/06/90	11/07/90	11/07/90	11/08/90	11/09/90	11/10/90
Halogenated Volatiles - SW8010(ug/L)											
DETECTION LEVEL MULTIPLIER	—	1.0	1.0	1.0	1.0	1.0	1.0	—	1.0	1.0	1.0
General	NA	U	U	U	U	U	U	NA	U	U	U
Aromatic Volatiles - SW8020(ug/L)											
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
General	U	U	U	U	U	U	U	U	U	U	U

TABLE E.31
SUMMARY OF EQUIPMENT RINSEATE BLANK RESULTS, 1990
VOLK FIELD ANGB, WI

Parameters	VF-ER1-X1	VF-ER1	VF-ER2	VF-ER3	VF-ER4	VF-ER5	VF-ER6	VF-ER7	VF-ER8	VF-ER9	VF-ER10	VF-ER11
Date Sampled	09/25/90	09/30/90	10/10/90	10/14/90	10/17/90	10/23/90	10/25/90	10/27/90	10/30/90	11/06/90	11/07/90	11/08/90
Halogenated Volatiles - SW8010(ug/L)												
DETECTION LEVEL MULTIPLIER	1.0	—	1.0	—	—	1.0	1.0	—	—	1.0	0.0	1.0
General	U	NA	U	NA	NA	U	U	NA	NA	U	NA	U
Aromatic Volatiles - SW8020(ug/L)												
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1	1.0
General	U	U	U	U	U	U	U	U	U	U	U	U
Total Petroleum Hydrocarbons - E418.1(ug/L)	NA	U	NA	U	U	U	U	U	U	U	U	U
Organochlorine Pesticides & PCB's - CLP SOW(ug/L)												
DETECTION LEVEL MULTIPLIER	—	—	—	—	—	1	1	—	—	1	—	—
General	NA	NA	NA	NA	NA	U	U	NA	NA	U	NA	NA
Semivolatile Organics - CLP SOW(ug/L)												
DETECTION LEVEL MULTIPLIER	—	—	—	—	—	1	1	—	—	1	—	1
General	NA	NA	NA	NA	NA	U	U	NA	NA	U	NA	U
bis(2-ethylhexyl)phthalate	NA	NA	NA	NA	NA	32B	13B	NA	NA	U	NA	U
ICP Dissolved Metals - SW6010(ug/L)												
General	NA	NA	NA	NA	NA	U	U	NA	NA	U	NA	U
Silver	NA	NA	NA	NA	NA	UJ4	UN	NA	NA	UN	NA	UN
Dissolved Thallium - SW7841(ug/L)	NA	NA	NA	NA	NA	U	U	NA	NA	U	NA	U
Dissolved Arsenic - SW7060(ug/L)	NA	NA	NA	NA	NA	U	U	NA	NA	UN	NA	U
Dissolved Mercury - SW7470(ug/L)	NA	NA	NA	NA	NA	U	U	NA	NA	U	NA	U
Dissolved Selenium - SW7740(ug/L)	NA	NA	NA	NA	NA	U	U	NA	NA	U	NA	U
Dissolved Lead - SW7421(ug/L)	NA	* U	NA	* U	* U	U	U	U	U	U	U	U
Total Dissolved Solids - E160.1(ug/L)	NA	NA	NA	NA	NA	6,000	6,000	5,000	U	U	NA	U

* - Total lead was analyzed for instead of dissolved lead.

TABLE E.32
SUMMARY OF FIELD BLANK RESULTS, 1990
VOLK FIELD ANGB, WI

Parameters	VF-FB1-1X	VF-FB2	VF-FB3	VF-FB4	VF-FB5
Date Sampled	09/25/90	10/25/90	10/25/90	11/07/90	11/10/90
Halogenated Volatiles - SW8010(ug/L)					
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1	5.0
General	U	U	U	U	U
Bromodichloromethane	U	U	1.5	U	U
Chloroform	U	U	19	U	96
Aromatic Volatiles - SW8020(ug/L)					
DETECTION LEVEL MULTIPLIER	1.0	1.0	1.0	1	5.0
General	U	U	U	U	U
Total Petroleum Hydrocarbons - E418.1(ug/L)	NA	U	U	U	U
Organochlorine Pesticides & PCB's - CLP SOW(ug/L)					
DETECTION LEVEL MULTIPLIER	—	1	1	1	1
General	NA	U	U	U	U
Semivolatile Organics - CLP SOW(ug/L)					
DETECTION LEVEL MULTIPLIER	—	1	1	1	1
General	NA	U	U	U	U
bis(2-ethylhexyl)phthalate	NA	17B	U	U	U
ICP Dissolved Metals - SW6010(ug/L)					
General	NA	U	U	U	U
Copper	NA	U	86.6	U	19.8
Nickel	NA	U	12.9	U	U
Silver	NA	UN	UN	UN	UN
Zinc	NA	U	1,240	U	2,730
Dissolved Thallium - SW7841(ug/L)	NA	U	U	U	U
Dissolved Arsenic - SW7060(ug/L)	NA	U	U	U	U
Dissolved Mercury - SW7470(ug/L)	NA	U	U	U	U
Dissolved Selenium - SW7740(ug/L)	NA	U	U	U	U
Dissolved Lead - SW7421(ug/L)	NA	U	U	U	UN
Total Dissolved Solids - E160.1(ug/L)	NA	6,000	43,000	6,000	47,000

TABLE E.33
SITE 1, FIRE TRAINING AREA
SUMMARY OF SOIL SAMPLE HOLDING TIMES, 1989
VOLK FIELD ANGB, WI

Sample Identification	Date Sample Collected	ICP Metals 6010 (180 Days)	Arsenic 7060 (180 Days)	Mercury 7470/7471 (28 Days)	Selenium 7740 (180 Days)	Lead 7421 (180 Days)	Thalluim 7841 (180 Days)
VF1-SB13 *	11/02/89	11/29/89(27)	11/21/89(19)	11/15/89(13)	11/21/89(19)	11/21/89(19)	11/29/89(27)
VF1-SB16	11/02/89	11/29/89(27)	11/21/89(19)	11/15/89(13)	11/21/89(19)	11/21/89(19)	11/29/89(27)
VF1-SB17-SS1	11/02/89	11/29/89(27)	11/21/89(19)	11/15/89(13)	11/21/89(19)	11/21/89(19)	11/29/89(27)
VF1-SB17-SS2	11/02/89	11/29/89(27)	11/21/89(19)	11/15/89(13)	11/21/89(19)	11/21/89(19)	11/29/89(27)
VF1-SB18-SS1	11/02/89	11/29/89(27)	11/21/89(19)	11/15/89(13)	11/21/89(19)	11/27/89(25)	11/29/89(27)
VF1-SB18-SS2	11/02/89	11/29/89(27)	11/21/89(19)	11/15/89(13)	11/21/89(19)	11/21/89(19)	11/29/89(27)

* - Duplicates: VF1-SB13 of VF1-SB16

TABLE E.33 (cont'd)
SITE 1, FIRE TRAINING AREA
SUMMARY OF SOIL SAMPLE HOLDING TIMES, 1989
VOLK FIELD ANGB, WI

Sample Identification	Date Sample Collected	Date of Sample Receipt	Halogenated Volatiles 8010 (14 Days)	Aromatic Volatiles 8020 (14 Days)	Total Petroleum Hydrocarbons 418.1 (28 Days)	Semivolatile Organics SW846-3550/8270 Date Extracted (10 Days)(3)	Semivolatile Organics SW846-3550/8270 Date Analyzed (40 Days)(3)	Lead 7421 (180 Days)
VF1-SB19-SS1	11/07/89	11/08/89	11/21/89(14)	11/21/89(14)	11/21/89(14)	11/14/89(06)	11/27/89(13)	11/24/89(17)
VF1-SB19-SS2	11/07/89	11/08/89	11/21/89(14)	11/21/89(14)	11/21/89(14)	11/14/89(06)	11/20/89(06)	11/24/89(17)
VF1-SB20-SS1	11/07/89	11/08/89	11/21/89(14)	11/21/89(14)	11/21/89(14)	11/14/89(06)	11/27/89(13)	11/24/89(17)
VF1-SB20-SS2	11/07/89	11/08/89	11/21/89(14)	11/20/89(13)	11/21/89(14)	11/14/89(06)	11/20/89(06)	11/24/89(17)
VF1-SB21-SS1	11/07/89	11/08/89	11/21/89(14)	11/21/89(14)	11/21/89(14)	11/13/89(05)	11/20/89(07)	11/24/89(17)
VF1-SB21-SS2	11/07/89	11/08/89	11/21/89(14)	11/21/89(14)	11/21/89(14)	11/13/89(05)	11/30/89(17)	11/24/89(17)
VF1-SB22-SS1	11/07/89	11/08/89	11/21/89(14)	11/21/89(14)	11/21/89(14)	11/13/89(05)	11/20/89(07)	11/24/89(17)
VF1-SB22-SS2	11/07/89	11/08/89	11/20/89(13)	11/20/89(13)	11/21/89(14)	11/13/89(05)	11/30/89(17)	11/24/89(17)
VF1-SB23-SS1	11/07/89	11/08/89	11/21/89(14)	11/21/89(14)	11/21/89(14)	11/13/89(05)	11/30/89(17)	11/24/89(17)
VF1-SB23-SS2	11/07/89	11/08/89	11/20/89(13)	11/20/89(13)	11/21/89(14)	11/13/89(05)	11/20/89(07)	11/24/89(17)
VF1-SB23-SS3	11/07/89	11/08/89	11/20/89(13)	11/20/89(13)	11/21/89(14)	11/13/89(05)	11/30/89(17)	11/24/89(17)
VF1-SB24-SS1	11/08/89	11/09/89	11/21/89(13)	11/21/89(13)	11/22/89(14)	11/16/89(07)	12/04/89(18)	11/21/89(13)
VF1-SB24-SS2	11/08/89	11/09/89	11/21/89(13)	11/21/89(13)	11/22/89(14)	11/16/89(07)	12/05/89(19)	11/21/89(13)
VF1-SB25-SS1	11/08/89	11/09/89	11/21/89(13)	11/21/89(13)	11/22/89(14)	11/16/89(07)	12/04/89(18)	11/27/89(19)
VF1-SB25-SS2	11/08/89	11/09/89	11/21/89(13)	11/21/89(13)	11/22/89(14)	11/16/89(07)	12/04/89(18)	11/27/89(19)
VF1-SB26-SS1	11/08/89	11/09/89	11/21/89(13)	11/21/89(13)	11/22/89(14)	11/16/89(07)	11/22/89(06)	11/21/89(13)
VF1-SB26-SS2	11/08/89	11/09/89	11/21/89(13)	11/21/89(13)	11/22/89(14)	11/16/89(07)	11/22/89(06)	11/21/89(13)
VF1-SB27-SS1	11/08/89	11/09/89	11/21/89(13)	11/21/89(13)	11/22/89(14)	11/16/89(07)	11/22/89(06)	11/21/89(13)
VF1-SB27-SS2	11/08/89	11/09/89	11/21/89(13)	11/21/89(13)	11/22/89(14)	11/16/89(07)	12/04/89(18)	11/24/89(17)
VF1-SB28-SS1	11/07/89	11/08/89	11/20/89(13)	11/20/89(13)	11/21/89(14)	11/13/89(05)	11/25/89(12)	11/24/89(17)
VF1-SB28-SS2	11/07/89	11/08/89	11/21/89(14)	11/21/89(14)	11/21/89(14)	11/13/89(05)	11/30/89(17)	11/21/89(13)
VF1-SB29-SS1	11/08/89	11/09/89	11/21/89(13)	11/21/89(13)	11/22/89(14)	11/16/89(07)	12/05/89(19)	11/21/89(13)
VF1-SB29-SS2	11/08/89	11/09/89	11/22/89(14)	11/22/89(14)	11/22/89(14)	11/16/89(07)	11/22/89(06)	11/21/89(13)
VF1-SB30-SS1	11/08/89	11/09/89	11/22/89(14)	11/22/89(14)	11/22/89(14)	11/16/89(07)	11/22/89(06)	11/21/89(13)
VF1-SB30-SS2	11/08/89	11/09/89	11/22/89(14)	11/22/89(14)	11/22/89(14)	11/16/89(07)	11/22/89(06)	11/21/89(13)
VF1-SB31-SS1	11/08/89	11/09/89	11/22/89(14)	11/22/89(14)	11/22/89(14)	11/16/89(07)	12/04/89(18)	11/21/89(13)
VF1-SB31-SS2	11/08/89	11/09/89	11/22/89(14)	11/22/89(14)	11/22/89(14)	11/16/89(07)	11/22/89(06)	11/21/89(13)
VF1-SB35-SS2 *	11/07/89	11/08/89	11/21/89(14)	11/21/89(14)	11/21/89(14)	11/14/89(06)	11/20/89(06)	11/24/89(17)
VF1-SB36-SS2 *	11/07/89	11/08/89	11/21/89(14)	11/21/89(14)	11/21/89(14)	11/13/89(05)	11/30/89(17)	11/24/89(17)
VF1-SB37-SS2 *	11/07/89	11/08/89	11/20/89(13)	11/20/89(13)	11/21/89(14)	11/13/89(05)	11/30/89(17)	11/24/89(17)
VF1-SB38 *	11/08/89	11/09/89	11/22/89(14)	11/22/89(14)	11/22/89(14)	11/16/89(07)	11/30/89(14)	11/21/89(13)

(3) - Extracted within 10 days of sample receipt and analyzed within 40 days of extraction.
* - Duplicates: VF1-SB35-SS2 of VF1-SB19-SS2, VF1-SB36-SS2 of VF1-SB21-SS2, VF1-SB37-SS2 of VF1-SB22SS2, and VF1-SB38 of VF1-SB27-SS2

TABLE E.34
SITE 1, FIRE TRAINING AREA
SUMMARY OF GROUNDWATER SAMPLE HOLDING TIMES, 1989
VOLK FIELD ANGB, WI

Sample Identification	Date Sample Collected	Date of Sample Receipt	Halogenated Volatiles 8010 (14 Days)	Aromatic Volatiles 8020 (14 Days)	Total Petroleum Hydrocarbons 418.1 (28 Days)	Semivolatile Organics SW846-3550/8270 Date Extracted (5 Days)(2)	Semivolatile Organics SW846-3550/8270 Date Analyzed (40 Days)(2)
VF1-MW5	11/02/89	11/06/89	11/08/89(06)	11/08/89(06)	11/17/89(15)	11/09/89(03)	11/14/89(05)
VF1-MW6	11/03/89	11/06/89	11/08/89(05)	11/08/89(05)	11/17/89(14)	11/09/89(03)	11/14/89(05)
VF1-MW7	11/03/89	11/06/89	11/08/89(05)	11/08/89(05)	11/17/89(14)	11/09/89(03)	11/14/89(05)
VF1-MW8	11/04/89	11/06/89	11/08/89(04)	11/08/89(04)	11/17/89(13)	11/09/89(03)	11/14/89(05)

Sample Identification	ICP Metals 6010 (180 Days)	Arsenic 7060 (180 Days)	Mercury 7470/7471 (28 DAYS)	Lead 7421 (180 Days)	Selenium 7740 (180 Days)	Thalluim 7421 (180 Days)	Total Dissolved Solids 160.1 (7 Days)
VF1-MW5	11/29/89(27)	11/28/89(26)	11/14/89(12)	11/29/89(28)	11/30/89(28)	11/29/89(27)	11/10/89(04)
VF1-MW6	11/20/89(17)	11/18/89(15)	11/14/89(11)	11/18/89(15)	11/20/89(17)	11/19/89(16)	11/10/89(04)
VF1-MW7	11/20/89(17)	11/18/89(15)	11/14/89(11)	11/27/89(24)	11/21/89(18)	11/29/89(26)	11/10/89(04)
VF1-MW8	11/20/89(16)	11/18/89(14)	11/14/89(10)	11/18/89(14)	11/20/89(16)	11/18/89(14)	11/10/89(04)

(2) - Extracted within 5 days of sample receipt
and analyzed within 40 days of extraction.

TABLE E.35
SITE 3/6, FUEL SPILL SITE
SUMMARY OF GROUNDWATER SAMPLE HOLDING TIMES, 1989
VOLK FIELD ANGB, WI

Sample Identification	Date Sample Collected	Total Petroleum Hydrocarbons 418.1 (28 Days)	Aromatic Volatiles 8020 (14 Days)	Lead 7421 (180 Days)	Total Dissolved Solids 160.1 (7 Days)
VF3/6-MW2	11/08/89	11/17/89(09)	11/17/89(09)	11/18/89(10)	11/13/89(05)
VF3/6-MW3	11/09/89	11/22/89(13)	11/18/89(09)	11/18/89(09)	11/13/89(04)
VF3/6-MW4	11/08/89	11/17/89(09)	11/17/89(09)	11/18/89(10)	11/13/89(05)
VF3/6-MW5	11/09/89	11/22/89(13)	11/18/89(09)	11/18/89(09)	11/13/89(04)
VF3/6-MW6	11/04/89	11/17/89(13)	11/16/89(12)	11/18/89(14)	11/10/89(06)

TABLE E.36
SITE 4, TRANSFORMER FLUID DISPOSAL AREA
SUMMARY OF SOIL SAMPLE HOLDING TIMES, 1989
VOLK FIELD ANGB, WI

Sample Identification	Date Sample Collected	Organochlorine Pesticides SW846-3550/8080 Date Extracted (14 Days)(4)	Organochlorine Pesticides SW846-3550/8080 Date Analyzed (40 Days)(4)	Oil & Grease 9071 (28 Days)
VF4-SB9-SS1	11/02/89	11/13/89(11)	11/21/89(08)	11/17/89(15)
VF4-SB9-SS2	11/02/89	11/13/89(11)	11/21/89(08)	11/17/89(15)
VF4-SB10-SS1	11/02/89	11/13/89(11)	11/21/89(08)	11/17/89(15)
VF4-SB10-SS2	11/02/89	11/13/89(11)	11/21/89(08)	11/17/89(15)
VF4-SB11-SS1	11/02/89	11/13/89(11)	11/21/89(08)	11/17/89(15)
VF4-SB11-SS2	11/02/89	11/13/89(11)	11/21/89(08)	11/17/89(15)
VF4-SB13-SS1 *	11/02/89	11/13/89(11)	11/21/89(08)	11/17/89(15)

(4) - Extracted within 14 days of collection and analyzed within 40 days of extraction. The 1989 QAPP specifies 7 days; however, the SW3550 extraction method from December 1987 (as well as current HAZWRAP guidelines) specify 14 days.

* - Duplicate: VF4-SB13-SS1 of VF4-SB10-SS1.

TABLE E.37
SITE 5, KC97 CRASH SITE
SUMMARY OF SOIL SAMPLE HOLDING TIMES, 1989
VOLK FIELD ANGB, WI

Sample Identification	Date Sample Collected	Halogenated Volatiles 8010 (14 Days)	Aromatic Volatiles 8020 (14 Days)	Total Petroleum Hydrocarbons 418.1 (28 Days)	Lead 7421 (180 Days)
VF5-SB1-SS1	11/04/89	11/15/89(11)	11/15/89(11)	11/17/89(13)	11/27/89(23)
VF5-SB1-SS2	11/04/89	11/15/89(11)	11/15/89(11)	11/17/89(13)	11/21/89(17)
VF5-SB2-SS1	11/04/89	11/15/89(11)	11/15/89(11)	11/17/89(13)	11/27/89(23)
VF5-SB2-SS2	11/04/89	11/15/89(11)	11/15/89(11)	11/17/89(13)	11/27/89(23)
VF5-SB2-SS3	11/04/89	11/15/89(11)	11/15/89(11)	11/17/89(13)	11/27/89(23)
VF5-SB3-SS1	11/04/89	11/15/89(11)	11/15/89(11)	11/17/89(13)	11/27/89(23)
VF5-SB4-SS1	11/04/89	11/15/89(11)	11/15/89(11)	11/17/89(13)	11/27/89(23)
VF5-SB4-SS2	11/04/89	11/15/89(11)	11/15/89(11)	11/17/89(13)	11/27/89(23)
VF5-SB5-SS1	11/05/89	11/19/89(14)	11/19/89(14)	11/22/89(17)	11/27/89(22)
VF5-SB6-SS1	11/05/89	11/19/89(14)	11/19/89(14)	11/17/89(12)	11/27/89(22)
VF5-SB7-SS1	11/05/89	11/19/89(14)	11/19/89(14)	11/22/89(17)	11/27/89(22)
VF5-SB8-SS1	11/05/89	11/19/89(14)	11/19/89(14)	11/17/89(12)	11/27/89(22)
VF5-SB8-SS2	11/05/89	11/19/89(14)	11/19/89(14)	11/17/89(12)	11/27/89(22)
VF5-SB9-SS1	11/05/89	11/18/89(13)	11/18/89(13)	11/17/89(12)	11/27/89(22)
VF5-SB10-SS1	11/05/89	11/18/89(13)	11/18/89(13)	11/17/89(12)	11/27/89(22)
VF5-SB11-SS1	11/05/89	11/18/89(13)	11/18/89(13)	11/17/89(12)	11/27/89(22)

TABLE E.38
SITE 5, KC97 CRASH SITE
SUMMARY OF GROUNDWATER SAMPLE HOLDING TIMES, 1989
VOLK FIELD ANGB, WI

Sample Identification	Date Sample Collected	Halogenated Volatiles 8010 (14 Days)	Aromatic Volatiles 8020 (14 Days)	Lead 7421 (180 Days)	Total Petroleum Hydrocarbons 418.1 (28 Days)	Total Dissolved Solids 160.1 (7 Days)
VF5-MW1	11/09/89	11/18/89(11)	11/18/89(11)	11/18/89(11)	11/22/89(13)	11/13/89(04)
VF5-MW20 *	11/09/89	11/18/89(11)	11/18/89(11)	11/18/89(11)	11/22/89(13)	11/13/89(04)

* - Duplicate: VF5-MW20 of VF5-MW1.

TABLE E.39
SITE 10, MUNITIONS BURIAL SITE
SUMMARY OF WATER SAMPLE HOLDING TIMES, 1989
VOLK FIELD ANGB, WI

Sample Identification	Date Sample Collected	Date Sample Received	Halogenated Volatiles 8010 (14 Days)	Aromatic Volatiles 8020 (14 Days)	Total Petroleum Hydrocarbons 418.1 (28 Days)	Semivolatile Organics SW846-3550/8270 Date Extracted (5 Days)(2)	Semivolatile Organics SW846-3550/8270 Date Analyzed (40 Days)(2)
VF10-MW5-W1-ES	11/06/89	11/08/89	11/17/89(11)	11/17/89(11)	11/17/89(11)	* 11/14/89(06)	11/25/89(09)
VF10-MW6-W1-ES	11/10/89	11/11/89	11/18/89(08)	11/18/89(08)	11/22/89(12)	11/15/89(04)	11/18/89(03)
VF10-MW7-W1-ES	11/06/89	11/08/89	11/17/89(11)	11/17/89(11)	11/17/89(11)	* 11/14/89(06)	11/17/89(09)
VF10-MW20 -W1-ES	11/06/89	11/08/89	11/17/89(11)	11/17/89(11)	11/17/89(11)	* 11/14/89(06)	11/25/89(09)
VF10-SW1-W1-ES	11/06/89	11/07/89	11/17/89(11)	11/17/89(11)	11/17/89(11)	11/09/89(02)	11/14/89(05)
VF10-SW1-W1-ES #	11/06/89	—	NA	NA	NA	NA	NA
VF10-SW2-W1-ES	11/06/89	11/07/89	11/17/89(11)	11/17/89(11)	11/17/89(11)	11/09/89(02)	11/25/89(16)
VF10-SW2-W1-ES #	11/06/89	—	NA	NA	NA	NA	NA
VF10-SW4-W1-ES	11/06/89	11/08/89	11/17/89(11)	11/17/89(11)	11/17/89(11)	* 11/14/89(06)	11/17/89(03)
VF10-SW4-W1-ES #	11/06/89	—	NA	NA	NA	NA	NA

Sample Identification	ICP Metals 6010 (180 Days)	Arsenic 7060 (180 Days)	Mercury 7470/7471 (28 Days)	Lead 7421 (180 Days)	Thallium 7421 (180 Days)	Selenium 7740 (180 Days)	Total Dissolved Solids 160.1 (7 Days)
VF10-MW5-W1-ES	11/20/89(14)	11/18/89(12)	11/14/89(08)	11/18/89(12)	11/18/89(12)	11/20/89(14)	11/10/89(04)
VF10-MW6-W1-ES	11/20/89(10)	11/18/89(08)	11/15/89(05)	11/18/89(08)	11/18/89(08)	11/20/89(10)	11/13/89(03)
VF10-MW7-W1-ES	11/20/89(14)	11/18/89(12)	11/14/89(08)	11/18/89(12)	11/18/89(12)	11/20/89(14)	11/09/89(03)
VF10-MW20 -W1-ES	11/20/89(14)	11/18/89(12)	11/14/89(08)	11/18/89(12)	11/18/89(12)	11/20/89(14)	11/10/89(04)
VF10-SW1-W1-ES	11/20/89(14)	11/19/89(13)	11/14/89(08)	11/18/89(12)	11/18/89(12)	11/20/89(14)	11/10/89(04)
VF10-SW1-W1-ES #	12/05/89(29)	12/07/89(31)	* 12/07/89(31)	12/05/89(29)	12/06/89(30)	12/06/89(30)	NA
VF10-SW2-W1-ES	11/20/89(14)	11/19/89(13)	11/14/89(08)	11/18/89(12)	11/18/89(12)	11/20/89(14)	11/10/89(04)
VF10-SW2-W1-ES #	12/05/89(29)	12/07/89(31)	* 12/07/89(31)	12/05/89(29)	12/06/89(30)	12/06/89(30)	NA
VF10-SW4-W1-ES	11/20/89(14)	11/18/89(12)	11/14/89(08)	11/18/89(12)	11/18/89(12)	11/20/89(14)	11/09/89(03)
VF10-SW4-W1-ES #	12/07/89(31)	12/07/89(31)	* 12/07/89(31)	12/05/89(29)	12/06/89(30)	12/06/89(30)	NA

* - Holding time was not met.
(2) - Extracted within 5 days of sample receipt and analyzed within 40 days of extraction.
- Sample was unfiltered.
NA - Not Analyzed

TABLE E.40
SUMMARY OF TRIP BLANK HOLDING TIMES, 1989
VOLK FIELD ANGB, WI

Sample Identification	Date Sampled	Halogenated Volatiles SW8010 (14 Days)	Aromatic Volatiles SW8020 (14 Days)
VF-TB1	11/02/89	11/14/89(12)	11/14/89(12)
VF-TB2	11/03/89	11/15/89(12)	11/15/89(12)
VF-TB3	11/04/89	11/15/89(11)	11/15/89(11)
VF-TB5(#9546-5)	11/06/89	11/16/89(10)	11/16/89(10)
VF-TB5(#9580-7)	11/06/89	11/17/89(11)	11/17/89(11)
VF-TB6	11/08/89	11/18/89(10)	11/17/89(09)
VF-TB8	11/08/89	11/17/89(09)	11/17/89(09)
VF-TB9	11/09/89	11/17/89(08)	11/17/89(08)
VF-TB10	11/10/89	11/17/89(07)	11/17/89(07)

NA - Not Analyzed

TABLE E.41
SUMMARY OF EQUIPMENT RINSATE BLANK HOLDING TIMES
VOLK FIELD ANGB, WI

Sample Identification	Date Sampled	Date Received	Halogenated Volatiles SW8010 (14 Days)	Aromatic Volatiles SW8020 (14 Days)	Total Petroleum Hydrocarbons 418.1 (28 Days)	Semivolatile Organics SW3550/8270 Date Extracted (5 Days)(2)	Semivolatile Organics SW3550/8270 Date Analyzed (40 Days)(2)
VF1-ERB1	11/02/89	11/6/89	11/15/89(13)	11/15/89(13)	11/17/89(15)	11/09/89(03)	11/14/89(05)
VF1-ERB2	11/03/89	—	11/15/89(12)	11/15/89(12)	NA	NA	NA
VF1-ERB3	11/04/89	11/06/89	11/16/89(12)	11/16/89(12)	11/17/89(13)	11/09/89(03)	11/14/89(05)
VF1-ERB4	11/08/89	11/11/89	11/19/89(11)	11/19/89(11)	11/22/89(14)	11/15/89(04)	11/18/89(03)

Sample Identification	ICP Metals 6010 (180 Days)	Arsenic 7060 (180 Days)	Mercury 7470/7471 (28 Days)	Lead 7421 (180 Days)	Selenium 7740 (180 Days)	Thallium 7421 (180 Days)	Total Dissolved Solids 160.1 (7 Days)
VF1-ERB1	11/20/89(18)	11/18/89(16)	11/14/89(12)	11/18/89(16)	11/20/89(18)	11/19/89(17)	11/07/89(05)
VF1-ERB2	NA	NA	NA	NA	NA	NA	NA
VF1-ERB3	11/29/89(25)	11/21/89(17)	11/14/89(10)	11/21/89(17)	11/21/89(17)	11/29/89(25)	11/10/89(06)
VF1-ERB4	NA	NA	NA	11/18/89(10)	NA	NA	11/13/89(05)

(1) - Extracted within 7 days of collection and analyzed within 40 days of extraction.

(2) - Extracted within 5 days of sample receipt and analyzed within 40 days of extraction.

NA - Not Analyzed

TABLE E.42
SUMMARY OF FIELD BLANK HOLDING TIMES
VOLK FIELD ANGB, WI

Sample Identification	Date Sampled	Date Received	Halogenated Volatiles SW8010 (14 Days)	Aromatic Volatiles SW8020 (14 Days)	Total Petroleum Hydrocarbons 418.1 (28 Days)	Semivolatile Organics SW846-3550/8270 Date Extracted (5 Days)(2)	Semivolatile Organics SW846-3550/8270 Date Analyzed (40 Days)(2)	ICP Metals 6010 (180 Days)
VF-FB1-HPLC	11/03/89	11/06/89	11/16/89(13)	11/16/89(13)	11/17/89(14)	11/09/89(03)	11/14/89(05)	11/29/89(26)
VF-FB1-PW	11/03/89	11/06/89	11/16/89(13)	11/16/89(13)	11/17/89(14)	11/09/89(03)	11/14/89(05)	11/29/89(26)
VF1-FB1-PW	11/03/89	—	NA	NA	NA	NA	NA	11/29/89(26)

Sample Identification	Arsenic 7060 (180 Days)	Mercury 7470/7471 (28 Days)	Lead 7421 (180 Days)	Selenium 7740 (180 Days)	Thallium 7421 (180 Days)	Organochlorine Pesticides & PCBs SW846-3550/8080 Date Extracted (7 Days)(1)	Organochlorine Pesticides & PCBs SW846-3550/8080 Date Analyzed (40 Days)(1)	Total Dissolved Solids 160.1 (7 Days)
VF-FB1-HPLC	11/21/89(18)	11/14/89(11)	11/21/89(18)	11/21/89(18)	11/29/89(26)	11/09/89(06)	11/13/89(04)	11/10/89(07)
VF-FB1-PW	11/21/89(18)	11/14/89(11)	11/29/89(26)	11/21/89(18)	11/29/89(26)	11/09/89(06)	11/13/89(04)	11/10/89(07)
VF1-FB1-PW	11/21/89(18)	11/14/89(11)	11/29/89(26)	11/21/89(18)	11/29/89(26)	NA	NA	NA

(1) - Extracted within 7 days of collection and analyzed within 40 days of extraction.
(2) - Extracted within 5 days of sample receipt and analyzed within 40 days of extraction.
NA - Not Analyzed

TABLE E.43
SITE 1, FIRE TRAINING AREA
SU MMARY OF GROUNDWATER SAMPLE HOLDING TIMES, 1990
VOLK FIELD ANGB, WI

Sample Identification	Date Sampled	Halogenated Volatiles SW8010(a) (14 days)		Aromatic Volatiles SW8020(a) (14 days)		Petroleum Hydrocarbons E418.1(a) (28 days)		Semivolatile Organics CLP SOW Extracted(a) (7 days)		Semivolatile Organics CLP SOW Analyzed(b) (40 days)		Dissolved ICP Metals SW6010(a,c) (180 days)	
VF1-BPW-1-W2-ES	11/09/90	11/16/90	7	11/15/90	6	11/21/90	12	11/12/90	3	12/06/90	24	11/21/90	12
VF1-BPW-2-W2-ES	11/09/90	11/15/90	6	11/15/90	6	11/21/90	12	11/12/90	3	11/29/90	17	11/21/90	12
VF1-BPW-4-W2-ES	11/09/90	11/16/90	7	11/16/90	7	11/21/90	12	11/12/90	3	11/29/90	17	11/21/90	12
VF1-BPW-7-W2-ES	11/09/90	11/15/90	6	11/15/90	6	11/21/90	12	11/12/90	3	11/29/90	17	11/21/90	12
VF92-BBW1-W2-ES	10/26/90	11/09/90	14	11/09/90	14	11/09/90	14	10/31/90	5	11/07/90	7	11/14/90	19
VF1-ET1-W2-ES	10/24/90	11/02/90	9	11/02/90	9	11/06/90	13	10/29/90	5	11/07/90	9	11/14/90	21
VF1-ET2-W2-ES	11/06/90	11/19/90	13	11/14/90	8	11/21/90	15	11/08/90	2	11/16/90	8	11/16/90	10
VF1-ET6-W2-ES	11/06/90	11/19/90	13	11/14/90	8	11/21/90	15	11/08/90	2	11/16/90	8	11/16/90	10
VF1-ET7-W2-ES	11/07/90	11/15/90	8	11/15/90	8	11/21/90	14	11/12/90	5	11/29/90	17	11/18/90	11
VF1-MW1-W2-ES	11/05/90	11/13/90	8	11/13/90	8	11/14/90	9	11/08/90	3	11/15/90	7	11/16/90	11
VF1-MW2-W2-ES	11/07/90	11/15/90	8	11/15/90	8	11/14/9(	7	11/12/90	5	12/05/90	23	11/18/90	11
VF1-MW3-W2-ES	11/07/90	11/15/90	8	11/15/90	8	11/14/90	7	11/12/90	5	12/04/90	22	11/18/90	11
VF1-MW4-W2-ES	11/05/90	11/19/90	14	11/19/90	14	11/14/90	9	11/08/90	3	11/15/90	7	11/16/90	11
VF1-MW5-1X-ES	09/25/90	10/01/90	6	10/01/90	6	NA		NA		NA		NA	
VF1-MW5-2X-ES	10/02/90	10/05/90	3	10/05/90	3	NA		NA		NA		NA	
VF1-MW5-W2-ES	11/08/90	11/14/90	6	11/14/90	6	11/29/90	21	11/12/90	4	12/04/90	22	11/18/90	10
VF1-MW6-W2-ES	11/07/90	11/15/90	8	11/15/90	8	11/21/90	14	11/12/90	5	11/29/90	17	11/18/90	11
VF1-MW7-W2-ES	11/07/90	11/15/90	8	11/15/90	8	11/21/90	14	11/12/90	5	11/29/90	17	11/18/90	11
VF1-MW8-W2-ES	11/08/90	11/13/90	5	11/13/90	5	11/29/90	21	11/12/90	4	11/19/90	7	11/18/90	10
VF1-MW9-W2-ES	11/08/90	11/14/90	6	11/14/90	6	11/29/90	21	11/12/90	4	11/19/90	7	11/18/90	10
VF1-MW10-W2-ES	11/08/90	11/13/90	5	11/14/90	6	11/29/90	21	11/12/90	4	11/19/90	7	11/18/90	10
VF1-MW11-W2-ES	11/08/90	11/13/90	5	11/14/90	6	11/29/90	21	11/12/90	4	12/04/90	22	11/18/90	10
VF1-MW12-1X-ES	10/10/90	10/12/90	2	10/12/90	2	NA		NA		NA		NA	
VF1-MW12-W2-ES	11/07/90	11/15/90	8	11/15/90	8	11/21/90	14	11/12/90	5	11/29/90	17	11/18/90	11
VF1-MW13-W2-ES	11/07/90	11/15/90	8	11/15/90	8	11/21/90	14	11/12/90	5	11/29/90	17	11/18/90	11
VF1-MW14-W2-ES	11/08/90	11/14/90	6	11/14/90	6	11/29/90	21	11/12/90	4	11/29/90	17	11/18/90	10
VF1-MW25-1X-ES	10/10/90	10/12/90	2	10/12/90	2	NA		NA		NA		NA	

(a) – HT from collection date.
(b) – HT from extraction date.
(c) – Dissolved ICP Metals include:
Sb, Be, Cd, Cr, Cu, Ni, Ag, Zn.
NA – Not analyzed.

TABLE E.43 (cont'd)
SITE 1, FIRE TRAINING AREA
SU MMARY OF GROUNDWATER SAMPLE HOLDING TIMES, 1990
VOLK FIELD ANGB, WI

Sample Identification	Date Sampled	Dissolved Arsenic SW7060(a) (180 days)		Dissolved Mercury SW7470(a) (30 days)		Dissolved Lead SW7421(a) (180 days)		Dissolved Selenium SW7740(a) (180 days)		Dissolved Thallium SW7841(a) (180 days)		Dissolved Solids E160.1(a) (7 days)	
VF1-BPW-1-W2-ES	11/09/90	12/19/90	40	11/21/90	12	12/17/90	38	12/18/90	39	12/17/90	38	11/13/90	4
VF1-BPW-2-W2-ES	11/09/90	12/19/90	40	11/21/90	12	12/17/90	38	12/18/90	39	12/17/90	38	11/13/90	4
VF1-BPW-4-W2-ES	11/09/90	12/19/90	40	11/21/90	12	12/17/90	38	12/18/90	39	12/17/90	38	11/13/90	4
VF1-BPW-7-W2-ES	11/09/90	12/19/90	40	11/21/90	12	12/17/90	38	12/18/90	39	12/17/90	38	11/13/90	4
VF92-BBW1-W2-ES	10/26/90	11/17/90	22	11/08/90	13	11/19/90	24	11/17/90	22	11/07/90	12	10/30/90	4
VF1-ET1-W2-ES	10/24/90	11/05/90	12	11/05/90	12	11/06/90	13	11/05/90	12	11/16/90	23	10/30/90	6
VF1-ET2-W2-ES	11/06/90	12/07/90	31	11/09/90	3	12/06/90	30	12/17/90	41	12/07/90	31	11/08/90	2
VF1-ET6-W2-ES	11/06/90	12/07/90	31	11/09/90	3	12/06/90	3[illegible]	12/17/90	41	12/07/90	31	11/08/90	2
VF1-ET7-W2-ES	11/07/90	11/20/90	13	11/15/90	8	11/20/90	13	11/20/90	13	11/20/90	13	11/13/90	6
VF1-MW1-W2-ES	11/05/90	12/07/90	32	11/09/90	4	12/06/90	31	12/17/90	42	12/07/90	32	11/08/90	3
VF1-MW2-W2-ES	11/07/90	11/20/90	13	11/15/90	8	11/20/90	13	11/20/90	13	11/20/90	13	11/13/90	6
VF1-MW3-W2-ES	11/07/90	11/20/90	13	11/15/90	8	11/20/90	13	11/20/90	13	11/20/90	13	11/13/90	6
VF1-MW4-W2-ES	11/05/90	12/07/90	32	11/09/90	4	12/06/90	31	12/17/90	42	12/07/90	32	11/08/90	3
VF1-MW5-1X-ES	09/25/90	NA		NA		NA		NA		NA		NA	
VF1-MW5-2X-ES	10/02/90	NA		NA		NA		NA		NA		NA	
VF1-MW5-W2-ES	11/08/90	12/07/90	29	11/15/90	7	12/06/90	28	11/20/90	12	12/07/90	29	11/13/90	5
VF1-MW6-W2-ES	11/07/90	11/20/90	13	11/15/90	8	11/20/90	13	11/20/90	13	11/20/90	13	11/13/90	6
VF1-MW7-W2-ES	11/07/90	11/20/90	13	11/15/90	8	11/20/90	13	11/20/90	13	11/20/90	13	11/13/90	6
VF1-MW8-W2-ES	11/08/90	12/07/90	29	11/15/90	7	12/06/90	28	12/17/90	39	12/07/90	29	11/13/90	5
VF1-MW9-W2-ES	11/08/90	12/07/90	29	11/15/90	7	12/06/90	28	12/17/90	39	12/07/90	29	11/13/90	5
VF1-MW10-W2-ES	11/08/90	12/07/90	29	11/15/90	7	12/06/90	28	12/17/90	39	12/07/90	29	11/13/90	5
VF1-MW11-W2-ES	11/08/90	12/07/90	29	11/15/90	7	12/06/90	28	12/17/90	39	12/07/90	29	11/13/90	5
VF1-MW12-1X-ES	10/10/90	NA		NA		NA		NA		NA		NA	
VF1-MW12-W2-ES	11/07/90	11/20/90	13	11/15/90	8	11/20/90	13	11/20/90	13	11/20/90	13	11/13/90	6
VF1-MW13-W2-ES	11/07/90	11/20/90	13	11/15/90	8	11/20/90	13	11/20/90	13	11/20/90	13	11/13/90	6
VF1-MW14-W2-ES	11/08/90	12/07/90	29	11/15/90	7	12/06/90	28	12/17/90	39	12/07/90	29	11/13/90	5
VF1-MW25-1X-ES	10/10/90	NA		NA		NA		NA		NA		NA	

(a) - HT from collection date.
(b) - HT from extraction date.
(c) - Dissolved ICP Metals include:
Sb, Be, Cd, Cr, Cu, Ni, Ag, Zn.
NA - Not analyzed.

TABLE E.44
SITE 2, FORMER LANDFILL C
SUMMARY OF SOIL SAMPLE HOLDING TIMES, 1990
VOLK FIELD ANGB, WI

Sample Identification	Date Sampled	Halogenated Volatiles SW8010(a) (14 days)	Aromatic Volatiles SW8020(a) (14 days)	Semivolatile Organics CLP SOW Extracted(a) (14 days)	Semivolatile Organics CLP SOW Analyzed(b) (40 days)	Organochlorine Pesticides & PCB'S CLP SOW Extracted(a) (14 days)	Organochlorine Pesticides & PCB'S CLP SOW Analyzed(b) (40 days)
VF2-SB1-SS1-1-2-ES	10/30/90	11/10/90 11	11/10/90 11	11/05/90 6	11/16/90 11	11/01/90 2	12/07/90 36
VF2-SB2-SS1-1-2-ES	10/29/90	11/12/90 14	11/12/90 14	11/05/90 7	11/16/90 11	11/01/90 3	12/07/90 36
VF2-SB3-SS1-1-2-ES	10/30/90	11/10/90 11	11/10/90 11	11/05/90 6	11/16/90 11	11/01/90 2	12/07/90 36
VF2-SB4-SS1-1-2-ES	10/30/90	11/10/90 11	11/10/90 11	11/05/90 6	11/16/90 11	11/01/90 2	12/07/90 36
VF2-SB5-SS1-1-2-ES	10/30/90	11/10/90 11	11/10/90 11	11/05/90 6	11/16/90 11	11/01/90 2	12/07/90 36

Sample Identification	ICP Metals(c) SW6010(a) (180 days)	Arsenic SW7060(a) (180 days)	Mercury SW7471(a) (30 days)	Lead SW7421(a) (180 days)	Selenium SW7740(a) (180 days)	Thallium SW7841(a) (180 days)
VF2-SB1-SS1-1-2-ES	11/15/90 16	11/14/90 15	11/09/90 10	11/13/90 14	11/20/90 21	11/14/90 15
VF2-SB2-SS1-1-2-ES	11/15/90 17	11/13/90 15	11/09/90 11	11/12/90 14	11/07/90 9	11/07/90 9
VF2-SB3-SS1-1-2-ES	11/15/90 16	11/14/90 15	11/09/90 10	11/13/90 14	11/20/90 21	11/14/90 15
VF2-SB4-SS1-1-2-ES	11/15/90 16	11/14/90 15	11/09/90 10	11/13/90 14	11/20/90 21	11/14/90 15
VF2-SB5-SS1-1-2-ES	11/15/90 16	11/14/90 15	11/09/90 10	11/13/90 14	11/20/90 21	11/14/90 15

(a) - Holding time from the time of sample collection.
(b) - Holding time from the time of extraction.
(c) - Dissolved ICP metals include: Sb, Be, Cd, Cr, Cu, Ni, Ag, Zn.
NA - Not analyzed

TABLE E.45
SITE 2, FORMER LANDFILL C
SUMMARY OF WATER SAMPLE HOLDING TIMES, 1990
VOLK FIELD ANGB, WI

Sample Identification	Date Sampled	Halogenated Volatiles SW8010(a) (14 days)		Aromatic Volatiles SW8020(a) (14 days)		Petroleum Hydrocarbons E418.1(a) (28 days)		Semivolatile Organics CLP SOW Extracted(a) (7 days)		Semivolatile Organics CLP SOW Analyzed(b) (40 days)		Organochlorine Pesticides & PCB'S CLP SOW Extracted(a) (7 days)		Organochlorine Pesticides & PCB'S CLP SOW Analyzed(b) (40 days)	
VF2-MW1-W2-ES	10/23/90	11/02/90	10	11/02/90	10	11/06/90	14	10/29/90	6	11/06/90	8	10/25/90	2	10/27/90	2
VF2-MW2-W2-ES	11/06/90	11/19/90	13	11/19/90	13	11/21/90	15	11/08/90	2	11/15/90	7	11/08/90	2	12/11/90	33
VF2-MW3-W2-ES	10/27/90	11/06/90	10	11/06/90	10	11/09/90	13	10/31/90	4	11/07/90	7	10/30/90	3	12/07/90	38
VF2-MW4-W2-ES	11/06/90	11/14/90	8	11/14/90	8	11/21/90	15	11/08/90	2	11/16/90	8	11/08/90	2	12/11/90	33
VF2-MW5-W2-ES	10/27/90	11/06/90	10	11/06/90	10	11/09/90	13	10/31/90	4	11/07/90	7	10/30/90	3	12/07/90	38
VF2-SW1-W2-ES	11/10/90	11/19/90	9	11/19/90	9	11/29/90	19	11/12/90	2	11/29/90	17	11/13/90	3	12/16/90	33
VF2-SW2-W2-ES	11/10/90	11/19/90	9	11/19/90	9	11/29/90	19	11/12/90	2	11/29/90	17	11/13/90	3	12/16/90	33
VF2-SW3-W2-ES	11/10/90	11/15/90	5	11/15/90	5	11/29/90	19	11/12/90	2	11/30/90	18	11/13/90	3	12/16/90	33
VF2-SW4-W2-ES	11/10/90	11/15/90	5	11/15/90	5	11/29/90	19	11/12/90	2	11/29/90	17	11/13/90	3	12/16/90	33
VF2-SW5-W2-ES	11/10/90	11/15/90	5	11/15/90	5	11/29/90	19	11/12/90	2	11/30/90	18	11/13/90	3	12/16/90	33

(a) - HT from collection date.
(b) - HT from extraction date.
(c) - Dissolved ICP metals include:
Sb, Be, Cd, Cr, Cu, Ni, Ag, Zn.
\+ - Indicates Total Metals HT.

TABLE E.45 (cont'd)
SITE 2, FORMER LANDFILL C
SUMMARY OF WATER SAMPLE HOLDING TIMES, 1990
VOLK FIELD ANGB, WI

Sample Identification	Date Sampled	Dissolved ICP Metals(c) SW6010(a) (180 days)	Dissolved Arsenic SW7060(a) (180 days)	Dissolved Mercury SW7470(a) (30 days)	Dissolved Lead SW7421(a) (180 days)	Dissolved Selenium SW7740(a) (180 days)	Dissolved Thallium SW7841(a) (180 days)	Dissolved Solids E160.1(a) (7 days)
VF2-MW1-W2-ES	10/23/90	11/14/90 22	11/05/90 13	11/05/90 13	11/20/90 28	11/05/90 13	11/16/90 24	10/30/90 7
VF2-MW2-W2-ES	11/06/90	11/16/90 10	12/07/90 31	11/09/90 3	12/06/90 30	12/17/90 41	12/07/90 31	11/08/90 2
VF2-MW3-W2-ES	10/27/90	11/16/90 20	12/07/90 41	11/09/90 13	12/06/90 40	12/17/90 51	12/07/90 41	10/30/90 3
VF2-MW4-W2-ES	11/06/90	11/16/90 10	12/07/90 31	11/09/90 3	12/06/90 30	12/17/90 41	12/07/90 31	11/08/90 2
VF2-MW5-W2-ES	10/27/90	11/16/90 20	12/07/90 41	11/09/90 13	12/06/90 40	12/17/90 51	12/07/90 41	10/30/90 3
VF2-SW1-W2-ES	11/10/90	11/20/90 10	12/19/90 39	11/21/90 11	12/17/90 37	12/18/90 38	12/17/90 37	11/13/90 3
		+ 11/21/90 11	+ 12/19/90 39	+ 11/21/90 11	+ 12/17/90 37	+ 12/18/90 38	+ 12/17/90 37	
VF2-SW2-W2-ES	11/10/90	11/20/90 10	12/19/90 39	11/21/90 11	12/17/90 37	12/18/90 38	12/17/90 37	11/17/90 7
		+ 11/21/90 11	+ 12/19/90 39	+ 11/21/90 11	+ 12/17/90 37	+ 12/18/90 38	+ 12/17/90 37	
VF2-SW3-W2-ES	11/10/90	11/20/90 10	12/19/90 39	11/21/90 11	12/17/90 37	12/18/90 38	12/17/90 37	11/13/90 3
		+ 11/21/90 11	+ 12/19/90 39	+ 11/21/90 11	+ 12/17/90 37	+ 12/18/90 38	+ 12/17/90 37	
VF2-SW4-W2-ES	11/10/90	11/20/90 10	12/19/90 39	11/21/90 11	12/17/90 37	12/18/90 38	12/17/90 37	11/13/90 3
		+ 11/21/90 11	+ 12/19/90 39	+ 11/21/90 11	+ 12/17/90 37	+ 12/18/90 38	+ 12/17/90 37	
VF2-SW5-W2-ES	11/10/90	11/20/90 10	12/19/90 39	11/21/90 11	12/17/90 37	12/18/90 38	12/17/90 37	11/13/90 3
		+ 11/21/90 11	+ 12/19/90 39	+ 11/21/90 11	+ 12/17/90 37	+ 12/18/90 38	+ 12/17/90 37	

(a) - HT from collection date.
(b) - HT from extraction date.
(c) - Dissolved ICP metals include:
Sb, Be, Cd, Cr, Cu, Ni, Ag, Zn.
+ - Indicates Total Metals HT.

TABLE E.46
SITE 3/6, FUEL SPILL SITE
SUMMARY OF SOIL SAMPLE HOLDING TIMES, 1990
VOLK FIELD ANGB, WI

Sample Identification	Date Sampled		Aromatic Volatiles SW8020(a) (14 days)		Lead SW7421(a) (180 days)		Petroleum Hydrocarbons E418.1(a) (28 days)	
VF3/6-SB1-SS1-0-1-ES	10/14/90		10/22/90	8	11/05/90	22	11/08/90	25
VF3/6-SB1-SS1-4-5-ES	10/16/90		10/26/90	10	11/05/90	20	11/08/90	23
VF3/6-SB2-SS1-0-1-ES	10/14/90		10/22/90	8	11/05/90	22	11/08/90	25
VF3/6-SB2-SS1-4-5-ES	10/16/90		10/26/90	10	11/05/90	20	11/08/90	23
VF3/6-SB3-SS1-0-0.5-ES	10/14/90		10/22/90	8	11/07/90	24	11/08/90	25
VF3/6-SB3-SS1-5-6-ES	10/16/90		10/26/90	10	11/05/90	20	11/08/90	23
VF3/6-SB4-SS1-0-0.5-ES	10/14/90		10/22/90	8	11/05/90	22	11/08/90	25
VF3/6-SB4-SS1-6-7-ES	10/16/90		10/30/90	14	11/05/90	20	11/08/90	23
VF3/6-SB5-SS1-5-6-ES	10/16/90		10/30/90	14	11/05/90	20	11/08/90	23
VF3/6-SB6-SS1-5-6-ES	10/16/90		10/26/90	10	11/05/90	20	11/08/90	23
VF3/6-SB6-SS11-5-6-ES	10/16/90		10/26/90	10	11/05/90	20	11/08/90	23
VF3/6-SB7-SS1-5-6-ES	10/17/90		10/26/90	9	11/05/90	19	11/08/90	22
VF3/6-SB8-SS1-5-6-ES	10/17/90		10/26/90	9	11/05/90	19	11/08/90	22
VF3/6-SB9-SS1-4-5-ES	10/17/90		10/26/90	9	11/05/90	19	11/08/90	22
VF3/6-SB10-SS1-2-3-ES	10/17/90		10/26/90	9	11/05/90	19	11/08/90	22
VF3/6-SB11-SS1-5-6-ES	11/07/90	*	12/01/90	24	11/19/90	12	11/28/90	21
VF3/6-SB11-SS11-5-6-ES	11/07/90	*	12/01/90	24	11/19/90	12	11/28/90	21
VF3/6-SB12-SS1-3-4-ES	11/07/90	*	12/04/90	27	11/19/90	12	11/28/90	21
VF3/6-SB13-SS1-5-6-ES	11/07/90	*	12/01/90	24	11/19/90	12	11/28/90	21
VF3/6-SB14-SS1-5-6-ES	11/07/90	*	12/01/90	24	11/19/90	12	11/28/90	21
VF3/6-SB15-SS1-7-8-ES	11/07/90	*	12/04/90	27	11/19/90	12	11/28/90	21
VF3/6-SB16-SS1-5-6-ES	11/07/90	*	12/04/90	27	11/19/90	12	11/28/90	21
VF3/6-SB16-SS11-5-6-ES	11/07/90	*	12/04/90	27	11/19/90	12	11/28/90	21

(a) - Holding time from the time of sampled collection.
* - Holding times that exceed the limit.
NA - Not analyzed

TABLE E.47
SITE 3/6, FUEL SPILL SITE
SUMMARY OF GROUNDWATER SAMPLE HOLDING TIMES, 1990
VOLK FIELD ANGB, WI

Sample Identification	Date Sampled	Aromatic Volatiles SW8020(a) (14 days)		Dissolved Lead SW7421(a) (180 days)		Petroleum Hydrocarbons E418.1(a) (28 days)		Dissolved Solids E160.1(a) (7 days)	
VF3/6-MW1-W2-ES	11/06/90	11/19/90	13	12/06/90	30	11/21/90	15	11/08/90	2
VF3/6-MW2-W2-ES	10/26/90	11/05/90	10	11/19/90	24	11/09/90	14	10/30/90	4
VF3/6-MW3-W2-ES	10/27/90	11/06/90	10	12/06/90	40	11/09/90	13	10/30/90	3
VF3/6-MW4-W2-ES	10/24/90	11/02/90	9	11/06/90	13	11/06/90	13	10/30/90	6
VF3/6-MW5-W2-ES	10/30/90	11/10/90	11	11/13/90	14	11/14/90	15	11/01/90	2
VF3/6-MW6-1X-ES	09/26/90	10/01/90	5	NA		NA		NA	
VF3/6-MW6-2X-ES	10/03/90	10/05/90	2	NA		NA		NA	
VF3/6-MW6-W2-ES	10/27/90	11/06/90	10	12/06/90	40	11/09/90	13	10/30/90	3
VF3/6-MW7-W2-ES	10/26/90	11/05/90	10	11/19/90	24	11/09/90	14	10/30/90	4
VF3/6-MW8-W2-ES	10/30/90	11/11/90	12	11/13/90	14	11/14/90	15	11/01/90	2
VF3/6-MW9-W2-ES	11/06/90	11/19/90	13	12/06/90	30	11/29/90	23	11/08/90	2
VF3/6-TW1-W2-ES	11/09/90	11/16/90	7	12/17/90	38	11/21/90	12	11/13/90	4

(a) - Holding time from the time of sample collection.
NA - Not analyzed

TABLE E.48
SITE 5, KC97 CRASH SITE
SUMMARY OF GROUNDWATER SAMPLE HOLDING TIMES, 1990
VOLK FIELD ANGB, WI

Sample Identification	Date Sampled	Aromatic Volatiles SW8020(a) (14 days)		Dissolved Lead SW7421(a) (180 days)		Petroleum Hydrocarbons E418.1(a) (28 days)		Dissolved Solids E160.1(a) (7 days)	
VF5-MW1-W2-ES	10/29/90	11/09/90	11	11/13/90	15	11/14/90	16	11/01/90	3

(a) - Holding time from the time of sample collection.

TABLE E.49
SITE 7, FORMER LANDFILL A
SUMMARY OF GROUNDWATER SAMPLE HOLDING TIMES, 1990
VOLK FIELD ANGB, WI

Sample Identification	Date Sampled	Halogenated Volatiles SW8010(a) (14 days)	Aromatic Volatiles SW8020(a) (14 days)	Petroleum Hydrocarbons E418.1(a) (28 days)	Semivolatile Organics CLP-SOW Extracted(a) (7 days)	Semivolatile Organics CLP-SOW Analyzed(b) (40 days)	Organochlorine Pesticides & PCB's CLP-SOW Extracted(a) (7 days)	Organochlorine Pesticides & PCB's CLP-SOW Analyzed(b) (40 days)
VF7-MW1-W2-ES	10/25/90	11/03/90 9	11/03/90 9	11/09/90 15	10/31/90 6	11/08/90 8	10/30/90 5	12/07/90 38
VF7-MW2-W2-ES	10/24/90	11/02/90 9	11/02/90 9	11/06/90 13	10/29/90 5	11/07/90 9	10/29/90 5	10/30/90 1
VF7-MW3-W2-ES	10/25/90	11/03/90 9	11/03/90 9	11/09/90 15	10/31/90 6	11/08/90 8	10/30/90 5	12/07/90 38
VF7-MW4-W2-ES	10/25/90	11/03/90 9	11/03/90 9	11/09/90 15	10/31/90 6	11/08/90 8	10/30/90 5	12/07/90 38
VF7-MW5-W2-ES	10/25/90	11/03/90 9	11/03/90 9	11/09/90 15	10/31/90 6	11/08/90 8	10/30/90 5	12/07/90 38
VF7-MW6-W2-ES	10/23/90	11/02/90 10	11/02/90 10	11/06/90 14	10/29/90 6	11/07/90 9	10/25/90 2	10/27/90 2
VF7-MW7-W2-ES	10/25/90	11/03/90 9	11/03/90 9	11/09/90 15	10/31/90 6	11/08/90 8	10/30/90 5	12/07/90 38

Sample Identification	Dissolved ICP Metals SW6010(a,c) (180 days)	Dissolved Arsenic SW7060(a) (180 days)	Dissolved Mercury SW7470(a) (30 days)	Dissolved Lead SW7421(a) (180 days)	Dissolved Selenium SW7740(a) (180 days)	Dissolved Thallium SW7841(a) (180 days)	Dissolved Solids E160.1(a) (7 days)
VF7-MW1-W2-ES	11/14/90 20	11/17/90 23	11/08/90 14	11/19/90 25	11/17/90 23	11/07/90 13	10/30/90 5
VF7-MW2-W2-ES	11/14/90 21	11/05/90 12	11/05/90 12	11/06/90 13	11/05/90 12	11/16/90 23	10/30/90 6
VF7-MW3-W2-ES	11/14/90 20	11/17/90 23	11/08/90 14	11/19/90 25	11/17/90 23	11/07/90 13	10/30/90 5
VF7-MW4-W2-ES	11/14/90 20	11/17/90 23	11/08/90 14	11/19/90 25	11/17/90 23	11/07/90 13	10/30/90 5
VF7-MW5-W2-ES	11/14/90 20	11/11/90 17	11/08/90 14	11/19/90 25	11/17/90 23	11/07/90 13	10/30/90 5
VF7-MW6-W2-ES	11/14/90 22	11/05/90 13	11/05/90 13	11/20/90 28	11/05/90 13	11/16/90 24	10/30/90 7
VF7-MW7-W2-ES	11/14/90 20	11/17/90 23	11/08/90 14	11/19/90 25	11/17/90 23	11/07/90 13	10/30/90 5

(a) - Holding time from the time of sample collection.
(b) - Holding time from the time of extraction.
(c) - Dissolved ICP Metals include: Sb, Be, Cd, Cr, Cu, Ni, Ag, Zn.

TABLE E.50
SITE 8, F84 CRASH SITE
SUMMARY OF SOIL SAMPLE HOLDING TIMES, 1990
VOLK FIELD ANGB, WI

Sample Identification	Date Sampled	Aromatic Volatiles SW8020(a) (14 days)		Lead SW7421(a) (180 days)		Petroleum Hydrocarbons E418.1(a) (28 days)	
VF8-SB1-SS1-0-2-ES	09/30/90	10/14/90	14	10/29/90	29	10/12/90	12
VF8-SB1-SS1-4-6-ES	09/30/90	10/14/90	14	10/29/90	29	10/12/90	12
VF8-SB2-SS1-0-2-ES	09/30/90	10/14/90	14	10/29/90	29	10/12/90	12
VF8-SB2-SS1-4-6-ES	09/30/90	10/14/90	14	10/29/90	29	10/12/90	12

(a) - Holding time from the time of sample collection.
NA - Not analyzed

TABLE E.51
SITE 8, F84 CRASH SITE
SUMMARY OF GROUNDWATER SAMPLE HOLDING TIMES, 1990
VOLK FIELD ANGB, WI

Sample Identification	Date Sampled	Aromatic Volatiles SW8020(a) (14 days)		Dissolved Lead SW7421(a) (180 days)		Petroleum Hydrocarbons E418.1(a) (28 days)		Dissolved Solids E160.1(a) (7 days)	
VF8-MW1-W2-ES	10/23/90	11/02/90	10	11/20/90	28	11/06/90	14	10/30/90	7
VF8-MW1-W2-ES	11/06/90	11/14/90	8	12/06/90	30	11/21/90	15	11/08/90	2

(a) – Holding time from the time of sample collection.

TABLE E.52
SITE 9, FORMER LANDFILL B
SUMMARY OF SOIL SAMPLE HOLDING TIMES, 1990
VOLK FIELD ANGB, WI

Sample Identification	Date Sampled	Halogenated Volatiles SW8010(a) (14 days)	Aromatic Volatiles SW8020(a) (14 days)	Semivolatile Organics CLP-SOW Extracted(a) (14 days)	Semivolatile Organics CLP-SOW Analyzed(b) (40 days)	Organochlorine Pesticides & PCB's CLP-SOW Extracted(a) (14 days)	Organochlorine Pesticides & PCB's CLP-SOW Analyzed(b) (40 days)
VF9-SB1-SS1-1-2-ES	10/29/90	11/12/90 14	11/12/90 14	11/05/90 7	11/16/90 11	11/01/90 3	12/07/90 36
VF9-SB2-SS1-1-2-ES	10/29/90	11/12/90 14	11/12/90 14	11/05/90 7	11/16/90 11	11/01/90 3	12/07/90 36
VF9-SB3-SS1-1-2-ES	10/29/90	11/12/90 14	11/12/90 14	11/05/90 7	11/15/90 10	11/01/90 3	12/07/90 36

Sample Identification	ICP Metals SW6010(a,c) (180 days)	Arsenic SW7060(a) (180 days)	Mercury SW7471(a) (30 days)	Lead SW7421(a) (180 days)	Selenium SW7740(a) (180 days)	Thallium SW7841(a) (180 days)
VF9-SB1-SS1-1-2-ES	11/15/90 17	11/13/90 15	11/09/90 11	11/12/90 14	11/07/90 9	11/07/90 9
VF9-SB2-SS1-1-2-ES	11/15/90 17	11/13/90 15	11/09/90 11	11/12/90 14	11/07/90 9	11/07/90 9
VF9-SB3-SS1-1-2-ES	11/15/90 17	11/13/90 15	11/09/90 11	11/12/90 14	11/07/90 9	11/07/90 9

(a) – Holding time from the time of sample collection.
(b) – Holding time from the time of extraction.
(c) – Dissolved ICP Metals include: Sb, Be, Cd, Cr, Cu, Ni, Ag, Zn.
NA – Not analyzed

TABLE E.53
SITE 9, FORMER LANDFILL B
SUMMARY OF GROUNDWATER SAMPLE HOLDING TIMES, 1990
VOLK FIELD ANGB, WI

Sample Identification	Date Sampled	Halogenated Volatiles SW8010(a) (14 days)		Aromatic Volatiles SW8020(a) (14 days)		Petroleum Hydrocarbons E418.1(a) (28 days)		Semivolatile Organics CLP-SOW Extracted(a) (7 days)		Semivolatile Organics CLP-SOW Analyzed(b) (40 days)		Organochlorine Pesticides & PCB's CLP-SOW Extracted(a) (7 days)		Organochlorine Pesticides & PCB's CLP-SOW Analyzed(b) (40 days)	
VF9-MW1-W2-ES	10/24/90	11/02/90	9	11/02/90	9	11/06/90	13	10/29/90	5	11/07/90	9	10/29/90	5	10/29/90	0
VF9-MW2-W2-ES	10/26/90	11/05/90	10	11/05/90	10	11/09/90	14	10/31/90	5	11/07/90	7	10/30/90	4	12/07/90	38
VF9-MW3-W2-ES	10/26/90	11/05/90	10	11/05/90	10	11/09/90	14	10/31/90	5	11/07/90	7	10/30/90	4	12/07/90	38

Sample Identification	Dissolved ICP Metals SW6010(a,c) (180 days)		Dissolved Arsenic SW7060(a) (180 days)		Dissolved Mercury SW7470(a) (30 days)		Dissolved Lead SW7421(a) (180 days)		Dissolved Selenium SW7740(a) (180 days)		Dissolved Thallium SW7841(a) (180 days)		Dissolved Solids E160.1(a) (7 days)	
VF9-MW1-W2-ES	11/14/90	21	11/05/90	12	11/05/90	12	11/06/90	13	11/05/90	12	11/16/90	23	10/30/90	6
VF9-MW2-W2-ES	11/14/90	19	11/17/90	22	11/08/90	13	11/19/90	24	11/17/90	22	11/07/90	12	10/30/90	4
VF9-MW3-W2-ES	11/14/90	19	11/17/90	22	11/08/90	13	11/19/90	24	11/17/90	22	11/07/90	12	10/30/90	4

(a) - Holding time from the time of sample collection.
(b) - Holding time from the time of extraction.
(c) - Dissolved ICP Metals include: Sb, Be, Cd, Cr, Cu, Ni, Ag, Zn.

TABLE E.54

SITE 10, MUNITIONS BURIAL SITE

SUMMARY OF SOIL SAMPLE HOLDING TIMES, 1990

VOLK FIELD ANGB, WI

Sample Identification	Date Sampled	Halogenated Volatiles SW8010(a) (14 days)		Aromatic Volatiles SW8020(a) (14 days)		Semivolatile Organics CLP SOW				Organochlorine Pesticides & PCB'S CLP SOW			
						Extracted(a) (14 days)		Analyzed(b) (40 days)		Extracted(a) (14 days)		Analyzed(b) (40 days)	
VF10-SB1-SS1-1-2-ES	10/28/90	* 11/12/90	15	* 11/12/90	15	11/05/90	8	11/16/90	11	11/01/90	4	12/07/90	36
VF10-SB2-SS1-1-2-ES	10/28/90	* 11/12/90	15	* 11/12/90	15	11/05/90	8	11/16/90	11	11/01/90	4	12/07/90	36
VF10-SB3-SS1-1-2-ES	10/28/90	* 11/12/90	15	* 11/12/90	15	11/05/90	8	11/15/90	10	11/01/90	4	12/07/90	36

Sample Identification	ICP Metals SW6010(a,c) (180 days)		Arsenic SW7060(a) (180 days)		Mercury SW7471(a) (30 days)		Lead SW7421(a) (180 days)		Selenium SW7740(a) (180 days)		Thallium SW7841(a) (180 days)	
VF10-SB1-SS1-1-2-ES	11/15/90	18	11/13/90	16	11/09/90	12	11/12/90	15	11/07/90	10	11/07/90	10
VF10-SB2-SS1-1-2-ES	11/15/90	18	11/13/90	16	11/09/90	12	11/12/90	15	11/07/90	10	11/07/90	10
VF10-SB3-SS1-1-2-ES	11/15/90	18	11/13/90	16	11/09/90	12	11/12/90	15	11/07/90	10	11/07/90	10

(a) – Holding time from the time of sample collection.

(b) – Holding time from the time of extraction.

(c) – Dissolved ICP Metals include: Sb, Be, Cd, Cr, Cu, Ni, Ag, Zn.

* – Holding times that exceed the limit.

TABLE E.55
SITE 10, MUNITIONS BURIAL SITE
SUMMARY OF GROUNDWATER SAMPLE HOLDING TIMES, 1990
VOLK FIELD ANGB, WI

Sample Identification	Date Sampled	Halogenated Volatiles SW8010(a) (14 days)		Aromatic Volatiles SW8020(a) (14 days)		Petroleum Hydrocarbons E418.1(a) (28 DAYS)		Semivolatile Organics CLP SOW Extracted(a) (7 days)		Semivolatile Organics CLP SOW Analyzed(b) (40 days)		Dissolved ICP Metals SW6010(a,c) (180 days)	
VF10-MW1-W2-ES	10/28/90	11/09/90	12	11/09/90	12	11/14/90	17	11/01/90	4	11/06/90	5	11/15/90	18
VF10-MW2-W2-ES	10/28/90	11/09/90	12	11/09/90	12	11/14/90	17	11/01/90	4	11/06/90	5	11/15/90	18
VF10-MW3-W2-ES	10/28/90	11/09/90	12	11/09/90	12	11/14/90	17	11/01/90	4	11/06/90	5	11/15/90	18
VF10-MW4-W2-ES	10/28/90	11/09/90	12	11/09/90	12	11/14/90	17	11/01/90	4	12/05/90	34	11/15/90	18
VF10-MW5-W2-ES	10/28/90	* 11/12/90	15	* 11/12/90	15	11/14/90	17	11/01/90	4	12/05/90	34	11/15/90	18
VF10-MW6-W2-ES	10/28/90	* 11/12/90	15	* 11/12/90	15	11/14/90	17	11/01/90	4	12/05/90	34	11/15/90	18
VF10-MW7-W2-ES	10/28/90	11/09/90	12	11/09/90	12	11/14/90	17	11/01/90	4	12/05/90	34	11/15/90	18
VF10-MW8-W2-ES	10/28/90	11/11/90	14	11/11/90	14	11/14/90	17	11/01/90	4	12/05/90	34	11/15/90	18

Sample Identification	Dissolved Arsenic SW7060(a) (180 days)		Dissolved Mercury SW7470(a) (30 days)		Dissolved Lead SW7421(a) (180 days)		Dissolved Selenium SW7740(a) (180 days)		Dissolved Thallium SW7841(a) (180 days)		Dissolved Solids E160.1(a) (7 days)	
VF10-MW1-W2-ES	11/14/90	17	11/08/90	11	11/13/90	16	11/20/90	23	11/14/90	17	11/01/90	4
VF10-MW2-W2-ES	11/14/90	17	11/08/90	11	11/13/90	16	11/20/90	23	11/14/90	17	11/01/90	4
VF10-MW3-W2-ES	11/14/90	17	11/08/90	11	11/13/90	16	11/20/90	23	11/14/90	17	11/01/90	4
VF10-MW4-W2-ES	11/14/90	17	11/08/90	11	11/13/90	16	11/20/90	23	11/14/90	17	11/01/90	4
VF10-MW5-W2-ES	11/14/90	17	11/08/90	11	11/13/90	16	11/20/90	23	11/14/90	17	11/01/90	4
VF10-MW6-W2-ES	11/14/90	17	11/08/90	11	11/13/90	16	11/20/90	23	11/14/90	17	11/01/90	4
VF10-MW7-W2-ES	11/14/90	17	11/08/90	11	11/13/90	16	11/20/90	23	11/14/90	17	11/01/90	4
VF10-MW8-W2-ES	11/14/90	17	11/08/90	11	11/13/90	16	11/20/90	23	11/14/90	17	11/01/90	4

(a) - Holding time from the time of sample collection.
(b) - Holding time from the time of extraction.
(c) - Dissolved ICP Metals include: Sb, Be, Cd, Cr, Cu, Ni, Ag, Zn.
* - Holding times that exceed the limit.
NA - Not analyzed

TABLE E.56
SUMMARY OF TRIP BLANK HOLDING TIMES, 1990
VOLK FIELD ANGB, WI

Sample Identification	Date Sampled	Halogenated Volatiles SW8010(a) (14 days)		Aromatic Volatiles SW8020(a) (14 days)	
VF-TB-1X-ES	09/25/90	10/02/90	7	10/02/90	7
VF-TB1-W2-ES	09/30/90	NA		10/14/90	14
VF-TB2-W2-ES	10/03/90	10/05/90	2	10/05/90	2
VF-TB3-W2-ES	10/10/90	10/12/90	2	10/12/90	2
VF-TB4-W2-ES	10/14/90	NA		10/19/9[illegible]	5
VF-TB5-W2-ES	10/16/90	NA		10/26/90	[illegible]
VF-TB6-W2-ES	10/17/90	NA		10/26/90	9
VF-TB7-W2-ES	10/23/90	11/02/90	10	11/02/90	10
VF-TB8-W2-ES	10/24/90	11/02/90	9	11/02/90	9
VF-TB9-W2-ES	10/25/90	11/03/90	9	11/03/90	9
VF-TB10-W2-ES	10/26/90	11/05/90	10	11/05/90	10
VF-TB11-W2-ES	10/27/90	NA		11/06/90	10
VF-TB11-W2-ES	10/28/90	11/09/90	12	11/09/90	12
VF-TB12-W2-ES	10/29/90	11/12/90	14	11/12/90	14
VF-TB13-W2-ES	10/30/90	11/10/90	11	11/10/90	11
VF-TB14-W2-ES	11/05/90	11/13/90	8	11/13/90	8
VF-TB15-W2-ES	11/06/90	11/14/90	8	11/14/90	8
VF-TB16-W2-ES	11/07/90	11/15/90	8	11/15/90	8
VF-TB17-W2-ES	11/07/90	NA		11/15/90	8
VF-TB18-W2-ES	11/08/90	11/14/90	6	11/14/90	6
VF-TB19-W2-ES	11/09/90	11/15/90	6	11/15/90	6
VF-TB20-W2-ES	11/10/90	11/16/90	6	11/16/90	6

(a) - Holding time from the time of sample collection.
NA - Not analyzed

TABLE E.57
SUMMARY OF EQUIPMENT RINSATE AND FIELD BLANK HOLDING TIMES, 1990
VOLK FIELD ANGB, WI

Sample Identification	Date Sampled	Halogenated Volatiles SW8010(a) (14 days)	Aromatic Volatiles SW8020(a) (14 days)	Petroleum Hydrocarbons E418.1(a) (28 days)	Semivolatile Organics CLP SOW Extracted(a) (7 days)	Semivolatile Organics CLP SOW Analyzed(b) (40 days)	Organochlorine Pesticides & PCB'S CLP SOW Extracted(a) (7 days)	Organochlorine Pesticides & PCB'S CLP SOW Analyzed(b) (40 days)
VF-ER1-1X-ES	09/25/90	10/02/90 7	10/02/90 7	NA	NA	NA	NA	NA
VF-ER1-W2-ES	09/30/90	NA	10/14/90 14	10/12/90 12	NA	NA	NA	NA
VF-ER2-W2-ES	10/10/90	10/12/90 2	10/12/90 2	NA	NA	NA	NA	NA
VF-ER3-W2-ES	10/14/90	NA	10/19/90 5	11/06/90 23	NA	NA	NA	NA
VF-ER4-W2-ES	10/17/90	NA	10/30/90 13	11/06/90 20	NA	NA	NA	NA
VF-ER5-W2-ES	10/23/90	11/02/90 10	11/02/90 10	11/06/90 14	10/29/90 6	11/06/90 8	10/25/90 2	10/27/90 2
VF-ER6-W2-ES	10/25/90	11/03/90 9	11/03/90 9	11/09/90 15	10/31/90 6	11/08/90 8	10/30/90 5	12/07/90 38
VF-ER7-W2-ES	10/27/90	NA	11/06/90 10	11/09/90 13	NA	NA	NA	NA
VF-ER8-W2-ES	10/30/90	NA	11/10/90 11	11/14/90 15	NA	NA	NA	NA
VF-BR9-W2-ES	11/06/90	11/14/90 8	11/14/90 8	11/21/90 15	11/08/90 2	11/16/90 8	11/08/90 2	12/11/90 33
VF-ER10-W2-ES	11/07/90	NA	11/15/90 8	11/21/90 14	NA	NA	NA	NA
VF-ER11-W2-ES	11/08/90	11/14/90 6	11/14/90 6	11/29/90 21	11/12/90 4	12/04/90 22	NA	NA
VF-FB1-1X-ES	09/25/90	10/02/90 7	10/02/90 7	NA	NA	NA	NA	NA
VF-FB2-W2-ES	10/25/90	11/03/90 9	11/03/90 9	11/09/90 15	10/31/90 6	11/08/90 8	10/30/90 5	12/07/90 38
VF-FB3-W2-ES	10/25/90	11/03/90 9	11/03/90 9	11/09/90 15	10/31/90 6	11/08/90 8	10/30/90 5	12/07/90 38
VF-FB4-W2-ES	11/07/90	11/15/90 8	11/15/90 8	11/21/90 14	11/12/90 5	11/29/90 17	11/08/90 1	12/11/90 33
VF-FB5-W2-ES	11/10/90	11/16/90 6	11/19/90 9	11/29/90 19	11/12/90 2	11/30/90 18	11/13/90 3	12/16/90 33

(a) - HT from collection date.
(b) - HT from extraction date.
(c) - Dissolved ICP Metals include:
Sb, Be, Cd, Cr, Cu, Ni, Ag, Zn.
NA - Not analyzed

TABLE E.57 (cont'd)
SUMMARY OF EQUIPMENT RINSATE AND FIELD BLANK HOLDING TIMES, 1990
VOLK FIELD ANGB, WI

Sample Identification	Date Sampled	Dissolved ICP Metals(c) SW6010(a) (180 days)	Dissolved Arsenic SW7060(a) (180 days)	Dissolved Mercury SW7470(a) (30 days)	Dissolved Lead SW7421(a) (180 days)	Dissolved Selenium SW7740(a) (180 days)	Dissolved Thallium SW7841(a) (180 days)	Dissolved Solids E160.1(a) (7 days)
VF-ER1-1X-ES	09/25/90	NA	NA	NA	NA	NA	NA	NA
VF-ER1-W2-ES	09/30/90	NA	NA	NA	10/29/90 29	NA	NA	NA
VF-ER2-W2-ES	10/10/90	NA	NA	NA	NA	NA	NA	NA
VF-ER3-W2-ES	10/14/90	NA	NA	NA	11/06/90 23	NA	NA	NA
VF-ER4-W2-ES	10/17/90	NA	NA	NA	11/06/90 20	NA	NA	NA
VF-ER5-W2-ES	10/23/90	11/14/90 22	11/05/90 13	11/05/90 13	11/20/90 28	11/05/90 13	11/16/90 24	10/30/90 7
VF-ER6-W2-ES	10/25/90	11,14/90 20	11/17/90 23	11/08/90 14	11/19/90 25	11/17/90 23	11/07/90 13	10/30/90 5
VF-ER7-W2-ES	10/27/90	NA	NA	NA	12/06/90 40	NA	NA	10/30/90 3
VF-ER8-W2-ES	10/30/90	NA	NA	NA	11/13/90 14	NA	NA	11/01/90 2
VF-BR9-W2-ES	11/06/90	11/16/90 10	12/07/90 31	11/09/90 3	12/06/90 30	12/17/90 41	12/07/90 31	11/08/90 2
VF-ER10-W2-ES	11/07/90	NA	NA	NA	11/20/90 13	NA	NA	NA
VF-ER11-W2-ES	11/08/90	11/18/90 10	12/07/90 29	11/15/90 7	12/06/90 28	12/17/90 39	12/07/90 29	11/13/90 5
VF-FB1-1X-ES	09/25/90	NA	NA	NA	NA	NA	NA	NA
VF-FB2-W2-ES	10/25/90	11/14/90 20	11/17/90 23	11/08/90 14	11/19/90 25	11/17/90 23	11/07/90 13	10/30/90 5
VF-FB3-W2-ES	10/25/90	11/14/90 20	11/17/90 23	11/08/90 14	11/19/90 25	11/17/90 23	11/07/90 13	10/30/90 5
VF-FB4-W2-ES	11/07/90	11/18/90 11	11/20/90 13	11/15/90 8	11/20/90 13	11/20/90 13	11/20/90 13	11/13/90 6
VF-FB5-W2-ES	11/10/90	11/20/90 10	12/19/90 39	11/21/90 11	12/17/90 37	12/18/90 38	12/17/90 37	11/13/90 3

(a) - HT from collection date.
(b) - HT from extraction date.
(c) - Dissolved ICP Metals include:
Sb, Be, Cd, Cr, Cu, Ni, Ag, Zn.
NA - Not analyzed

TABLE E.58
SUMMARY OF DUPLICATE SOIL SAMPLE RESULTS, 1989
VOLK FIELD ANGB, WI

Coded Field Duplicate Samples: Identification Number One (Actual Sample ID)	Identification Number Two (Coded ID)	Result One	Result Two	Mean	Relative Percent Difference
AROMATIC VOLATILES: SW8020(ug/kg)					
Toluene					
VF1-SB16 ES(Composite 0-10)	VF1-SB13 ES(Composite 0-10)	U	U	—	—
VF4-SB10-SS1,1.0-3.0 ES	VF4-SB13-SS1,1.0-3.0 ES	U	U	—	—
VF1-SB19-SS2,5.5-8.0 ES	VF1-SB35-SS2,5.5-8.0 ES	5.7	U	—	—
VF1-SB21-SS2,5.5-8.0 ES	VF1-SB36-SS2,5.5-8.0 ES	U	U	—	—
VF1-SB22-SS2,5.5-8.0 ES	VF1-SB37-SS2,5.5-8.0 ES	U	U	—	—
VF1-SB27-SS2,5.5-8.0 ES	VF1-SB38 ES	U	U	—	—
ICP METALS: SW6010(ug/kg)					
Chromium					
VF1-SB16 ES(Composite 0-10)	VF1-SB13 ES(Composite 0-10)	2,000	2,300	2,150	13.95
VF4-SB10-SS1,1.0-3.0 ES	VF4-SB13-SS1,1.0-3.0 ES	U	U	—	—
VF1-SB19-SS2,5.5-8.0 ES	VF1-SB35-SS2,5.5-8.0 ES	U	U	—	—
VF1-SB21-SS2,5.5-8.0 ES	VF1-SB36-SS2,5.5-8.0 ES	U	U	—	—
VF1-SB22-SS2,5.5-8.0 ES	VF1-SB37-SS2,5.5-8.0 ES	U	U	—	—
VF1-SB27-SS2,5.5-8.0 ES	VF1-SB38 ES	U	U	—	—
Copper					
VF1-SB16 ES(Composite 0-10)	VF1-SB13 ES(Composite 0-10)	1,200	1,700	1,450	34.48
VF4-SB10-SS1,1.0-3.0 ES	VF4-SB13-SS1,1.0-3.0 ES	U	U	—	—
VF1-SB19-SS2,5.5-8.0 ES	VF1-SB35-SS2,5.5-8.0 ES	U	U	—	—
VF1-SB21-SS2,5.5-8.0 ES	VF1-SB36-SS2,5.5-8.0 ES	U	U	—	—
VF1-SB22-SS2,5.5-8.0 ES	VF1-SB37-SS2,5.5-8.0 ES	U	U	—	—
VF1-SB27-SS2,5.5-8.0 ES	VF1-SB38 ES	U	U	—	—
Zinc					
VF1-SB16 ES(Composite 0-10)	VF1-SB13 ES(Composite 0-10)	3,400	3,800	3,600	11.11
VF4-SB10-SS1,1.0-3.0 ES	VF4-SB13-SS1,1.0-3.0 ES	U	U	—	—
VF1-SB19-SS2,5.5-8.0 ES	VF1-SB35-SS2,5.5-8.0 ES	U	U	—	—
VF1-SB21-SS2,5.5-8.0 ES	VF1-SB36-SS2,5.5-8.0 ES	U	U	—	—
VF1-SB22-SS2,5.5-8.0 ES	VF1-SB37-SS2,5.5-8.0 ES	U	U	—	—
VF1-SB27-SS2,5.5-8.0 ES	VF1-SB38 ES	U	U	—	—
LEAD: SW7421(ug/kg)					
VF1-SB16 ES(Composite 0-10)	VF1-SB13 ES(Composite 0-10)	1,600	1,300	1,450	20.69
VF4-SB10-SS1,1.0-3.0 ES	VF4-SB13-SS1,1.0-3.0 ES	U	U	—	—
VF1-SB19-SS2,5.5-8.0 ES	VF1-SB35-SS2,5.5-8.0 ES	2,700	2,200	2,450	20.41
VF1-SB21-SS2,5.5-8.0 ES	VF1-SB36-SS2,5.5-8.0 ES	1,300	1,300	1,300	0.00
VF1-SB22-SS2,5.5-8.0 ES	VF1-SB37-SS2,5.5-8.0 ES	1,200	1,100	1,150	8.70
VF1-SB27-SS2,5.5-8.0 ES	VF1-SB38 ES	1,200	1,200	1,200	0.00

TABLE E.59
SUMMARY OF DUPLICATE GROUNDWATER SAMPLE RESULTS, 1989
VOLK FIELD ANGB, WI

<u>Coded Field Duplicate Samples</u>

Identification Number One (Actual Sample ID)	Identification Number Two (Coded ID)	Result One	Result Two	Mean	Relative Percent Difference
HALOGENATED VOLATILES: SW8010(ug/L)					
Chloroform					
VF10-MW5-W1-ES	VF10-MW20-W1-ES	1.4(U)	1.4(U)	1.40	0.00
VF5-MW1-W1-ES	VF5-MW20-W1-ES	0.46(U)	U	—	—
SEMIVOLATILE ORGANICS: SW8270(ug/L)					
bis(2-ethylhexyl)phthalate					
VF10-MW5-W1-ES	VF10-MW20-W1-ES	U	12(J2,J3)	—	—
VF5-MW1-W1-ES	VF5-MW20-W1-ES	U	U	—	—
TOTAL DISSOLVED SOLIDS: E160.1(mg/L)					
VF10-MW5-W1-ES	VF10-MW20-W1-ES	170	180	175	5.71
VF5-MW1-W1-ES	VF5-MW20-W1-ES	130	140	135	7.41
ICP METALS: SW6010(ug/L)					
Zinc					
VF10-MW5-W1-ES	VF10-MW20-W1-ES	35	59	47	51.06
VF5-MW1-W1-ES	VF5-MW20-W1-ES	U	U	—	—
MERCURY: SW7470(ug/L)					
VF10-MW5-W1-ES	VF10-MW20-W1-ES	0.27	0.28	0.275	3.64
VF5-MW1-W1-ES	VF5-MW20-W1-ES	U	U	—	—

TABLE E.60
SUMMARY OF DUPLICATE SOIL SAMPLE RESULTS, 1990
VOLK FIELD ANGB, WI

Coded Field Duplicate Samples

Identifier Number One (Actual Sample ID)	Identifier Number Two (Coded ID)	Result One	Result Two	Mean	Relative Percent Difference
AROMATIC VOLATILES: SW8020 (ug/kg)					
Toluene					
VF3/6-SB6-SS1-5-6-ES	VF3/6-SB6-SS11-5-6-ES	U	U	—	—
VF3/6-SB11-SS1-5-6-ES	VF3/6-SB11-SS11-5-6-ES	U	U	—	—
VF3/6-SB16-SS1-5-6-ES	VF3/6-SB16-SS11-5-6-ES	73,000	73,000	73,000	0.00
Xylenes					
VF3/6-SB6-SS1-5-6-ES	VF3/6-SB6-SS11-5-6-ES	U	U	—	—
VF3/6-SB11-SS1-5-6-ES	VF3/6-SB11-SS11-5-6-ES	U	U	—	—
VF3/6-SB16-SS1-5-6-ES	VF3/6-SB16-SS11-5-6-ES	110,000	130,000	120,000	16.7
TOTAL PETROLEUM HYDROCARBONS: E418.1 (ug/kg)					
VF3/6-SB6-SS1-5-6-ES	VF3/6-SB6-SS11-5-6-ES	63,000	67,000	65,000	6.15
VF3/6-SB11-SS1-5-6-ES	VF3/6-SB11-SS11-5-6-ES	38,000	55,000	46,500	36.6
VF3/6-SB16-SS1-5-6-ES	VF3/6-SB16-SS11-5-6-ES	3,400,000	2,300,000	2,850,000	38.6
DISSOLVED LEAD: SW7421 (mg/kg)					
VF3/6-SB6-SS1-5-6-ES	VF3/6-SB6-SS11-5-6-ES	9.0	4.0	6.50	76.9
VF3/6-SB11-SS1-5-6-ES	VF3/6-SB11-SS11-5-6-ES	1.5J	1.1J	1.30	30.8
VF3/6-SB16-SS1-5-6-ES	VF3/6-SB16-SS11-5-6-ES	1.1J	1.1J	1.10	0.00

TABLE E.61

SUMMARY OF DUPLICATE GROUNDWATER SAMPLE RESULTS, 1990

VOLK FIELD ANGB, WI

Coded Field Duplicate Samples: Identifier Number One (Actual Sample ID)	Identifier Number Two (Coded ID)	Result One	Result Two	Mean	Relative Percent Difference
HALOGENATED VOLATILES: SW8010 (ug/L)					
Chlorform					
VF1-MW2-1X-ES	VF1-MW25-1X-ES	U	U	—	—
VF7-MW1-W2-ES	VF7-MW7-W2-ES	U	U	—	—
VF3/6-MW1-W2-ES	VF3/6-MW9-W2-ES	NA	NA	—	—
VF1-MW2-W2-ES	VF1-MW13-W2-ES	U	U	—	—
VF1-MW9-W2-ES	VF1-MW14-W2-ES	U	U	—	—
VF1-BPW-1-W2-ES	VF1-BPW-7-W2-ES	86	U	—	—
VF2-SW3-W2-ES	VF2-SW5-W2-ES	U	U	—	—
VF10-MW3-W2-ES	VF10-MW8-W2-ES	U	U	—	—
AROMATIC VOLATILES: SW8020 (ug/L)					
Benzene					
VF1-MW2-1X-ES	VF1-MW25-1X-ES	U	U	—	—
VF7-MW1-W2-ES	VF7-MW7-W2-ES	U	U	—	—
VF3/6-MW1-W2-ES	VF3/6-MW9-W2-ES	1200	1100	1150	8.70
VF1-MW2-W2-ES	VF1-MW13-W2-ES	U	U	—	—
VF1-MW9-W2-ES	VF1-MW14-W2-ES	U	U	—	—
VF1-BPW-1-W2-ES	VF1-BPW-7-W2-ES	U	U	—	—
VF2-SW3-W2-ES	VF2-SW5-W2-ES	U	U	—	—
VF10-MW3-W2-ES	VF10-MW8-W2-ES	42	41	41.5	2.41
Ethylbenzene					
VF1-MW2-1X-ES	VF1-MW25-1X-ES	U	U	—	—
VF7-MW1-W2-ES	VF7-MW7-W2-ES	U	U	—	—
VF3/6-MW1-W2-ES	VF3/6-MW9-W2-ES	260	260	260	0.00
VF1-MW2-W2-ES	VF1-MW13-W2-ES	U	U	—	—
VF1-MW9-W2-ES	VF1-MW14-W2-ES	U	U	—	—
VF1-BPW-1-W2-ES	VF1-BPW-7-W2-ES	U	U	—	—
VF2-SW3-W2-ES	VF2-SW5-W2-ES	U	U	—	—
VF10-MW3-W2-ES	VF10-MW8-W2-ES	U	U	—	—
Toluene					
VF1-MW2-1X-ES	VF1-MW25-1X-ES	U	U	—	—
VF7-MW1-W2-ES	VF7-MW7-W2-ES	U	U	—	—
VF3/6-MW1-W2-ES	VF3/6-MW9-W2-ES	4900	4800	4850	2.06
VF1-MW2-W2-ES	VF1-MW13-W2-ES	1.3	0.95	1.13	31.0
VF1-MW9-W2-ES	VF1-MW14-W2-ES	U	U	—	—
VF1-BPW-1-W2-ES	VF1-BPW-7-W2-ES	U	U	—	—
VF2-SW3-W2-ES	VF2-SW5-W2-ES	U	U	—	—
VF10-MW3-W2-ES	VF10-MW8-W2-ES	U	U	—	—

TABLE E.61 (cont'd)
SUMMARY OF DUPLICATE GROUNDWATER SAMPLE RESULTS, 1990
VOLK FIELD ANGB, WI

Coded Field Duplicate Samples Identifier Number One (Actual Sample ID)	Identifier Number Two (Coded ID)	Result One	Result Two	Mean	Relative Percent Difference
Xylenes					
VF1-MW2-1X-ES	VF1-MW25-1X-ES	U	U	—	—
VF7-MW1-W2-ES	VF7-MW7-W2-ES	U	U	—	—
VF3/6-MW1-W2-ES	VF3/6-MW9-W2-ES	1700	1800	1750	5.71
VF1-MW2-W2-ES	VF1-MW13-W2-ES	U	U	—	—
VF1-MW9-W2-ES	VF1-MW14-W2-ES	U	U	—	—
VF1-BPW-1-W2-ES	VF1-BPW-7-W2-ES	U	U	—	—
VF2-SW3-W2-ES	VF2-SW5-W2-ES	U	U	—	—
VF10-MW3-W2-ES	VF10-MW8-W2-ES	U	1.4	—	—
TOTAL PETROLEUM HYDROCARBONS: E418.1 (ug/L)					
VF1-MW2-1X-ES	VF1-MW25-1X-ES	NA	NA	—	—
VF7-MW1-W2-ES	VF7-MW7-W2-ES	U	U	—	—
VF3/6-MW1-W2-ES	VF3/6-MW9-W2-ES	17,000	14,000	15,500	19.4
VF1-MW2-W2-ES	VF1-MW13-W2-ES	U	2,300	—	—
VF1-MW9-W2-ES	VF1-MW14-W2-ES	U	U	—	—
VF1-BPW-1-W2-ES	VF1-BPW-7-W2-ES	U	U	—	—
VF2-SW3-W2-ES	VF2-SW5-W2-ES	U	U	—	—
VF10-MW3-W2-ES	VF10-MW8-W2-ES	U	1,000	—	—
DISSOLVED ICP METALS: SW6010 (mg/L)					
Copper					
VF1-MW2-1X-ES	VF1-MW25-1X-ES	NA	NA	—	—
VF7-MW1-W2-ES	VF7-MW7-W2-ES	U	117	—	—
VF3/6-MW1-W2-ES	VF3/6-MW9-W2-ES	NA	NA	—	—
VF1-MW2-W2-ES	VF1-MW13-W2-ES	U	U	—	—
VF1-MW9-W2-ES	VF1-MW14-W2-ES	U	U	—	—
VF1-BPW-1-W2-ES	VF1-BPW-7-W2-ES	120	269	194.50	76.6
VF2-SW3-W2-ES	VF2-SW5-W2-ES	U	U	—	—
VF10-MW3-W2-ES	VF10-MW8-W2-ES	U	U	—	—
Nickel					
VF1-MW2-1X-ES	VF1-MW25-1X-ES	NA	NA	—	—
VF7-MW1-W2-ES	VF7-MW7-W2-ES	U	17.3	—	—
VF3/6-MW1-W2-ES	VF3/6-MW9-W2-ES	NA	NA	—	—
VF1-MW2-W2-ES	VF1-MW13-W2-ES	U	U	—	—
VF1-MW9-W2-ES	VF1-MW14-W2-ES	U	U	—	—
VF1-BPW-1-W2-ES	VF1-BPW-7-W2-ES	U	U	—	—
VF2-SW3-W2-ES	VF2-SW5-W2-ES	U	U	—	—
VF10-MW3-W2-ES	VF10-MW8-W2-ES	U	U	—	—

TABLE E.61 (cont'd)
SUMMARY OF DUPLICATE GROUNDWATER SAMPLE RESULTS, 1990
VOLK FIELD ANGB, WI

Coded Field Duplicate Samples Identifier Number One (Actual Sample ID)	Identifier Number Two (Coded ID)	Result One	Result Two	Mean	Relative Percent Difference
Zinc					
VF1-MW2-1X-ES	VF1-MW25-1X-ES	NA	NA	—	—
VF7-MW1-W2-ES	VF7-MW7-W2-ES	U	28.0	—	—
VF3/6-MW1-W2-ES	VF3/6-MW9-W2-ES	NA	NA	—	—
VF1-MW2-W2-ES	VF1-MW13-W2-ES	41.6	U	—	—
VF1-MW9-W2-ES	VF1-MW14-W2-ES	18.8	16.5	17.65	13.0
VF1-BPW-1-W2-ES	VF1-BPW-7-W2-ES	28.9	72.2	50.55	85.7
VF2-SW3-W2-ES	VF2-SW5-W2-ES	U	U	—	—
VF10-MW3-W2-ES	VF10-MW8-W2-ES	U	11.0J4	—	—
DISSOLVED LEAD: SW7421 (ug/L)					
VF1-MW2-1X-ES	VF1-MW25-1X-ES	NA	NA	—	—
VF7-MW1-W2-ES	VF7-MW7-W2-ES	U	U	—	—
VF3/6-MW1-W2-ES	VF3/6-MW9-W2-ES	U	U	—	—
VF1-MW2-W2-ES	VF1-MW13-W2-ES	U	U	—	—
VF1-MW9-W2-ES	VF1-MW14-W2-ES	U	U	—	—
VF1-BPW-1-W2-ES	VF1-BPW-7-W2-ES	25.5J	27.9J	26.70	8.99
VF2-SW3-W2-ES	VF2-SW5-W2-ES	U	U	—	—
VF10-MW3-W2-ES	VF10-MW8-W2-ES	U	U	—	—
TOTAL DISSOLVED SOLIDS: E160.1 (ug/L)					
VF1-MW2-1X-ES	VF1-MW25-1X-ES	NA	NA	—	—
VF7-MW1-W2-ES	VF7-MW7-W2-ES	94,000	71,000	82,500	27.9
VF3/6-MW1-W2-ES	VF3/6-MW9-W2-ES	270,000	330,000	300,000	20.0
VF1-MW2-W2-ES	VF1-MW13-W2-ES	59,000	63,000	61,000	6.56
VF1-MW9-W2-ES	VF1-MW14-W2-ES	30,000	22,000	26,000	30.8
VF1-BPW-1-W2-ES	VF1-BPW-7-W2-ES	37,000	30,000	33,500	20.9
VF2-SW3-W2-ES	VF2-SW5-W2-ES	330,000	340,000	335,000	2.99
VF10-MW3-W2-ES	VF10-MW8-W2-ES	57,000	54,000	55,500	5.41

TABLE E.62
TRIP BLANK IDENTIFICATION, 1989
VOLK FIELD ANGB, WI

Trip Blank	Date Sampled	Associated Sample Identification
VF-TB1-ES	11/02/89	VF1-MW5-W1-ES
		VF1-ERB1-ES
**	11/02/89	VF4-SB9-SS1,3.5-5.5
		VF4-SB9-SS2,8.5-10.5
		VF4-SB10-SS1,1.0-3.0
		VF4-SB10-SS2,8.0-10.0
		VF4-SB11-SS1,1.0-3.0
		VF4-SB11-SS2,4.0-6.0
		VF4-SB13-SS1,1.0-3.0
		VF1-SB13 (Composite 0-10)
		VF1-SB16 (Composite 0-10)
		VF1-SB17-SS1,1.0-3.0
		VF1-SB17-SS2,4.0-6.0
		VF1-SB18-SS1,1.0-3.0
		VF1-SB18-SS2,4.0-6.0
VF-TB2-ES	11/03/89	VF1-MW6-W1-ES
		VF1-MW7-W1-ES
		VF-FB1-HPLC-ES
		VF-FB1-PW-ES
		VF-ERB2-ES
VF-TB3-ES	11/04/89	VF1-MW8-W1-ES
		VF3/6-MW6-W1-ES
		VF-ERB3-ES
**	11/04/89	VF5-SB1-SS1,0-1.0
		VF5-SB1-SS2,3.5-5.5
		VF5-SB2-SS1,0-2.0
		VF5-SB2-SS2,3.5-5.5
		VF5-SB2-SS3,5.5-8.0
		VF5-SB3-SS1,3.5-6.0
		VF5-SB4-SS1,0-2.5
		VF5-SB4-SS2,3.5-6.0
+VF-TB5A-ES	11/06/89	VF10-SW1-W1-ES
		VF10-SW2-W1-ES
		VF10-SW4-W1-ES
		VF10-MW7-W1-ES
**	11/06/89	VF5-SB5-SS1,3.5-6.0
		VF5-SB6-SS1,3.5-6.0
		VF5-SB7-SS1,3.5-6.0
		VF5-SB8-SS1,0-2.0
		VF5-SB8-SS2,3.5-6.0
		VF5-SB9-SS1,3.5-6.0
		VF5-SB10-SS1,3.5-6.0
		VF5-SB11-SS1,3.5-6.0

TABLE E.62 (cont'd)
TRIP BLANK IDENTIFICATION, 1989
VOLK FIELD ANGB, WI

Trip Blank	Date Sampled	Associated Sample Identification
VF10-TB5-ES	*11/06/89	VF10-MW5-W1-ES
		VF10-MW20-W1-ES
	11/07/89	VF1-SB19-SS1,0-2.0
		VF1-SB19-SS2,5.5-8.0
		VF1-SB20-SS1,0-2.5
		VF1-SB20-SS2,5.5-8.0
		VF1-SB21-SS1,0-2.5
		VF1-SB21-SS2,5.5-8.0
		VF1-SB35-SS2,5.5-8.0
		VF1-SB36-SS2,5.5-8.0
**	11/07/89	VF1-SB22-SS1,0-2.5
		VF1-SB22-SS2,5.5-8.0
		VF1-SB23-SS1,0-2.5
		VF1-SB23-SS2,5.5-8.0
		VF1-SB23-SS3,10.0-12.5
		VF1-SB28-SS1,0-2.5
		VF1-SB28-SS2,5.5-8.0
		VF1-SB37-SS2,5.5-8.0
VF-TB6-ES	11/08/89	VF3/6-MW2-W1-ES
		VF3/6-MW4-W1-ES
		VF1-SB24-SS1,0-2.0
		VF1-SB24-SS2,5.5-8.0
		VF1-SB25-SS1,0-2.0
		VF1-SB25-SS2,5.5-8.0
		VF1-SB26-SS1,0-2.0
		VF1-SB27-SS1,0-2.0
		VF1-SB27-SS2,5.5-8.0
		VF1-SB29-SS1,0-2.0
		VF1-SB29-SS2,5.5-8.0
		VF1-SB30-SS1,0-2.0
		VF1-SB30-SS2,5.5-8.0
		VF1-SB31-SS1,0-2.0
		VF1-SB31-SS2,5.5-8.0
		VF1-SB38
+VF-TB8-ES	11/08/89	VF-ERB4-ES
VF-TB9-ES	11/09/89	VF3/6-MW3-W1-ES
		VF3/6-MW5-W1-ES
		VF5-MW1-W1-ES
		VF5-MW20-W1-ES
VF-TB10-ES	11/10/89	VF10-MW6-W1-ES

+ - There was no VF-TB4-ES or VF-TB7-ES sent.

* - Samples were collected on 11/06/89 and sent to the laboratory on 11/07/89.

** - No Trip Blank associated with these samples.

TABLE E.63
EQUIPMENT RINSATE IDENTIFICATION, 1989
VOLK FIELD ANGB, WI

Equipment Rinsate	Date Sampled	Associated Sample Identification
VF-ERB1-ES	11/02/89	VF1-MW5-W1-ES
VF-ERB2-ES(1)	11/03/89	VF1-MW6-W1-ES VF1-MW7-W1-ES VF-FB1-HPLC-ES VF-FB1-PW-ES
(2)	11/02/89	VF4-SB9-SS1,3.5-5.5 VF4-SB9-SS2,8.5-10.5 VF4-SB10-SS1,1.0-3.0 VF4-SB10-SS2,8.0-10.0 VF4-SB11-SS1,1.0-3.0 VF4-SB11-SS2,4.0-6.0 VF4-SB13-SS1,1.0-3.0 VF1-SB13 (Composite 0-10) VF1-SB16 (Composite 0-10) VF1-SB17-SS1,1.0-3.0 VF1-SB17-SS2,4.0-6.0 VF1-SB18-SS1,1.0-3.0 VF1-SB18-SS2,4.0-6.0
VF-ERB3-ES(3)	11/04/89	VF1-MW8-W1-ES VF3/6-MW6-W1-ES
	11/06/89	VF10-SW1-W1-ES VF10-SW2-W1-ES VF10-SW4-W1-ES VF10-MW7-W1-ES
	11/06/89(4)	VF10-MW5-W1-ES VF10-MW20-W1-ES
(2)	11/04/89	VF5-SB1-SS1,0-1.0 VF5-SB1-SS2,3.5-5.5 VF5-SB2-SS1,0-2.0 VF5-SB2-SS2,3.5-5.5 VF5-SB2-SS3,5.5-8.0 VF5-SB3-SS1,3.5-6.0 VF5-SB4-SS1,0-2.5 VF5-SB4-SS2,3.5-6.0
(2)	11/06/89	VF5-SB5-SS1,3.5-6.0 VF5-SB6-SS1,3.5-6.0 VF5-SB7-SS1,3.5-6.0 VF5-SB8-SS1,0-2.0 VF5-SB8-SS2,3.5-6.0 VF5-SB9-SS1,3.5-6.0 VF5-SB10-SS1,3.5-6.0 VF5-SB11-SS1,3.5-6.0
(2)	11/07/89	VF1-SB19-SS1,0-2.0 VF1-SB19-SS2,5.5-8.0 VF1-SB20-SS1,0-2.5 VF1-SB20-SS2,5.5-8.0 VF1-SB21-SS1,0-2.5 VF1-SB21-SS2,5.5-8.0 VF1-SB35-SS2,5.5-8.0 VF1-SB36-SS2,5.5-8.0

TABLE E.63 (cont'd)
EQUIPMENT RINSATE IDENTIFICATION, 1989
VOLK FIELD ANGB, WI

Equipment Rinsate	Date Sampled	Associated Sample Identification
(2)	11/07/89	VF1-SB22-SS1,0-2.5
		VF1-SB22-SS2,5.5-8.0
		VF1-SB23-SS1,0-2.5
		VF1-SB23-SS2,5.5-8.0
		VF1-SB23-SS3,10.0-12.5
		VF1-SB28-SS1,0-2.5
		VF1-SB28-SS2,5.5-8.0
		VF1-SB37-SS2,5.5-8.0
(2)	11/08/89	VF1-SB24-SS1,0-2.0
		VF1-SB24-SS2,5.5-8.0
		VF1-SB25-SS1,0-2.0
		VF1-SB25-SS2,5.5-8.0
		VF1-SB26-SS1,0-2.0
		VF1-SB27-SS1,0-2.0
		VF1-SB27-SS2,5.5-8.0
		VF1-SB29-SS1,0-2.0
		VF1-SB29-SS2,5.5-8.0
		VF1-SB30-SS1,0-2.0
		VF1-SB30-SS2,5.5-8.0
		VF1-SB31-SS1,0-2.0
		VF1-SB31-SS2,5.5-8.0
		VF1-SB38
VF-ERB4-ES(5,6)	11/08/89	VF3/6-MW2-W1-ES(7)
		VF3/6-MW4-W1-ES(7)
	11/09/89	VF3/6-MW3-W1-ES
		VF3/6-MW5-W1-ES
		VF5-MW1-W1-ES
		VF5-MW20-W1-ES
	11/10/89	VF10-MW6-W1-ES(8)

(1) - VF-ERB2-ES was analyzed for SW8010 and SW8020 only. VF-ERB1-ES is effective for the samples on this date for all the parameters.
(2) - No Equipment Rinsates associated with these samples.
(3) - No samples were collected on 11/05/89.
(4) - These samples were collected on 11/06/89 and were sent to the laboratory on 11/07/89.
(5) - Equipment Rinsate was collected on 11/08/89 and sent to the laboratory on 11/09/89.
(6) - Two VF-ERB4-ES's were collected. The one collected on 11/05/89 was not sent in for analysis.
(7) - These samples were collected on 11/08/89 and were sent to the laboratory on 11/08/89.
(8) - This sample exceeds the every other day requirement for Equipment Rinsates.

TABLE E.64
FIELD BLANK IDENTIFICATION, 1989
VOLK FIELD ANGB, WI

Field Blanks	Date Sampled	Associated Sample Identification
VF-FB1-HPLC-ES	11/02/89	VF1-MW5-W1-ES
VF-FB1-PW-ES		VF1-ERB1-ES
	11/02/89	VF4-SB9-SS1,3.5-5.5
		VF4-SB9-SS2,8.5-10.5
		VF4-SB10-SS1,1.0-3.0
		VF4-SB10-SS2,8.0-10.0
		VF4-SB11-SS1,1.0-3.0
		VF4-SB11-SS2,4.0-6.0
		VF4-SB13-SS1,1.0-3.0
		VF1-SB13 (Composite 0-10)
		VF1-SB16 (Composite 0-10)
		VF1-SB17-SS1,1.0-3.0
		VF1-SB17-SS2,4.0-6.0
		VF1-SB18-SS1,1.0-3.0
		VF1-SB18-SS2,4.0-6.0
	11/03/89	VF1-MW6-W1-ES
		VF1-MW7-W1-ES
		VF-ERB2-ES
	11/04/89	VF1-MW8-W1-ES
		VF3/6-MW6-W1-ES
		VF-ERB3-ES
	11/04/89	VF5-SB1-SS1,0-1.0
		VF5-SB1-SS2,3.5-5.5
		VF5-SB2-SS1,0-2.0
		VF5-SB2-SS2,3.5-5.5
		VF5-SB2-SS3,5.5-8.0
		VF5-SB3-SS1,3.5-6.0
		VF5-SB4-SS1,0-2.5
		VF5-SB4-SS2,3.5-6.0
	11/06/89	VF10-SW1-W1-ES
		VF10-SW2-W1-ES
		VF10-SW4-W1-ES
		VF10-MW7-W1-ES
	11/06/89	VF5-SB5-SS1,3.5-6.0
		VF5-SB6-SS1,3.5-6.0
		VF5-SB7-SS1,3.5-6.0
		VF5-SB8-SS1,0-2.0
		VF5-SB8-SS2,3.5-6.0
		VF5-SB9-SS1,3.5-6.0
		VF5-SB10-SS1,3.5-6.0
		VF5-SB11-SS1,3.5-6.0

TABLE E.64 (cont'd)
FIELD BLANK IDENTIFICATION, 1989
VOLK FIELD ANGB, WI

Field Blanks	Date Sampled	Associated Sample Identification
	11/06/89	VF10-MW5-W1-ES
		VF10-MW20-W1-ES
	11/07/89	VF1-SB19-SS1,0-2.0
		VF1-SB19-SS2,5.5-8.0
		VF1-SB20-SS1,0-2.5
		VF1-SB20-SS2,5.5-8.0
		VF1-SB21-SS1,0-2.5
		VF1-SB21-SS2,5.5-8.0
		VF1-SB35-SS2,5.5-8.0
		VF1-SB36-SS2,5.5-8.0
	11/07/89	VF1-SB22-SS1,0-2.5
		VF1-SB22-SS2,5.5-8.0
		VF1-SB23-SS1,0-2.5
		VF1-SB23-SS2,5.5-8.0
		VF1-SB23-SS3,10.0-12.5
		VF1-SB28-SS1,0-2.5
		VF1-SB28-SS2,5.5-8.0
		VF1-SB37-SS2,5.5-8.0
	11/08/89	VF3/6-MW2-W1-ES
		VF3/6-MW4-W1-ES
		VF1-SB24-SS1,0-2.0
		VF1-SB24-SS2,5.5-8.0
		VF1-SB25-SS1,0-2.0
		VF1-SB25-SS2,5.5-8.0
		VF1-SB26-SS1,0-2.0
		VF1-SB27-SS1,0-2.0
		VF1-SB27-SS2,5.5-8.0
		VF1-SB29-SS1,0-2.0
		VF1-SB29-SS2,5.5-8.0
		VF1-SB30-SS1,0-2.0
		VF1-SB30-SS2,5.5-8.0
		VF1-SB31-SS1,0-2.0
		VF1-SB31-SS2,5.5-8.0
		VF1-SB38
	11/08/89	VF-ERB4-ES
	11/09/89	VF3/6-MW3-W1-ES
		VF3/6-MW5-W1-ES
		VF5-MW1-W1-ES
		VF5-MW20-W1-ES
	11/10/89	VF10-MW6-W1-ES

TABLE E.65
LABORATORY IDENTIFICATION, 1989
VOLK FIELD ANGB, WI

Log Number Batch	Specific Sample	Sample ID
89-9534	-1	VF5-SB1-SS1-O-1.0
	-2	VF5-SB1-SS2-3.5-5.5
	-3	VF5-SB2-SS1-0-2.0
	-4	VF5-SB2-SS2-3.5-5.5
	-5	VF5-SB2-SS3-5.5-8.0
	-6	VF5-SB3-SS1-3.5-6.0
	-7	VF5-SB4-SS1-0-2.5
	-8	VF5-SB4-SS2-3.5-6.0
	-9	VF4-SB9-SS1-3.5-5.5
	-10	VF4-SB9-SS2-8.5-10.5
	-11	VF4-SB10-SS1-1.0-3.0
	-12	VF4-SB13-SS1-1.0-3.0
	-13	VF4-SB10-SS2-8.0-10.0
	-14	VF4-SB11-SS1-1.0-3.0
	-15	VF4-SB11-SS2-4.0-6.0
	-16	VF1-SB16(COMP.0-10)
	-17	VF1-SB17-SS1-1.0-3.0
	-18	VF1-SB17-SS2-4.0-6.0
	-19	VF1-SB18-SS1-1.0-3.0
	-20	VF1-SB18-SS2-4.0-6.0
	-21	VF1-SB13
	-22	VF1-MW6-W1-ES
	-23	VF1-MW7-W1-ES
	-24	VF1-MW5-W1-ES
	-25	VF1-MW8-W1-ES
	-26	VF-3/6-MW6-W1-ES
	-27	VF1-MW8-W1-ES
	-28	VF1-MW6-W1-ES
	-29	VF1-MW7-W1-ES
	-30	VF1-ERB1-ES
	-31	VF-TB1-ES
	-32	VF-TB2-ES
	-33	VF-TB3-ES
	-34	VF-ERB2-ES
	-35	VF-FB1-HPLC-ES
	-36	VF-FB1-PW-ES
	-37	VF1-FB1-PW-ES
	-38	VF-ERB3-ES
	-39	VF1-MW5-W1-ES
89-9546	-1	VF10-SW1-W1-ES
	-2	VF10-SW2-W1-ES
	-3	VF10-SW4-W1-ES
	-4	VF10-MW7-W1-ES
	-5	VF-TB5-ES
	-6	VF5-SB10-SS1-3.5-6.0
	-7	VF5-SB9-SS1-3.5-6.0
	-8	VF5-SB1-SS1-3.5-6.0
	-9	VF5-SB8-SS1-0-2.0
	-10	VF5-SB8-SS2-3.5-6.0
	-11	VF5-SB6-SS1-3.5-6.0
	-12	VF5-SB7-SS1-3.5-6.0
	-13	VF5-SB5-SS1-3.5-6.0

TABLE E.65 (cont'd)
LABORATORY IDENTIFICATION, 1989
VOLK FIELD ANGB, WI

Log Number		
Batch	Specific Sample	Sample ID
89-9580	-1	VF10-MW5-W1-ES
	-2	VF10-MW20-W1-ES
	-3	VF10-MW7-W1-ES
	-4	VF10-SW4-W1-ES
	-5	VF10-MW5-W1-ES
	-6	VF10-MW20-W1-ES
	-7	VF-TB5-ES
	-8	VF1-SB19-SS1-0-2.0
	-9	VF1-SB19-SS2-5.5-8.0
	-10	VF1-SB35-SS2-5.5-8.0
	-11	VF1-SB20-SS1-0-2.5
	-12	VF1-SB20-SS2-5.5-8.0
	-13	VF1-SB21-SS1-0-2.5
	-14	VF1-SB21-SS2-5.5-8.0
	-15	VF1-SB36-SS2-5.5-8.0
	-16	VF1-SB22-SS1-0-2.5
	-17	VF1-SB22-SS2-5.5-8.0
	-18	VF1-SB37-SS2-5.5-8.0
	-19	VF1-SB28-SS1-0-2.5
	-20	VF1-SB28-SS2-5.5-8.0
	-21	VF1-SB23-SS1-0-2.5
	-22	VF1-SB23-SS2-5.5-8.0
	-23	VF1-SB23-SS3-10.0-12.5
89-9606	-1	VF3/6-MW4-W1-ES
	-2	VF3/6-MW2-W1-ES
	-3	VF-TB6-ES
	-4	VF1-SB25-SS1-0-2.0
	-5	VF1-SB25-SS2-5.5-8.0
	-6	VF1-SB26-SS1-1.0-2.0
	-7	VF1-SB26-SS2-5.5-8.0
	-8	VF1-SB27-SS1-0-2.0
	-9	VF1-SB27-SS2-5.5-8.0
	-10	VF1-SB24-SS1-0-2.0
	-11	VF1-SB24-SS2-5.5-8.0
	-12	VF1-SB29-SS1-0-2.0
	-13	VF1-SB29-SS2-5.5-8.0
	-14	VF1-SB30-SS1-0-2.0
	-15	VF1-SB30-SS2-5.5-8.0
	-16	VF1-SB38
	-17	VF1-SB31-SS1-0-2.0
	-18	VF1-SB31-SS2-5.5-8.0
89-9848	-1	VF-ERB4-ES
	-2	VF-TB8-ES
	-3	VF-TB10-ES
	-4	VF-TB9-ES
	-5	VF10-MW6-W1-ES
	-6	VF5-MW1-W1-ES
	-7	VF-MW20-W1-ES
	-8	VF3/6-MW5-W1-ES
	-9	VF3/6-MW3-W1-WS

TABLE E.66
TRIP BLANK IDENTIFICATION, 1990
VOLK FIELD ANGB, WI

Trip Blanks	Date Sampled	Associated Sample Identification
VF-TB1-1X	09/25/90	VF1-MW5-1X
		VF3/6-MW6-X1
		VF-ER1-X1
		VF-FB1-1X
VF-TB1-W2-ES	09/30/90	VF8-SB1-SS1,0-2
		VF8-SB1-SS1,4-6
		VF8-SB2-SS1,0-2
		VF8-SB2-SS1,4-6
		VF-ER1-W2-ES
VF-TB2-W2-ES	10/03/90	VF1-MW5-2X-ES
		VF3/6-MW6-2X-ES
VF-TB3-W2-ES	10/10/90	VF1-MW12-1X-ES
		VF1-MW25-W2-ES
		VF-ER2-W2-ES
VF-TB4-W2-ES	10/14/90	VF3/6-SB1-SS1,0-1
		VF3/6-SB2-SS1,0-1
		VF3/6-SB3-SS1,0-0.5
		VF3/6-SB4-SS1,0-0.5
		VF-ER3-W2-ES
VF-TB5-W2-ES	10/16/90	VF3/6-SB1-SS1,4-5
		VF3/6-SB2-SS1,4-5
		VF3/6-SB3-SS1,5-6
		VF3/6-SB4-SS1,6-7
		VF3/6-SB5-SS1,5-6
		VF3/6-SB6-SS1,5-6
		VF3/6-SB6-SS11,5-6
VF-TB6-W2-ES	10/17/90	VF3/6-SB7-SS1,5-6
		VF3/6-SB8-SS1,5-6
		VF3/6-SB9-SS1,4-5
		VF3/6-SB10-SS1,2-3
		VF-ER4-W2-ES
VF-TB7-W2-ES	10/23/90	VF8-MW1-W2-ES
		VF2-MW1-W2-ES
		VF7-MW6-W2-ES
		VF-ER5-W2-ES
VF-TB8-W2-ES	10/24/90	VF9-MW1-W2-ES
		VF1-ET1-W2-ES
		VF3/6-MW4-W2-ES
		VF7-MW2-W2-ES

TABLE E.66 (cont'd)
TRIP BLANK IDENTIFICATION, 1990
VOLK FIELD ANGB, WI

Trip Blanks	Date Sampled	Associated Sample Identification
VF-TB9-W2-ES	10/25/90	VF7-MW1-W2-ES
		VF7-MW3-W2-ES
		VF7-MW4-W2-ES
		VF7-MW5-W2-ES
		VF7-MW6-W2-ES
		VF7-MW7-W2-ES
		VF-ER6-W2-ES
		VF-FB2-W2-ES
		VF-FB3-W2-ES
VF-TB10-W2-ES	10/26/90	VF9-MW2-W2-ES
		VF9-MW3-W2-ES
		VF92-BBW1-W2-ES
		VF3/6-MW2-W2-ES
		VF3/6-MW7-W2-ES
VF-TB11-W2-ES	10/27/90	VF3/6-MW3-W2-ES
(Not analyzed for		VF3/6-MW6-W2-ES
SW8010)		VF2-MW3-W2-ES
		VF2-MW5-W2-ES
		VF-ER7-W2-ES
VF-TB11-W2-ES	10/28/90	VF10-SB1-SS1,1-2
		VF10-SB2-SS1,1-2
		VF10-SB3-SS1,1-2
		VF10-MW1-W2-ES
		VF10-MW2-W2-ES
		VF10-MW3-W2-ES
		VF10-MW4-W2-ES
		VF10-MW5-W2-ES
		VF10-MW6-W2-ES
		VF10-MW7-W2-ES
		VF10-MW8-W2-ES
VF-TB12-W2-ES	10/29/90	VF9-SB1-SS1,1-2
		VF9-SB2-SS1,1-2
		VF9-SB3-SS1,1-2
		VF2-SB2-SS1,1-2
		VF5-MW1-W2-ES
VF-TB13-W2-ES	10/30/90	VF2-SB1-SS1,1-2
		VF2-SB3-SS1,1-2
		VF2-SB4-SS1,1-2
		VF2-SB5-SS1,1-2
		VF3/6-MW5-W2-ES
		VF3/6-MW8-W2-ES
		VF-ER8-W2-ES

TABLE E.66 (cont'd)
TRIP BLANK IDENTIFICATION, 1990
VOLK FIELD ANGB, WI

Trip Blanks	Date Sampled	Associated Sample Identification
VF-TB14-W2-ES	11/05/90	VF1-MW1-W2-ES
		VF1-MW4-W2-ES
VF-TB15-W2-ES	11/06/90	VF8-MW1-W2-ES
		VF3/6-MW1-W2-ES
		VF3/6-MW9-W2-ES
		VF2-MW2-W2-ES
		VF2-MW4-W2-ES
		VF1-ET2-W2-ES
		VF1-ET6-W2-ES
		VF-ER9-W2-ES
VF-TB16-W2-ES	11/07/90	VF1-ET7-W2-ES
		VF1-MW2-W2-ES
		VF1-MW3-W2-ES
		VF1-MW6-W2-ES
		VF1-MW7-W2-ES
		VF1-MW12-W2-ES
		VF1-MW13-W2-ES
		VF-FB4-W2-ES
VF-TB17-W2-ES	11/07/90	VF3/6-SB11-SS1.5-6
		VF3/6-SB11-SS11.5-6
		VF3/6-SB12-SS1.3-4
		VF3/6-SB13-SS1.5-6
		VF3/6-SB14-SS1.5-6
		VF3/6-SB15-SS1.7-8
		VF3/6-SB16-SS1.5-6
		VF3/6-SB16-SS11.5-6
		VF-ER10-W2-ES
VF-TB18-W2-ES	11/08/90	VF1-MW5-W2-ES
		VF1-MW8-W2-ES
		VF1-MW9-W2-ES
		VF1-MW10-W2-ES
		VF1-MW11-W2-ES
		VF1-MW14-W2-ES
		VF-ER11-W2-ES
VF-TB19-W2-ES	11/09/90	VF3/6-TW1-W2-ES
		VF1-BPW-1-W2-ES
		VF1-BPW-2-W2-ES
		VF1-BPW-4-W2-ES
		VF1-BPW-7-W2-ES
VF-TB20-W2-ES	11/10/90	VF2-SW1-W2-ES
		VF2-SW2-W2-ES
		VF2-SW3-W2-ES
		VF2-SW4-W2-ES
		VF2-SW5-W2-ES
		VFB5-W2-ES

TABLE E.67
EQUIPMENT RINSATE BLANK IDENTIFICATION, 1990
VOLK FIELD ANGB, WI

Equipment Rinsates	Date Sampled	Associated Sample Identification
VF-ER1-X1	09/25/90	VF1-MW5-1X
		VF3/6-MW6-X1
	10/03/90	VF1-MW5-2X-ES
		VF3/6-MW6-2X-ES
VF-ER1-W2-ES	09/30/90	VF8-SB1-SS1,0-2 ES
		VF8-SB1-SS1,4-6 ES
		VF8-SB2-SS1,0-2 ES
		VF8-SB2-SS1,4-6 ES
VF-ER2-W2-ES	10/10/90	VF1-MW12-1X-ES
		VF1-MW25-W2-ES
VF-ER3-W2-ES	10/14/90	VF3/6-SB1-SS1,0-1 ES
		VF3/6-SB2-SS1,0-1 ES
		VF3/6-SB3-SS1,0-0.5 ES
		VF3/6-SB4-SS1,0-0.5 ES
	10/16/90	VF3/6-SB1-SS1;4-5 ES
		VF3/6-SB2-SS1,4-5 ES
		VF3/6-SB3-SS1,5-6 ES
		VF3/6-SB4-SS1,6-7 ES
		VF3/6-SB5-SS1,5-6 ES
		VF3/6-SB6-SS1,5-6 ES
		VF3/6-SB6-SS11,5-6 ES
VF-ER4-W2-ES	10/17/90	VF3/6-SB7-SS1,5-6 ES
		VF3/6-SB8-SS1,5-6 ES
		VF3/6-SB9-SS1,4-5 ES
		VF3/6-SB10-SS1,2-3 ES
VF-ER5-W2-ES	10/23/90	VF8-MW1-W2-ES
		VF2-MW1-W2-ES
		VF7-MW6-W2-ES
	10/24/90	VF9-MW1-W2-ES
		VF1-ET1-W2-ES
		VF3/6-MW4-W2-ES
		VF7-MW2-W2-ES
VF-ER6-W2-ES	10/25/90	VF7-MW1-W2-ES
		VF7-MW3-W2-ES
		VF7-MW4-W2-ES
		VF7-MW5-W2-ES
		VF7-MW6-W2-ES
		VF7-MW7-W2-ES
	10/26/90	VF9-MW2-W2-ES
		VF9-MW3-W2-ES
		VF92-BBW1-W2-ES
		VF3/6-MW2-W2-ES
		VF3/6-MW7-W2-ES

TABLE E.67 (cont'd)
EQUIPMENT RINSATE BLANK IDENTIFICATION, 1990
VOLK FIELD ANGB, WI

Equipment Rinsates	Date Sampled		Associated Sample Identification
VF-ER7-W2-ES	10/27/90		VF3/6-MW3-W2-ES
(Not analyzed for			VF3/6-MW6-W2-ES
SW8010, Pests/PCB,			VF2-MW3-W2-ES
Semivolatiles)			VF2-MW5-W2-ES
	10/28/90	*	VF10-SB1-SS1,1-2 ES
		*	VF10-SB2-SS1,1-2 ES
		*	VF10-SB3-SS1,1-2 ES
			VF10-MW1-W2-ES
			VF10-MW2-W2-ES
			VF10-MW3-W2-ES
			VF10-MW4-W2-ES
			VF10-MW5-W2-ES
			VF10-MW6-W2-ES
			VF10-MW7-W2-ES
			VF10-MW8-W2-ES
	10/29/90	**	VF9-SB1-SS1,1-2 ES
		**	VF9-SB2-SS1,1-2 ES
		**	VF9-SB3-SS1,1-2 ES
		**	VF2-SB2-SS1,1-2 ES
		**	VF5-MW1-W2-ES
VF-ER8-W2-ES	10/30/90	*	VF2-SB1-SS1,1-2 ES
		*	VF2-SB3-SS1,1-2 ES
		*	VF2-SB4-SS1,1-2 ES
		*	VF2-SB5-SS1,1-2 ES
			VF3/6-MW5-W2-ES
			VF3/6-MW8-W2-ES
VF-ER9-W2-ES	11/05/90		VF1-MW1-W2-ES
(Collected 11/06/90)			VF1-MW4-W2-ES
	11/06/90		VF8-MW1-W2-ES
			VF3/6-MW1-W2-ES
			VF3/6-MW9-W2-ES
			VF2-MW2-W2-ES
			VF2-MW4-W2-ES
			VF1-ET2-W2-ES
			VF1-ET6-W2-ES
	11/07/90	**	VF1-ET7-W2-ES
		**	VF1-MW2-W2-ES
		**	VF1-MW3-W2-ES
		**	VF1-MW6-W2-ES
		**	VF1-MW7-W2-ES
		**	VF1-MW12-W2-ES
		**	VF1-MW13-W2-ES

TABLE E.67 (cont'd)
EQUIPMENT RINSATE BLANK IDENTIFICATION, 1990
VOLK FIELD ANGB, WI

Equipment Rinsates	Date Sampled	Associated Sample Identification
VF-ER10-W2-ES	11/07/90	VF3/6-SB11-SS1,5-6 ES
		VF3/6-SB11-SS11,5-6 ES
		VF3/6-SB12-SS1,3-4 ES
		VF3/6-SB13-SS1,5-6 ES
		VF3/6-SB14-SS1,5-6 ES
		VF3/6-SB15-SS1,7-8 ES
		VF3/6-SB16-SS1,5-6 ES
		VF3/6-SB16-SS11,5-6 ES
VF-ER11-W2-ES	11/08/90	VF1-MW5-W2-ES
		VF1-MW8-W2-ES
		VF1-MW9-W2-ES
		VF1-MW10-W2-ES
		VF1-MW11-W2-ES
		VF1-MW14-W2-ES
	11/09/90	VF3/6-TW1-W2-ES
		VF1-BPW-1-W2-ES
		VF1-BPW-2-W2-ES
		VF1-BPW-4-W2-ES
		VF1-BPW-7-W2-ES

* - Equipment rinsate was a bailer rinsate only.
** - Sample does not qualify within the QAPP rinsate limits.

TABLE E.68
FIELD BLANK IDENTIFICATION, 1990
VOLK FIELD ANGB, WI

Field Blanks	Date Sampled		Associated Sample Identification
VF-FB1-1X ASTM II Water (Analyzed only for SW8010 and SW8020)	09/25/90		VF1-MW5-1X
			VF3/6-MW6-X1
	09/30/90		VF8-SB1-SS1,0-2 ES
			VF8-SB1-SS1,4-6 ES
			VF8-SB2-SS1,0-2 ES
			VF8-SB2-SS1,4-6 ES
	10/03/90		VF1-MW5-2X-ES
			VF3/6-MW6-2X-ES
	10/10/90	*	VF1-MW12-1X-ES
		*	VF1-MW25-W2-ES
	10/14/90	*	VF3/6-SB1-SS1,0-1 ES
		*	VF3/6-SB2-SS1,0-1 ES
		*	VF3/6-SB3-SS1,0-0.5 ES
		*	VF3/6-SB4-SS1,0-0.5 ES
	10/16/90	*	VF3/6-SB1-SS1,4-5 ES
		*	VF3/6-SB2-SS1,4-5 ES
		*	VF3/6-SB3-SS1,5-6 ES
		*	VF3/6-SB4-SS1,6-7 ES
		*	VF3/6-SB5-SS1,5-6 ES
		*	VF3/6-SB6-SS1,5-6 ES
		*	VF3/6-SB6-SS11,5-6 ES
	10/17/90	*	VF3/6-SB7-SS1,5-6 ES
		*	VF3/6-SB8-SS1,5-6 ES
		*	VF3/6-SB9-SS1,4-5 ES
		*	VF3/6-SB10-SS1,2-3 ES
VF-FB2-W2-ES ASTM II Water VF-FB3-W2-ES Source Tap Water	10/23/90		VF8-MW1-W2-ES
			VF2-MW1-W2-ES
			VF7-MW6-W2-ES
	10/24/90		VF9-MW1-W2-ES
			VF1-ET1-W2-ES
			VF3/6-MW4-W2-ES
			VF7-MW2-W2-ES
	10/25/90		VF7-MW1-W2-ES
			VF7-MW3-W2-ES
			VF7-MW4-W2-ES
			VF7-MW5-W2-ES
			VF7-MW6-W2-ES
			VF7-MW7-W2-ES
	10/26/90		VF9-MW2-W2-ES
			VF9-MW3-W2-ES
			VF92-BBW1-W2-ES
			VF3/6-MW2-W2-ES
			VF3/6-MW7-W2-ES
	10/27/90		VF3/6-MW3-W2-ES
			VF3/6-MW6-W2-ES
			VF2-MW3-W2-ES
			VF2-MW5-W2-ES
	10/28/90		VF10-SB1-SS1,1-2 ES
			VF10-SB2-SS1,1-2 ES
			VF10-SB3-SS1,1-2 ES
			VF10-MW1-W2-ES
			VF10-MW2-W2-ES
			VF10-MW3-W2-ES
			VF10-MW4-W2-ES
			VF10-MW5-W2-ES
			VF10-MW6-W2-ES
			VF10-MW7-W2-ES
			VF10-MW8-W2-ES

TABLE E.68 (cont'd)
FIELD BLANK IDENTIFICATION, 1990
VOLK FIELD ANGB, WI

Field Blanks	Date Sampled	Associated Sample Identification
	10/29/90	VF9-SB1-SS1,1-2 ES
		VF9-SB2-SS1,1-2 ES
		VF9-SB3-SS1,1-2 ES
		VF2-SB2-SS1,1-2 ES
		VF5-MW1-W2-ES
	10/30/90	VF2-SB1-SS1,1-2 ES
		VF2-SB3-SS1,1-2 ES
		VF2-SB4-SS1,1-2 ES
		VF2-SB5-SS1,1-2 ES
		VF3/6-MW5-W2-ES
		VF3/6-MW8-W2-ES
VF-FB4-W2-ES	11/05/90	VF1-MW1-W2-ES
ASTM II Water		VF1-MW4-W2-ES
VF-FB5-W2-ES	11/06/90	VF8-MW1-W2-ES
Source Tap Water		VF3/6-MW1-W2-ES
		VF3/6-MW9-W2-ES
		VF2-MW2-W2-ES
		VF2-MW4-W2-ES
		VF1-ET2-W2-ES
		VF1-ET6-W2-ES
	11/07/90	VF1-ET7-W2-ES
		VF1-MW2-W2-ES
		VF1-MW3-W2-ES
		VF1-MW6-W2-ES
		VF1-MW7-W2-ES
		VF1-MW12-W2-ES
		VF1-MW13-W2-ES
	11/07/90	VF3/6-SB11-SS1,5-6 ES
		VF3/6-SB11-SS11,5-6 ES
		VF3/6-SB12-SS1,3-4 ES
		VF3/6-SB13-SS1,5-6 ES
		VF3/6-SB14-SS1,5-6 ES
		VF3/6-SB15-SS1,7-8 ES
		VF3/6-SB16-SS1,5-6 ES
		VF3/6-SB16-SS11,5-6 ES
	11/08/90	VF1-MW5-W2-ES
		VF1-MW8-W2-ES
		VF1-MW9-W2-ES
		VF1-MW10-W2-ES
		VF1-MW11-W2-ES
		VF1-MW14-W2-ES
	11/09/90	VF3/6-TW1-W2-ES
		VF1-BPW-1-W2-ES
		VF1-BPW-2-W2-ES
		VF1-BPW-4-W2-ES
		VF1-BPW-7-W2-ES
	11/10/90	VF2-SW1-W2-ES
		VF2-SW2-W2-ES
		VF2-SW3-W2-ES
		VF2-SW4-W2-ES
		VF2-SW5-W2-ES

* - Separate sampling event with no field blanks.

TABLE E.69
LABORATORY IDENTIFICATION, 1990
VOLK FIELD ANGB, WI

Log Number Batch	Specific Sample	Sample ID
SO-11480	-1	VF1-MW5-1X
	-2	VF3/6-MW6-X1
	-3	VF-ER1-X1
	-4	VF-FB1-1X
	-5	VF-TB-1X
SO-11565	-1	VF8-SB1-SS1,0-2
	-2	VF8-SB1-SS1,4-6
	-3	VF8-SB2-SS1,0-2
	-4	VF8-SB2-SS1,4-6
	-5	VF-ER1-W2-ES
	-6	VF-TB1-W2-ES
SO-12409	-1	VF1-MW5-2X-ES
	-2	VF3/6-MW6-2X-ES
	-3	VF-TB2-W2-ES
SO-12821	-1	VF1-MW12-1X-ES
	-2	VF1-MW25-1X-ES
	-3	VF-TB3-W2-ES
	-4	VF-ER2-W2-ES
SO-12912	-1	VF3/6-SB1-SS1,0-1'
	-2	VF3/6-SB2-SS1,0-1'
	-3	VF3/6-SB3-SS1,0-6"
	-4	VF3/6-SB4-SS1,0-6"
	-5	VF-ER3-W2-ES
	-6	VF-TB4-W2-ES
SO-12965	-1	VF3/6-SB1-SS1,4-5'
	-2	VF3/6-SB2-SS1,4-5'
	-3	VF3/6-SB4-SS1,6-7'
	-4	VF3/6-SB5-SS1,5-6'
	-5	VF3/6-SB6-SS1,5-6'
	-6	VF3/6-SB6-SS11,5-6'
	-7	VF3/6-SB3-SS1,5-6'
	-8	VF3/6-SB7-SS1,5-6'
	-9	VF3/6-SB8-SS1,5-6'
	-10	VF3/6-SB9-SS1,4-5'
	-11	VF3/6-SB10-SS1,2-3'
	-12	VF-ER4-W2-ES
	-13	VF-TB5-W2-ES
	-14	VF-TB6-W2-ES
SO-13059	-1	VF-ER5-W2-ES
	-2	VF2-MW1-W2-ES
	-3	VF7-MW6-W2-ES
	-4	VF8-MW1-W2-ES
	-5	VF-TB7-W2-ES
SO-13092	-1	VF9-MW1-W2-ES
	-2	VF7-MW2-W2-ES
	-3	VF1-ET1-W2-ES
	-4	VF3/6-MW4-W2-ES
	-5	VF-TB8-W2-ES

TABLE E.69 (cont'd)
LABORATORY IDENTIFICATION, 1990
VOLK FIELD ANGB, WI

Log Number Batch	Specific Sample	Sample ID
SO-13125	-1	VF-ER6-W2-ES
	-2	VF-FB2-W2-ES
	-3	VF-FB3-W2-ES
	-4	VF7-MW5-W2-ES
	-5	VF7-MW3-W2-ES
	-6	VF7-MW1-W2-ES
	-7	VF7-MW4-W2-ES
	-8	VF7-MW7-W2-ES
	-9	VF-TB9-W2-ES
SO-13139	-1	VF9-MW3-W2-ES
	-2	VF9-MW2-W2-ES
	-3	VF3/6-MW7-W2-ES
	-4	VF3/6-MW2-W2-ES
	-5	VF92-BBW1-W2-ES
	-6	VF-TB10-W2-ES
SO-13146	-1	VF2-MW3-W2-ES
	-2	VF2-MW5-W2-ES
	-3	VF-ER7-W2-ES
	-4	VF3/6-MW3-W2-ES
	-5	VF3/6-MW6-W2-ES
	-6	VF-TB11-W2-ES
SO-13171	-1	VF9-SB2-SS1,1-2'
	-2	VF9-SB1-SS1,1-2'
	-3	VF9-SB3-SS1,1-2'
	-4	VF2-SB2-SS1,1-2'
	-5	VF10-SB1-SS1,1-2'
	-6	VF10-SB2-SS1,1-2'
	-7	VF10-SB3-SS1,1-2'
	-18	VF10-MW1-W2-ES
	-19	VF10-MW2-W2-ES
	-20	VF10-MW3-W2-ES
	-21	VF10-MW8-W2-ES
	-22	VF10-MW6-W2-ES
	-23	VF10-MW7-W2-ES
	-24	VF10-MW5-W2-ES
	-25	VF10-MW4-W2-ES
	-26	VF5-MW1-W2-ES
	-27	VF-TB12-W2-ES
	-28	VF-TB11-W2-ES
SO-13196	-1	VF2-SB5-SS1,1-2'
	-2	VF2-SB4-SS1,1-2'
	-3	VF2-SB3-SS1,1-2'
	-4	VF2-SB1-SS1,1-2'
	-15	VF-ER8-W2-ES
	-16	VF3/6-MW8-W2-ES
	-17	VF3/6-MW5-W2-ES
	-18	VF-TB13-W2-ES
SO-13488	-1	VF1-MW4-W2-ES
	-2	VF1-MW1-W2-ES
	-3	VF-TB14-W2-ES

TABLE E.69 (cont'd)
LABORATORY IDENTIFICATION, 1990
VOLK FIELD ANGB, WI

Log Number Batch	Specific Sample	Sample ID
SO-13513	-1	VF-BR9-W2-ES
	-2	VF2-MW4-W2-ES
	-3	VF2-MW2-W2-ES
	-4	VF8-MW1-W2-ES
	-5	VF3/6-MW1-W2-ES
	-6	VF3/6-MW9-W2-ES
	-7	VF1-ET2-W2-ES
	-8	VF1-ET6-W2-ES
	-9	VF-TB15-W2-ES
SO-13540	-1	VF-FB4-W2-ES
	-2	VF1-ET7-W2-ES
	-3	VF1-MW3-W2-ES
	-4	VF1-MW2-W2-ES
	-5	VF1-MW13-W2-ES
	-6	VF1-MW7-W2-ES
	-7	VF1-MW6-W2-ES
	-8	VF1-MW12-W2-ES
	-9	VF-TB16-W2-ES
	-10	VF-ER10-W2-ES
	-11	VF-TB17-W2-ES
	-22	VF3/6-SB11-SS1,5-6'
	-23	VF3/6-SB11-SS11,5-6'
	-24	VF3/6-SB12-SS1,3-4'
	-25	VF3/6-SB13-SS1,5-6'
	-26	VF3/6-SB14-SS1,5-6'
	-27	VF3/6-SB15-SS1,7-8'
	-28	VF3/6-SB16-SS1,5-6'
	-29	VF3/6-SB16-SS11,5-6'
SO-13573	-1	VF-ER11-W2-ES
	-2	VF1-MW10-W2-ES
	-3	VF1-MW5-W2-ES
	-4	VF1-MW9-W2-ES
	-5	VF1-MW14-W2-ES
	-6	VF1-MW11-W2-ES
	-7	VF1-MW8-W2-ES
	-8	VF-TB18-W2-ES
SO-13592	-1	VF1-BPW-2-W2-ES
	-2	VF1-BPW-1-W2-ES
	-3	VF1-BPW-7-W2-ES
	-4	VF1-BPW-4-W2-ES
	-5	VF3/6-TW1-W2-ES
	-6	VF-TB19-W2-ES
SO-13904	-1	VF-FB5-W2-ES
	-2	VF2-SW1-W2-ES
	-3	VF2-SW1-W2-ES
	-4	VF2-SW3-W2-ES
	-5	VF2-SW5-W2-ES
	-6	VF2-SW4-W2-ES
	-7	VF-TB20-W2-ES

ATTACHMENT A

The following subsections describe the data validation for the analytical results of four sediment samples collected at Site 2 during July 1991. The samples were analyzed for pesticides/PCBs, semivolatile organics, and metals. The analyses, QA/QC requirements, and validation procedures are described in the preceding QA/QC Report. When the QA/QC criteria (as outlined in Section 2 of the QA/QC report) are satisfied, they are not mentioned in the ensuing discussion. However, when the QA/QC criteria used to evaluate the data were not satisfied, the irregularities are noted and the necessary qualifications of the data are discussed. Methods, analytes, and practical quantitation limits are listed in Table 1.A.

Pesticides/PCBs

The only noted deviation from criteria for pesticides and PCBs was in one standard for 4,4′-DDT. The continuing calibration was inadequate for quantitation of 4,4′-DDT but acceptable for detection or confirmation. 4,4′-DDT was not detected; therefore, data qualification was not necessary. Had 4,4′-DDT been detected, the result would have been estimated (J2).

Semivolatile Organics

One surrogate spike was out of criteria for each of the four samples as well as the MS and MSD samples. The irregularity has been noted, but data qualification is not required. Data qualification required two unacceptable surrogates at a minimum.

The recovery of pyrene was high in the MS and MSD; however, this irregularity required no data qualification.

A high continuing calibration of 3,3′-dichlorobenzidine required the estimation (J2) of the result for sample VF2-SD2. High continuing calibrations for 3-nitroaniline, 4-nitrophenol, 4-nitroaniline, and butylbenzlphthalate required the estimation of these results (J2) in samples VF2-SD1, VF2-SD3, and VF2-SD4. The affected compounds in all four samples were not detected.

Internal standards IS4, IS5, and IS6 did not meet criteria for sample VF2-SD2; the standards IS5 and IS6 did not meet criteria for samples VF2-SD1, VF2-SD3, and VF2-SD4. The results for compounds corresponding to these internal standards were estimated (J2). The six internal standards and their corresponding compounds are listed in Table 1 of the QA/QC Report.

Inorganics

The matrix spike for selenium was high; however, data qualification was not necessary since selenium was not detected.

The laboratory estimated non-detected results for thallium, arsenic, and selenium due to post digestive spike recovery.

TABLE 1.A

1991 TARGET COMPOUNDS AND ANALYTICAL DETECTION LIMITS(1) VOLK FIELD ANGB, WI

	Practical Quantitation Limit Sediment Samples (μg/kg)
CLP SOW Semi-Volatile Organics	
1,2,4-Trichlorobenzene	330
1,2-Dichlorobenzene	330
1,3-Dichlorobenzene	330
1,4-Dichlorobenzene	330
2,4,5-Trichlorophenol	1700
2,4,6-Trichlorophenol	330
2,4-Dichlorophenol	330
2,4-Dimethylphenol	330
2,4-Dinitrophenol	1700
2,4-Dinitrotoluene	330
2,6-Dinitrotoluene	330
2-Chloronaphthalene	330
2-Chlorophenol	330
2-Methylnaphthalene	330
2-Methylphenol	330
2-Nitroaniline	1700
2-Nitrophenol	330
3,3'-Dichlorobenzidine	670
3-Nitroaniline	1700
4,6-Dinitro-2-methylphenol	1700
4-Bromophenyl-phenylether	330
4-Chloro-3-methylphenol (para-chloro-meta-cresol)	330
4-Chloroaniline	330
4-Chlorophenyl-phenyl ether	330
4-Methylphenol	330
4-Nitroaniline	1600
4-Nitrophenol	1600
Acenaphthene	330
Acenapthylene	330
Anthracene	330
Benzo(a)anthracene	330
Benzo(a)pyrene	330
Benzo(b)fluoranthene	330
Benzo(g,h,i)perylene	330
Benzo(k)fluoranthene	330
Benzoic acid	1700
Benzyl alcohol	330
bis(2-chloroethoxy)methane	330
bis(2-chloroethyl)ether	330
bis(2-chloroisopropyl)ether	330
bis(2-ethylhexyl)phthalate	330
Butylbenzylphthalate	330
Chrysene	330
Di-n-butylphthalate	330
Di-n-octylphthalate	330
Dibenz(a,h)anthracene	330
Dibenzofuran	330
Diethylphthalate	330
Dimethylphthalate	330

TABLE 1.A--CONTINUED

1991 TARGET COMPOUNDS AND ANALYTICAL DETECTION LIMITS[1]
VOLK FIELD ANGB, WI

	Practical Quantitation Limit Sediment Samples (µg/kg)
CLP SOW Semi-Volatile Organics (Continued)	
Fluoranthene	330
Fluorene	330
Hexachlorobenzene	330
Hexachlorobutadiene	330
Hexachlorocyclopentadiene	330
Hexachloroethane	330
Indeno(1,2,3-cd)pyrene	330
Isophorone	330
N-Nitroso-di-n-propylamine	330
N-nitrosodiphenylamine	330
Naphthalene	330
Nitrobenzene	330
Pentachlorophenol	1700
Phenanthrene	330
Phenol	330
Pyrene	330
CLP SOW - Pesticides and PCBs	
Aldrin	8.0
Alpha-BHC	8.0
Beta-BHC	8.0
Delta-BHC	8.0
Gamma-BHC	8.0
Alpha Chlordane	80
Gamma Chlordane	80
4,4'-DDD	16.0
4,4'-DDE	16.0
4,4'-DDT	16.0
Dieldrin	16.0
Endosulfan I	8.0
Endosulfan II	16.0
Endosulfan Sulfate	16.0
Endrin Ketone	16.0
Endrin	16.0
Heptachlor	8.0
Heptachlor epoxide	8.0
Methoxychlor	80
Toxaphene	160
PCB-1016	80
PCB-1221	80
PCB-1232	80
PCB-1242	80
PCB-1248	80
PCB-1254	160
PCB-1260	160

TABLE 1.A--CONTINUED

1991 TARGET COMPOUNDS AND ANALYTICAL DETECTION LIMITS(1)
VOLK FIELD ANGB, WI

	Practical Quantitation Limit Sediment Samples (μg/kg)
INORGANICS	
E415.1 - Total Organic Carbon	50,000
Antimony (SW6010)	5,000
Arsenic (SW7060)	1,000
Beryllium (SW6010)	500
Cadmium (SW6010)	500
Chromium (SW6010)	1,000
Copper (SW6010)	2,500
Lead (SW7421)	500
Mercury (SW7471)	10
Nickel (SW6010)	4,000
Selenium (SW7740)	1,000
Silver (SW6010)	1,000
Thallium (SW7841)	1,000
Zinc (SW6010)	2,000

1 Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always have been achievable.

TABLE 1.A (CONTINUED)
1991 TARGET COMPOUNDS AND ANALYTICAL DETECTION LIMITS[1]
VOLK FIELD ANGB, WI

	Practical Quantitation Limit Liquid Samples ($\mu g/L$)
SW8020 - Purgeable Aromatic Hydrocarbons	
Benzene	1.0
Chlorobenzene	1.0
1,2-Dichlorobenzene	1.0
1,3-Dichlorobenzene	1.0
1,4-Dichlorobenzene	1.0
Ethyl Benzene	1.0
Toluene	1.0
Xylenes (o, m, p isomers)	1.0
Modified SW8015 - Hydrocarbons	
Hydrocarbons as Gasoline	100
Modified SW8100 - Hydrocarbons	
Hydrocarbons as Kerosene	500
Hydrocarbons as Diesel Fuel	500
Hydrocarbons as Heavy Oils	500
Hydrocarbons as Mineral Spirits	500
Hydrocarbons as Varsol	500
Hydrocarbons as Fuel Oil	500

TABLE A.1
SITE 2, FORMER LANDFILL C
SUMMARY OF SEDIMENT SAMPLE RESULTS, 1991
VOLK FIELD ANGB, WI

Parameters	VF2-SD1	VF2-SD2	VF2-SD3	VF2-SD4
Date Sampled	07/10/91	07/10/91	07/10/91	07/10/91
Semivolatile Organics - CLP SOW(ug/kg)				
DETECTION LEVEL MULTIPLIER	6.06	4.85	4.55	4.85
General	U	U	U	U
Anthracene	U	UJ2	U	U
Benzo(a)Anthracene	UJ2	UJ2	UJ2	UJ2
Benzo(B)fluoranthene	UJ2	UJ2	UJ2	UJ2
Benzo(k)fluoranthene	UJ2	UJ2	UJ2	UJ2
Benzo(a)pyrene	UJ2	UJ2	UJ2	UJ2
Benzo(g,h,i)perylene	UJ2	UJ2	UJ2	UJ2
Benzoic Acid	U	2100J	U	U
Bis(2-ethylhexyl)phthalate	UJ2	UJ2	UJ2	UJ2
4-Bromophenyl-phenyl-ether	U	UJ2	U	U
Butylbenzylphthalate	UJ2	UJ2	UJ2	UJ2
Chrysene	UJ2	UJ2	UJ2	UJ2
Dibenzo(a,h)anthracene	UJ2	UJ2	UJ2	UJ2
Di-n-butylphthalate	U	UJ2	U	U
Di-n-octylphthalate	UJ2	UJ2	UJ2	UJ2
4,6-Dinitro-2-methylphenol	U	UJ2	U	U
3,3'-Dichlorobenzidine	UJ2	UJ2	UJ2	UJ2
Fluoranthene	U	UJ2	U	U
Hexachlorobenzene	U	UJ2	U	U
Indeno(1,2,3-cd)pyrene	UJ2	UJ2	UJ2	UJ2
N-nitrosodiphenylamine	U	UJ2	U	U
3-Nitroaniline	UJ2	U	UJ2	UJ2
4-Nitroaniline	UJ2	U	UJ2	UJ2
4-Nitrophenol	UJ2	U	UJ2	UJ2
Phenanthrene	U	UJ2	U	U
Pentachlorophenol	U	UJ2	U	U
Pyrene	UJ2	UJ2	UJ2	UJ2
Organochlorine Pesticides & PCB's - CLP SOW(ug/kg)				
DETECTION LEVEL MULTIPLIER	31.1	10.0	9.3	9.4
General	U	U	U	U
ICP Metals - SW6010(mg/kg)				
General	U	U	U	U
Cadmium	5.4	2.4U	3.0	2.2U
Chromium	12	7.7	7.3	4.4
Copper	24	21	24	19
Zinc	1000	32	110	77
Thallium - SW7841(mg/kg)	6.0UJ4	4.8UJ4	4.3UJ4	4.5UJ4
Arsenic - SW7060(mg/kg)	15.9	8.1	6.0	4.5UJ4
Mercury - SW7471(mg/kg)	0.24	0.16	0.24	0.23
Selenium - SW7740(mg/kg)	3.0UJ4	2.4UJ4	2.1UJ4	2.2UJ4
Lead - SW7421(mg/kg)	72.5	13.7	58.7	19.8

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Atlanta, GA 30329

Project: AT077 Volk Field ANGB
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE SAMPLED
34553-1	VF2-SD2-ES	07-10-91
34553-2	VF2-SD1-ES	07-10-91
34553-3	VF2-SD4-ES	07-10-91
34553-4	VF2-SD3-ES	07-10-91

PARAMETER	34553-1	34553-2	34553-3	34553-4
TCL Pesticides				
alpha-BHC, ug/kg dw	80U	250U	73U	76U
beta-BHC, ug/kg dw	80U	250U	73U	76U
delta-BHC, ug/kg dw	80U	250U	73U	76U
gamma-BHC, ug/kg dw	80U	250U	73U	76U
Heptachlor, ug/kg dw	80U	250U	73U	76U
Aldrin, ug/kg dw	80U	250U	73U	76U
Heptachlor epoxide, ug/kg dw	80U	250U	73U	76U
Endosulfan I, ug/kg dw	80U	250U	73U	76U
Dieldrin, ug/kg dw	160U	500U	150U	150U
4,4'-DDE, ug/kg dw	160U	500U	150U	150U
Endrin, ug/kg dw	160U	500U	150U	150U
Endosulfan II, ug/kg dw	160U	500U	150U	150U
4,4'-DDD, ug/kg dw	160U	500U	150U	150U
Endosulfan sulfate, ug/kg dw	160U	500U	150U	150U
4,4'-DDT, ug/kg dw	160U	500U	150U	150U
Endrin ketone, ug/kg dw	160U	500U	150U	150U
Methoxychlor, ug/kg dw	800U	2500U	730U	760U
alpha-Chlordane, ug/kg dw	800U	2500U	730U	760U
gamma-Chlordane, ug/kg dw	800U	2500U	730U	760U
Toxaphene, ug/kg dw	1600U	5000U	1500U	1500U
Aroclor-1016, ug/kg dw	800U	2500U	730U	760U
Aroclor-1221, ug/kg dw	800U	2500U	730U	760U

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34553-2	VF2-SD1-ES	07-10-91
34553-3	VF2-SD4-ES	07-10-91
34553-4	VF2-SD3-ES	07-10-91

PARAMETER	34553-1	34553-2	34553-3	34553-4
Aroclor-1232, ug/kg dw	800U	2500U	730U	760U
Aroclor-1242, ug/kg dw	800U	2500U	730U	760U
Aroclor-1248, ug/kg dw	800U	2500U	730U	760U
Aroclor-1254, ug/kg dw	1600U	5000U	1500U	1500U
Aroclor-1260, ug/kg dw	1600U	5000U	1500U	1500U
Date Extracted	07.17.91	07.17.91	07.17.91	07.17.91
Date Analyzed	08.13.91	08.13.91	08.13.91	08.13.91

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34553-2	VF2-SD1-ES	07-10-91
34553-3	VF2-SD4-ES	07-10-91
34553-4	VF2-SD3-ES	07-10-91

PARAMETER	34553-1	34553-2	34553-3	34553-4
TCL Semivolatiles (8270)				
Phenol, ug/kg dw	1600U	2000U	1500U	1600U
bis(2-Chloroethyl) ether, ug/kg dw	1600U	2000U	1500U	1600U
2-Chlorophenol, ug/kg dw	1600U	2000U	1500U	1600U
1,3-Dichlorobenzene, ug/kg dw	1600U	2000U	1500U	1600U
1,4-Dichlorobenzene, ug/kg dw	1600U	2000U	1500U	1600U
Benzyl alcohol, ug/kg dw	1600U	2000U	1500U	1600U
1,2-Dichlorobenzene, ug/kg dw	1600U	2000U	1500U	1600U
2-Methylphenol (o-cresol), ug/kg dw	1600U	2000U	1500U	1600U
Bis(2-chloroisopropyl)ether, ug/kg dw	1600U	2000U	1500U	1600U
4-Methylphenol (p-cresol), ug/kg dw	1600U	2000U	1500U	1600U
N-Nitroso-di-n-propylamine, ug/kg dw	1600U	2000U	1500U	1600U
Hexachloroethane, ug/kg dw	1600U	2000U	1500U	1600U
Nitrobenzene, ug/kg dw	1600U	2000U	1500U	1600U
Isophorone, ug/kg dw	1600U	2000U	1500U	1600U
2-Nitrophenol, ug/kg dw	1600U	2000U	1500U	1600U
2,4-Dimethylphenol, ug/kg dw	1600U	2000U	1500U	1600U
Benzoic acid, ug/kg dw	2100J	10000U	7500U	7800U
bis(2-Chloroethoxy) methane, ug/kg dw	1600U	2000U	1500U	1600U
2,4-Dichlorophenol, ug/kg dw	1600U	2000U	1500U	1600U
1,2,4-Trichlorobenzene, ug/kg dw	1600U	2000U	1500U	1600U
Naphthalene, ug/kg dw	1600U	2000U	1500U	1600U
4-Chloroaniline, ug/kg dw	1600U	2000U	1500U	1600U

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34553-2	VF2-SD1-ES	07-10-91
34553-3	VF2-SD4-ES	07-10-91
34553-4	VF2-SD3-ES	07-10-91

PARAMETER	34553-1	34553-2	34553-3	34553-4
Hexachlorobutadiene, ug/kg dw	1600U	2000U	1500U	1600U
4-Chloro-3-methylphenol, ug/kg dw	1600U	2000U	1500U	1600U
2-Methylnaphthalene, ug/kg dw	1600U	2000U	1500U	1600U
Hexachlorocyclopentadiene, ug/kg dw	1600U	2000U	1500U	1600U
2,4,6-Trichlorophenol, ug/kg dw	1600U	2000U	1500U	1600U
2,4,5-Trichlorophenol, ug/kg dw	8200U	10000U	7500U	7800U
2-Chloronaphthalene, ug/kg dw	1600U	2000U	1500U	1600U
2-Nitroaniline, ug/kg dw	8200U	10000U	7500U	7800U
Dimethylphthalate, ug/kg dw	1600U	2000U	1500U	1600U
Acenaphthylene, ug/kg dw	1600U	2000U	1500U	1600U
3-Nitroaniline, ug/kg dw	8200U	10000U J2	7500U J2	7800U J2
Acenaphthene, ug/kg dw	1600U	2000U	1500U	1600U
2,4-Dinitrophenol, ug/kg dw	8200U	10000U	7500U	7800U
4-Nitrophenol, ug/kg dw	8200U	10000U J2	7500U J2	7800U J2
Dibenzofuran, ug/kg dw	1600U	2000U	1500U	1600U
2,4-Dinitrotoluene, ug/kg dw	1600U	2000U	1500U	1600U
2,6-Dinitrotoluene, ug/kg dw	1600U	2000U	1500U	1600U
Diethylphthalate, ug/kg dw	1600U	2000U	1500U	1600U
4-Chlorophenyl-phenyl ether, ug/kg dw	1600U	2000U	1500U	1600U
Fluorene, ug/kg dw	1600U	2000U	1500U	1600U
4-Nitroaniline, ug/kg dw	8200U	10000U J2	7500U J2	7800U J2
4,6-Dinitro-2-methylphenol, ug/kg dw	8200U J2	10000U	7500U	7800U
N-Nitrosodiphenylamine/Diphenylamine, ug/kg dw	1600U J2	2000U	1500U	1600U

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REPORT OF RESULTS

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34553-2	VF2-SD1-ES	07-10-91
34553-3	VF2-SD4-ES	07-10-91
34553-4	VF2-SD3-ES	07-10-91

PARAMETER	34553-1	34553-2	34553-3	34553-4
4-Bromophenyl-phenyl-ether, ug/kg dw	16000U J2	20000U	15000U	16000U
Hexachlorobenzene, ug/kg dw	16000U J2	20000U	15000U	16000U
Pentachlorophenol, ug/kg dw	82000U J2	100000U	75000U	78000U
Phenanthrene, ug/kg dw	16000U J2	20000U	15000U	16000U
Anthracene, ug/kg dw	16000U J2	20000U	15000U	16000U
Di-n-butylphthalate, ug/kg dw	16000U J2	20000U	15000U	16000U
Fluoranthene, ug/kg dw	16000U J2	20000U	15000U	16000U
Pyrene, ug/kg dw	16000U J2	20000U J2	15000U J2	16000U J2
Butylbenzylphthalate, ug/kg dw	16000U J2	20000U J2	15000U J2	16000U J2
3,3'-Dichlorobenzidine, ug/kg dw	33000U J2	41000U J2	30000U J2	78000U J2
Benzo(a)anthracene, ug/kg dw	16000U J2	20000U J2	15000U J2	16000U J2
bis(2-Ethylhexyl) phthalate, ug/kg dw	16000U J2	20000U J2	15000U J2	16000U J2
Chrysene, ug/kg dw	16000U J2	20000U J2	15000U J2	16000U J2
Di-n-octylphthalate, ug/kg dw	16000U J2	20000U J2	15000U J2	16000U J2
Benzo(b)fluoranthene, ug/kg dw	16000U J2	20000U J2	15000U J2	16000U J2
Benzo(k)fluoranthene, ug/kg dw	16000U J2	20000U J2	15000U J2	16000U J2
Benzo(a)pyrene, ug/kg dw	16000U J2	20000U J2	15000U J2	16000U J2
Indeno (1,2,3-cd)pyrene, ug/kg dw	16000U J2	20000U J2	15000U J2	16000U J2
Dibenzo(a,h)anthracene, ug/kg dw	16000U J2	20000U J2	15000U J2	16000U J2
Benzo(g,h,i)perylene, ug/kg dw	16000U J2	20000U J2	15000U J2	16000U J2
Date Extracted	07.16.91	07.16.91	07.16.91	07.16.91
Date Analyzed	07.19.91	07.19.91	07.19.91	07.19.91

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34553-2	VF2-SD1-ES	07-10-91
34553-3	VF2-SD4-ES	07-10-91
34553-4	VF2-SD3-ES	07-10-91

PARAMETER	34553-1	34553-2	34553-3	34553-4
ICP Metals (6010)				
Antimony, mg/kg dw	24U	29U	22U	22U
Beryllium, mg/kg dw	2.4U	2.9U	2.2U	2.2U
Cadmium, mg/kg dw	2.4U	5.4	3.0	2.2U
Chromium, mg/kg dw	7.7	12	7.3	4.4
Copper, mg/kg dw	21	24	24	19
Nickel, mg/kg dw	19U	23U	17U	17U
Silver, mg/kg dw	4.9U	5.8U	4.3U	4.3U
Zinc, mg/kg dw	32	1000	110	77
Date Analyzed	08.01.91	08.01.91	08.01.91	08.01.91
Thallium (7841)				
Thallium, mg/kg dw	4.8U~~W~~ J4	6.0U~~W~~ J4	4.3U~~W~~ J4	4.5U~~W~~ J4
Date Analyzed	07.22.91	07.22.91	07.22.91	07.22.91
Arsenic (7060)				
Arsenic, mg/kg dw	8.1	15.9	6.0	4.5U~~W~~ J4
Date Analyzed	07.26.91	07.26.91	07.26.91	07.26.91
Mercury (7470/7471)				
Mercury , mg/kg dw	0.16	0.24	0.24	0.23
Date Analyzed	08.07.91	08.07.91	08.07.91	08.07.91
Selenium (7740)				
Selenium, mg/kg dw	2.4U~~W~~ J4	3.0U~~WN~~ J4	2.1U~~WN~~ J4	2.2U~~WN~~ J4
Date Analyzed	07.26.91	07.26.91	07.26.91	07.26.91
Lead (7421)				
Lead, mg/kg dw	13.7	72.5	58.7	19.8
Date Analyzed	07.22.91	07.22.91	07.22.91	07.22.91

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34553-1	VF2-SD2-ES	07-10-91
34553-2	VF2-SD1-ES	07-10-91
34553-3	VF2-SD4-ES	07-10-91
34553-4	VF2-SD3-ES	07-10-91

PARAMETER	34553-1	34553-2	34553-3	34553-4
Total Organic Carbon (415.1)				
Total Organic Carbon , mg/kg dw	410000	410000	380000	210000
Date Analyzed	07.23.91	07.23.91	07.23.91	07.23.91
Percent Solids, %	20	16	22	21

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LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID
34553-5	Method Blank/Prep Blank
34553-6	Matrix Spike/MSD Added
34553-7	Sample Concentration
34553-8	MS Concentration
34553-9	MS % Recovery

PARAMETER	34553-5	34553-6	34553-7	34553-8	34553-9
TCL Pesticides					
alpha-BHC, ug/kg dw	8.0U	---	---	---	---
beta-BHC, ug/kg dw	8.0U	---	---	---	---
delta-BHC, ug/kg dw	8.0U	---	---	---	---
gamma-BHC, ug/kg dw	8.0U	33.3	80U	20.2	61 %
Heptachlor, ug/kg dw	8.0U	33.3	80U	20.2	61 %
Aldrin, ug/kg dw	8.0U	33.3	80U	23.7	71 %
Heptachlor epoxide, ug/kg dw	8.0U	---	---	---	---
Endosulfan I, ug/kg dw	8.0U	---	---	---	---
Dieldrin, ug/kg dw	16U	83.3	160U	59.7	72 %
4,4'-DDE, ug/kg dw	16U	---	---	---	---
Endrin, ug/kg dw	16U	83.3	160U	47.6	57 %
Endosulfan II, ug/kg dw	16U	---	---	---	---
4,4'-DDD, ug/kg dw	16U	---	---	---	---
Endosulfan sulfate, ug/kg dw	16U	---	---	---	---
4,4'-DDT, ug/kg dw	16U	83.3	160U	54.9	66 %
Endrin ketone, ug/kg dw	16U	---	---	---	---
Methoxychlor, ug/kg dw	80U	---	---	---	---
alpha-Chlordane, ug/kg dw	80U	---	---	---	---
gamma-Chlordane, ug/kg dw	80U	---	---	---	---
Toxaphene, ug/kg dw	160U	---	---	---	---
Aroclor-1016, ug/kg dw	80U	---	---	---	---

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Project: AT077 Volk Field ANGB
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID
34553-5	Method Blank/Prep Blank
34553-6	Matrix Spike/MSD Added
34553-7	Sample Concentration
34553-8	MS Concentration
34553-9	MS % Recovery

PARAMETER	34553-5	34553-6	34553-7	34553-8	34553-9
Aroclor-1221, ug/kg dw	80U	---	---	---	---
Aroclor-1232, ug/kg dw	80U	---	---	---	---
Aroclor-1242, ug/kg dw	80U	---	---	---	---
Aroclor-1248, ug/kg dw	80U	---	---	---	---
Aroclor-1254, ug/kg dw	160U	---	---	---	---
Aroclor-1260, ug/kg dw	160U	---	---	---	---
Date Extracted	07.17.91	---	07.17.91	07.17.91	---
Date Analyzed	08.13.91	---	08.13.91	08.13.91	---

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34553-5	Method Blank/Prep Blank
34553-6	Matrix Spike/MSD Added
34553-7	Sample Concentration
34553-8	MS Concentration
34553-9	MS % Recovery

PARAMETER	34553-5	34553-6	34553-7	34553-8	34553-9
TCL Semivolatiles (8270)					
Phenol, ug/kg dw	330U	16340/**	1600U	13110	80 %
bis(2-Chloroethyl) ether, ug/kg dw	330U	---	---	---	---
2-Chlorophenol, ug/kg dw	330U	16340/**	1600U	12750	78 %
1,3-Dichlorobenzene, ug/kg dw	330U	---	---	---	---
1,4-Dichlorobenzene, ug/kg dw	330U	8170/8140	1600U	6120	75 %
Benzyl alcohol, ug/kg dw	330U	---	---	---	---
1,2-Dichlorobenzene, ug/kg dw	330U	---	---	---	---
2-Methylphenol (o-cresol), ug/kg dw	330U	---	---	---	---
Bis(2-chloroisopropyl)ether, ug/kg dw	330U	---	---	---	---
4-Methylphenol (p-cresol), ug/kg dw	330U	---	---	---	---
N-Nitroso-di-n-propylamine, ug/kg dw	330U	8170/8140	1600U	6540	80 %
Hexachloroethane, ug/kg dw	330U	---	---	---	---
Nitrobenzene, ug/kg dw	330U	---	---	---	---
Isophorone, ug/kg dw	330U	---	---	---	---
2-Nitrophenol, ug/kg dw	330U	---	---	---	---
2,4-Dimethylphenol, ug/kg dw	330U	---	---	---	---
Benzoic acid, ug/kg dw	1700U	---	---	---	---

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REPORT OF RESULTS

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34553-5	Method Blank/Prep Blank
34553-6	Matrix Spike/MSD Added
34553-7	Sample Concentration
34553-8	MS Concentration
34553-9	MS % Recovery

PARAMETER	34553-5	34553-6	34553-7	34553-8	34553-9
bis(2-Chloroethoxy) methane, ug/kg dw	330U	---	---	---	---
2,4-Dichlorophenol, ug/kg dw	330U	---	---	---	---
1,2,4-Trichlorobenzene, ug/kg dw	330U	8170/8140	1600U	6602	81 %
Naphthalene, ug/kg dw	330U	---	---	---	---
4-Chloroaniline, ug/kg dw	330U	---	---	---	---
Hexachlorobutadiene, ug/kg dw	330U	---	---	---	---
4-Chloro-3-methylphenol, ug/kg dw	330U	16340/**	1600U	12540	77 %
2-Methylnaphthalene, ug/kg dw	330U	---	---	---	---
Hexachlorocyclopentadiene, ug/kg dw	330U	---	---	---	---
2,4,6-Trichlorophenol, ug/kg dw	330U	---	---	---	---
2,4,5-Trichlorophenol, ug/kg dw	1700U	---	---	---	---
2-Chloronaphthalene, ug/kg dw	330U	---	---	---	---
2-Nitroaniline, ug/kg dw	1700U	---	---	---	---
Dimethylphthalate, ug/kg dw	330U	---	---	---	---
Acenaphthylene, ug/kg dw	330U	---	---	---	---
3-Nitroaniline, ug/kg dw	1700U	---	---	---	---
Acenaphthene, ug/kg dw	330U	8170/8140	1600U	7650	94 %
2,4-Dinitrophenol, ug/kg dw	1700U	---	---	---	---
4-Nitrophenol, ug/kg dw	1700U	16340/**	8200U	7940	49 %
Dibenzofuran, ug/kg dw	330U	---	---	---	---

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34553-5	Method Blank/Prep Blank
34553-6	Matrix Spike/MSD Added
34553-7	Sample Concentration
34553-8	MS Concentration
34553-9	MS % Recovery

PARAMETER	34553-5	34553-6	34553-7	34553-8	34553-9
2,4-Dinitrotoluene, ug/kg dw	3300U	8170/8140	1600U	5170	63 %
2,6-Dinitrotoluene, ug/kg dw	3300U	---	---	---	---
Diethylphthalate, ug/kg dw	3300U	---	---	---	---
4-Chlorophenyl-phenyl ether, ug/kg dw	3300U	---	---	---	---
Fluorene, ug/kg dw	3300U	---	---	---	---
4-Nitroaniline, ug/kg dw	17000U	---	---	---	---
4,6-Dinitro-2-methylphenol, ug/kg dw	17000U	---	---	---	---
N-Nitrosodiphenylamine/Diphenylamine, ug/kg dw	3300U	---	---	---	---
4-Bromophenyl-phenyl-ether, ug/kg dw	3300U	---	---	---	---
Hexachlorobenzene, ug/kg dw	3300U	---	---	---	---
Pentachlorophenol, ug/kg dw	17000U	16340/**	8200U	5770	35 %
Phenanthrene, ug/kg dw	3300U	---	---	---	---
Anthracene, ug/kg dw	3300U	---	---	---	---
Di-n-butylphthalate, ug/kg dw	3300U	---	---	---	---
Fluoranthene, ug/kg dw	3300U	---	---	---	---
Pyrene, ug/kg dw	3300U	8170/8140	1600U	11750	144 %
Butylbenzylphthalate, ug/kg dw	3300U	---	---	---	---
3,3'-Dichlorobenzidine, ug/kg dw	6700U	---	---	---	---

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34553-6	Matrix Spike/MSD Added
34553-7	Sample Concentration
34553-8	MS Concentration
34553-9	MS % Recovery

PARAMETER	34553-5	34553-6	34553-7	34553-8	34553-9
Benzo(a)anthracene, ug/kg dw	3300	---	---	---	---
bis(2-Ethylhexyl) phthalate, ug/kg dw	3300	---	---	---	---
Chrysene, ug/kg dw	3300	---	---	---	---
Di-n-octylphthalate, ug/kg dw	3300	---	---	---	---
Benzo(b)fluoranthene, ug/kg dw	3300	---	---	---	---
Benzo(k)fluoranthene, ug/kg dw	3300	---	---	---	---
Benzo(a)pyrene, ug/kg dw	3300	---	---	---	---
Indeno (1,2,3-cd)pyrene, ug/kg dw	3300	---	---	---	---
Dibenzo(a,h)anthracene, ug/kg dw	3300	---	---	---	---
Benzo(g,h,i)perylene, ug/kg dw	3300	---	---	---	---
Date Extracted	07.16.91	---	07.16.91	07.16.91	---
Date Analyzed	07.19.91	---	07.19.91	07.19.91	---
ICP Metals (6010)					
Antimony, mg/kg dw	5.0U	240/---	24U	200	83 %
Beryllium, mg/kg dw	0.500U	24/---	2.4U	22	92 %
Cadmium, mg/kg dw	0.500U	24/---	2.4U	27	113 %
Chromium, mg/kg dw	1.0U	95/---	7.7	103	100 %
Copper, mg/kg dw	2.5U	120/---	21	139	98 %
Nickel, mg/kg dw	4.0U	240/---	19U	250	104 %
Silver, mg/kg dw	1.0U	24/---	4.9U	24	100 %
Zinc, mg/kg dw	2.0U	240/---	32	264	97 %
Date Analyzed	08.01.91	---	08.01.91	08.01.91	---

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REPORT OF RESULTS

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34553-5	Method Blank/Prep Blank
34553-6	Matrix Spike/MSD Added
34553-7	Sample Concentration
34553-8	MS Concentration
34553-9	MS % Recovery

PARAMETER	34553-5	34553-6	34553-7	34553-8	34553-9
Thallium (7841)					
Thallium, mg/kg dw	1.0U	24.0	4.8U	21.1	88 %
Date Analyzed	07.22.91	---	07.22.91	07.22.91	---
Arsenic (7060)					
Arsenic, mg/kg dw	1.0U	19.2	8.1	25.7	92 %
Date Analyzed	07.26.91	---	07.26.91	07.26.91	---
Mercury (7470/7471)					
Mercury , mg/kg dw	0.010U	0.24	0.23	0.44	88 %
Date Analyzed	08.07.91	---	08.07.91	08.07.91	---
Selenium (7740)					
Selenium, mg/kg dw	1.0U	4.8	2.4U	6.7	140 %
Date Analyzed	07.26.91	---	07.26.91	07.26.91	---
Lead (7421)					
Lead, mg/kg dw	0.50U	9.6	13.7	23.3	100 %
Date Analyzed	07.22.91	---	07.22.91	07.22.91	---
Total Organic Carbon (415.1)					
Total Organic Carbon , mg/kg dw	50U	---	---	---	---
Date Analyzed	07.23.91	---	---	---	---

** = 16290

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID
34553-10	MSD Concentration
34553-11	MSD % Recovery
34553-12	Recovery Limit
34553-13	% RPD
34553-14	% RPD Limit

PARAMETER	34553-10	34553-11	34553-12	34553-13	34553-14
TCL Pesticides					
gamma-BHC, ug/kg dw	22.1	66 %	46-127 %	7.8 %	<50 %
Heptachlor, ug/kg dw	22.8	68 %	35-130 %	13 %	<31 %
Aldrin, ug/kg dw	25.5	77 %	34-132 %	8.1 %	<43 %
Dieldrin, ug/kg dw	65.2	78 %	31-134 %	8.0 %	<38 %
Endrin, ug/kg dw	53.7	64 %	42-139 %	11 %	<45 %
4,4'-DDT, ug/kg dw	58.9	71 %	23-134 %	7.3 %	<50 %
TCL Semivolatiles (8270)					
Phenol, ug/kg dw	12520	77 %	26-90 %	3.8 %	<35 %
2-Chlorophenol, ug/kg dw	12290	75 %	25-102 %	3.9 %	<50 %
1,4-Dichlorobenzene, ug/kg dw	6501	80 %	28-104 %	6.5 %	<27 %
N-Nitroso-di-n-propylamine, ug/kg dw	6550	80 %	41-126 %	0 %	<38 %
1,2,4-Trichlorobenzene, ug/kg dw	6590	81 %	38-107 %	0 %	<23 %
4-Chloro-3-methylphenol, ug/kg dw	12020	74 %	26-103 %	4.0 %	<33 %
Acenaphthene, ug/kg dw	7365	90 %	31-137 %	4.3 %	<19 %
4-Nitrophenol, ug/kg dw	6595	40 %	11-114 %	20 %	<36 %
2,4-Dinitrotoluene, ug/kg dw	4720	58 %	28-89 %	8.3 %	<47 %
Pentachlorophenol, ug/kg dw	4390	27 %	17-109 %	26 %	<47 %
Pyrene, ug/kg dw	13780	169 %	35-142 %	16 %	<36 %

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34553-10	MSD Concentration
34553-11	MSD % Recovery
34553-12	Recovery Limit
34553-13	% RPD
34553-14	% RPD Limit

PARAMETER	34553-10	34553-11	34553-12	34553-13	34553-14
ICP Metals (6010)					
Antimony, mg/kg dw	---	---	75-125 %	---	<20 %
Beryllium, mg/kg dw	---	---	75-125 %	---	<20 %
Cadmium, mg/kg dw	---	---	75-125 %	---	<20 %
Chromium, mg/kg dw	---	---	75-125 %	---	<20 %
Copper, mg/kg dw	---	---	75-125 %	---	<20 %
Nickel, mg/kg dw	---	---	75-125 %	---	<20 %
Silver, mg/kg dw	---	---	75-125 %	---	<20 %
Zinc, mg/kg dw	---	---	75-125 %	---	<20 %
Thallium (7841)					
Thallium, mg/kg dw	---	---	75-125 %	---	<20 %
Arsenic (7060)					
Arsenic, mg/kg dw	---	---	75-125 %	---	<20 %
Mercury (7470/7471)					
Mercury , mg/kg dw	0.46	96 %	75-125 %	8.7 %	<30 %
Date Analyzed	08.07.91	---	---	---	---
Selenium (7740)					
Selenium, mg/kg dw	---	---	75-125 %	---	<20 %
Lead (7421)					
Lead, mg/kg dw	---	---	75-125 %	---	<20 %
Total Organic Carbon (415.1)					
Total Organic Carbon , mg/kg dw	---	---	---	---	---

** = 16290

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
34553-15	VF1-WW6-W2X-ES	07-09-91

PARAMETER	34553-15
Hydrocarbons (Modified 8015)	
Hydrocarbons as Gasoline, mg/l	150000
Purgeable Aromatics (602/8020)	
Benzene, ug/l	480000*F68
Chlorobenzene, ug/l	<100000
1,2-Dichlorobenzene, ug/l	<100000
1,3-Dichlorobenzene, ug/l	<100000
1,4-Dichlorobenzene, ug/l	<100000
Ethylbenzene, ug/l	1900000
Toluene, ug/l	8300000
Xylenes, ug/l	5100000
Hydrocarbons (Modified 8100)	
Hydrocarbons as Kerosene, mg/l	980000
Hydrocarbons as Diesel Fuel, mg/l	30000U
Hydrocarbons as Heavy Oils, mg/l	30000U
Hydrocarbons as Mineral Spirits, mg/l	30000U
Hydrocarbons as Varsol, mg/l	30000U
Hydrocarbons as Fuel Oil, mg/l	30000U

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
34553-16	VF1-WW1-W2X-ES	07-09-91

PARAMETER	34553-16
Hydrocarbons (Modified 8015)	
Hydrocarbons as Gasoline, mg/l	430
Purgeable Aromatics (602/8020)	
Benzene, ug/l	5000U
Chlorobenzene, ug/l	5000U
1,2-Dichlorobenzene, ug/l	5000U
1,3-Dichlorobenzene, ug/l	5000U
1,4-Dichlorobenzene, ug/l	5000U
Ethylbenzene, ug/l	5000U
Toluene, ug/l	18000
Xylenes, ug/l	22000
Hydrocarbons (Modified 8100)	
Hydrocarbons as Kerosene, mg/l	61000
Hydrocarbons as Diesel Fuel, mg/l	500U
Hydrocarbons as Heavy Oils, mg/l	500U
Hydrocarbons as Mineral Spirits, mg/l	500U
Hydrocarbons as Varsol, mg/l	500U
Hydrocarbons as Fuel Oil, mg/l	500U

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
34553-17	Method Blank/Prep Blank - Liquid
34553-18	Matrix Spike/MSD Added - Liquid
34553-19	Sample Concentration - Liquid
34553-20	MS Concentration - Liquid
34553-21	MS % Recovery - Liquid

PARAMETER	34553-17	34553-18	34553-19	34553-20	34553-21
Hydrocarbons (Modified 8015)					
Hydrocarbons as Gasoline, mg/l	0.100	---	---	---	---
Purgeable Aromatics (602/8020)					
Benzene, ug/l	1.0U	10	1.0U	10.4*	104 %*
Chlorobenzene, ug/l	1.0U	10	1.0U	7.5*	75 %*
1,2-Dichlorobenzene, ug/l	1.0U	---	---	---	---
1,3-Dichlorobenzene, ug/l	1.0U	---	---	---	---
1,4-Dichlorobenzene, ug/l	1.0U	---	---	---	---
Ethylbenzene, ug/l	1.0U	---	---	---	---
Toluene, ug/l	1.0U	10	1.0U	11.4*	114 %*
Xylenes, ug/l	1.0U	---	---	---	---
Hydrocarbons (Modified 8100)					
Hydrocarbons as Kerosene, mg/l	0.50U	---	---	---	---
Hydrocarbons as Diesel Fuel, mg/l	0.50U	10	0.50U	0.62*	62 %*
Hydrocarbons as Heavy Oils, mg/l	0.50U	---	---	---	---
Hydrocarbons as Mineral Spirits, mg/l	0.50U	---	---	---	---
Hydrocarbons as Varsol, mg/l	0.50U	---	---	---	---
Hydrocarbons as Fuel Oil, mg/l	0.50U	---	---	---	---

Methods: EPA SW-846 & CLP-SOW
* Due to the abundance of target and non-target compounds lab control sample data has been reported in lieu of matrix spike data.
** = 16290 ug/kg dw.
F68 - Reported value is estimated because of matrix interference.

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
34553-22	MSD Concentration - Liquid
34553-23	MSD % Recovery - Liquid
34553-24	Recovery Limit - Liquid
34553-25	% RPD - Liquid
34553-26	% RPD Limit - Liquid

PARAMETER	34553-22	34553-23	34553-24	34553-25	34553-26
Hydrocarbons (Modified 8015)					
Hydrocarbons as Gasoline, mg/l	---	---	---	---	---
Purgeable Aromatics (602/8020)					
Benzene, ug/l	10.2*	102 %*	75-125 %	1.9 %	<30 %
Chlorobenzene, ug/l	8.6*	86 %*	56-144 %	14 %	<30 %
Toluene, ug/l	11.1*	111 %*	70-130 %	2.7 %	<30 %
Hydrocarbons (Modified 8100)					
Hydrocarbons as Diesel Fuel, mg/l	0.56	56 %	30-130 %	10 %	<60 %

Methods: EPA SW-846 & CLP-SOW
* Due to the abundance of target and non-target compounds lab control sample data has been reported in lieu of matrix spike data.
** = 16290 ug/kg dw.
F68 - Reported value is estimated because of matrix interference.

Linda A. Wolfe
Linda A. Wolfe

APPENDIX F
TOXICITY PROFILES

APPENDIX F
TOXICITY PROFILES

TABLE OF CONTENTS

APPENDIX F
TOXICITY PROFILES

This section contains toxicity profiles for selected chemicals detected during the 1987/1988 and 1989/1990 investigations at Volk Field ANGB. The profiles were used to support the site risk assessments. The toxicity profiles discuss toxilogical effects on humans, toxicity to the environment, mode of transport and contaminant fate for each compound. The depth of discussion varies with the availability of the information.

1,1-DICHLOROETHANE (1,1-DCA)

1,1-DCA is a halogenated organic compound used commercially for a number of purposes, such as an extractant for heat-sensitive substances, a cleaning solvent, and a fumigant. It is most widely used as an intermediate in the manufacture of 1,1,1-trichloroethane (1,1,1-TCA) and can also be a degradation product of 1,1,1-TCA.

1,1-DCA is highly mobile in the natural soil/groundwater system, and is only sorbed to a limited extent onto soils. The weak tendency to be absorbed is particularly true in soils with a low organic content. Because it is highly volatile, migration occurs by volatilization upward toward the atmosphere. The non-sorbed dissolved fraction also migrates in the groundwater. Biodegradation and transformation in natural systems are probably not significant factors in migration [Arthur D. Little, 1987].

1,1-DCA is a possible human carcinogen (EPA Group C). Very little information is available concerning the non-carcinogenic effects of 1,1-DCA. This compound was used as an anesthetic in the past; however, its use was discontinued because it induced cardiac arrhythmias.

1,3-DICHLOROPROPENE

1,3-Dichloropropene is used as a soil fumigant and nematocide [Sittig, 1985]. Dichloropropene is classified by EPA as a probable human carcinogen (Group B2) based on the observation of benign lung tumors in mice (inhalation exposure) and liver, adrenal, forestomach and thyroid tumors in rats (oral exposure) [EPA, 1990]. Information on the environmental fate was not located.

BENZENE

Benzene is a colorless aromatic hydrocarbon with a characteristic odor. Benzene was widely used in the past as a solvent and as an octane-raising additive in gasoline. Presently, benzene is used primarily in the chemical industry as a starting or intermediate material for the synthesis of many other organic compounds.

Benzene can be mobile in the soil/groundwater system. It is relatively soluble in groundwater and may be transported through sandy soils and soils of low organic content. The amount of benzene sorbed to the soil increases with increasing organic content. Benzene is highly volatile, and volatilization in surficial soils is probably an important transport mechanism. However, sorption of benzene vapors onto soil particles may slow the vapor-phase transport. Hydrolysis is not expected to be an important process for benzene transport. Data on the biodegradation of benzene are inconclusive [Arthur D. Little, 1987]. There is some evidence of gradual biodegradation at low concentrations by aquatic organisms, but the compound is considered fairly resistant to biodegradation. The rate of biodegradation may be enhanced in the presence of other hydrocarbons [Versar, 1979].

Data are not considered sufficient to develop ambient water quality criteria for benzene [EPA, 1986b]. No information is available on the toxicity of benzene to terrestrial wildlife, domestic animals, birds, or plants. Toxic effects in laboratory animals include central nervous system effects, hematological effects, and immune system depression [EPA, 1981].

Benzene is readily absorbed following oral and inhalation exposure [EPA, 1985b]. The toxic effects of benzene in humans following exposure by inhalation is the same as that for laboratory animals. Effects include central nervous system effects, hematological effects, and immune system depression. In humans, acute exposure to high concentrations of benzene vapors has been associated with dizziness, nausea, vomiting, headaches, drowsiness, narcosis, comas, and death [Sittig, 1985]. Chronic exposure to benzene vapors can produce reduced leukocyte, platelet, and red blood cell levels [EPA, 1985b].

Chronic exposure to benzene is known to cause leukemia and bone marrow damage. In addition, the compound is a central nervous system depressant at high concentrations, and may cause acute narcotic reactions [Sittig, 1985]. Benzene is a human carcinogen (EPA Group A).

BIS(2-ETHYLHEXYL)PHTHALATE

Bis(2-ethylhexyl)phthalate, also known as di-ethylhexylphthalate (DEHP), is a common laboratory contaminant. It is used in vacuum pumps. When heated to decomposition, it emits acrid smoke. As a group, phthalate esters are widely distributed in the environment by anthropogenic and perhaps natural sources. They have been found in well and drinking water, oil, soil, air, plants, fish, food, animals, and humans. Phthalate ester contamination in surface water residues has been correlated with drainage from industrial or heavily polluted areas [Versar, 1979].

A variety of organisms can accumulate phthalate esters and they have become concentrated in animal and human tissues and organs. Under aerobic conditions, microbial systems can degrade phthalate esters, but under anaerobic conditions, bis(2-ethylhexyl)phthalate, in particular, ceases to degrade. In determining the environmental fate of phthalate esters, bioaccumulation, biotransformation, and biodegradation are probably the most important processes [Versar, 1979].

Bis(2-ethylhexyl)phthalate is a probable human carcinogen (EPA Group B2). Exposure to DEHP has also been associated with developmental toxicity as well as with adverse effects upon the liver and kidneys in laboratory animals [EPA, 1980]. This compound causes irritation of the eyes and mucous membranes and may cause nausea and diarrhea [Sittig, 1985].

CADMIUM

Cadmium is a transitional metal which occurs widely in nature, generally in association with lead or zinc ores. Elemental cadmium is insoluble in water, but many cadmium compounds are quite soluble. The general population is widely exposed to low levels of cadmium in drinking water, food, and industrial settings.

Cadmium is relatively mobile in the environment compared to most other heavy metals. PH is a major factor influencing mobility. Cadmium is less mobile in alkaline than in acidic waters. Sorption processes affect cadmium less than most other heavy metals. However, the mobility of cadmium can be reduced by sorption onto clays, hydrous iron, aluminum oxides, manganese oxides, and organic materials. Volatilization is not an important process in aqueous environments [Versar, 1979].

In aquatic systems, hardness affects the toxicity of cadmium. Species also exhibit different sensitivities to cadmium. There is no evidence that cadmium is an essential mineral [Eisler, 1985]. Mammals have no effective mechanism for the elimination of ingested cadmium; therefore, the cadmium tends to accumulate in the liver and kidneys. It tends to be very persistent in the kidney and can cause renal tubular damage. Toxic effects include decreased growth rates, anemia, infertility, fetus abnormalities, abortions, kidney disease, intestinal disease, and hypertension [NAS, 1980].

Cadmium compounds, when inhaled, have been associated with pulmonary cancer. The inhalation of cadmium dust or fumes affects the respiratory tract and kidneys [EPA, 1985e]. Exposure to high concentrations may result in pulmonary edema and death. Cadmium is a suspected human carcinogen via inhalation (EPA Group B1) [EPA, 1990].

CHROMIUM

Chromium (Cr) is a transition element. It occurs in nature principally as the trivalent ion Cr^{+3}, although valence states ranging from -2 to +6 have been reported. Cr exists in two oxidation states in aqueous systems: Cr (III) and Cr (VI). The hexavalent form, Cr (VI), is quite soluble. It exists in solution as a complex anion. It is not sorbed to any significant degree by clays or hydrous metal oxides. It is, however, sorbed strongly to activated carbon. Cr (VI) is a moderately strong oxidizing agent and reacts with reducing materials to form trivalent Cr. The trivalent form, Cr (III), reacts with aqueous hydroxide ions to form insoluble chromium hydroxide ($Cr(OH)_3$). Most of the hydroxide form precipitates to the benthic zone in natural waters directly or by sorption [Versar, 1979].

Chromium is bioaccumulated by aquatic organisms, and passage of chromium through the food chain has been demonstrated [Versar, 1979]. Cr has a low inherent toxicity to fish and animals, moderate toxicity to plants, and low potential for biomagnification in the food chain. Cr is an essential trace element for animals and is considered non-essential for plants.

In aquatic systems, plants and polychaete worms appear to be the most sensitive groups tested. The toxicity of Cr (VI) to aquatic species appears to increase as pH and/or hardness decreases. Bioaccumulation has been found to vary among species; concentrations are normally highest at lower trophic levels and lowest with the top predators, indicating that biomagnification does not occur [EPA, 1985a]. Ambient water quality criteria have been established for Cr (VI).

Following oral exposure, absorption of Cr (III) is low while absorption of Cr (VI) is high. Chromium is an essential micronutrient and is not toxic in trace quantities. High levels of soluble Cr (VI) and Cr (III) can produce kidney and liver damage following acute oral exposure; target organs affected by chronic oral exposure remain unidentified. Chronic inhalation exposure may cause respiratory system damage. Further, epidemiological studies of worker populations have clearly established that inhaled Cr (VI) is a human carcinogen (EPA Group A); the respiratory passages and the lungs are the target organs. Inhalation of Cr (III) or ingestion of Cr (VI) or (III) has not been associated with carcinogenicity in humans.

COPPER

Copper is naturally occurring and ubiquitous in the earth's crust. It is found primarily as sulfides and oxides.

Copper is present in foods (<10 - >25000 ug/100 calories) and in finished drinking water (0.61 - 250 ug/l). Copper is approximately 50% absorbed by the gastrointestinal tract. Dermal absorption is negligible. The extent of respiratory absorption is unknown [Carson et al., 1986].

Chronic inhalation exposure to copper may cause "metal fume fever", nasal ulcerations, and mild anemia. Ingestion of copper may cause salivation, nausea, vomiting, hemorrhagic gastritis, diarrhea, and pain. Chronic toxic effects due to copper are rarely seen except for individuals with Wilson's Disease. Wilson's Disease is a genetically determined condition in which the body absorbs and retains abnormally high copper concentrations [Sittig, 1985].

DDT, DDD AND DDE

DDT is a broad-spectrum insecticide. DDD and DDE are degradation products of DDT. The use of DDT has been banned in the United States since December, 1972.

DDT and its metabolites are extremely persistent in the environment. Processes which are chiefly responsible for the fate of DDT, DDD and DDE in the environment include sorption to soils, accumulation in biota, and volatilization from water. These compounds tend to partition into the fat of wildlife and humans due to their high lipophilicity and low water solubility. They are widely and easily dispersed in the environment through erosion, runoff, and volatilization [EPA, 1979, Sittig, 1985].

DDT, DDD and DDE can be taken into the body through oral, dermal and inhalation exposures. Human exposure to DDT occurs primarily through contaminated foods. EPA has estimated that the average DDT intake for a US citizen is 3 mg/year [Sittig, 1985].

DDT and its degradation products have been classified by EPA as probable human carcinogens (Group B2). They are also known to target the central and peripheral nervous systems, liver, kidneys and skin [EPA, 1990, Sittig, 1985].

ETHYLBENZENE

Ethylbenzene is a colorless aromatic liquid. It is used in industry as a resin solvent and in the conversion to a styrene monomer. No empirical studies on the bioaccumulation of ethylbenzene were found. No information on the toxicity of ethylbenzene to terrestrial wildlife or birds was available.

Ethylbenzene is moderately adsorbed to soils but it will leach to groundwater, particularly in soils containing low levels of organic matter. Ethylbenzene will volatilize from surface soils. It is thought that it will biodegrade once microbial populations become acclimated [Howard, 1989].

In humans, short-term inhalation exposure to ethylbenzene can result in sleepiness, fatigue, headaches, mild eye irritation, and respiratory irritation. The liver and kidney appear to be the primary target organ following chronic oral exposure [Sittig, 1985].

LEAD

Elemental lead is heavy, ductile, and bluish-white in color. It is widely used in industry because of its softness, resistance to corrosion and radiation, and high density. Lead is also used in solders, in storage batteries, and as a paint pigment.

The concentration and mobility of lead is controlled primarily by sorption. The tendency for lead to form complexes with naturally-occurring organic materials increases its adsorptive affinity for clays and other mineral surfaces. At low pH values, sorption and precipitation are not nearly as effective in removing lead from solution; therefore, lead has greater mobility in acidic waters than at higher pH values. In alkaline and circumneutral waters, removal of lead by sorption and precipitation may occur relatively quickly. Bioaccumulation may also be an important fate process [Versar, 1979].

Lead is generally considered a highly toxic contaminant because it is not an essential nutrient to either plants or animals. Lead bioaccumulates in animal tissues, but has a low potential for biomagnification in the food chain. The solubility of lead is dependent on water hardness; furthermore, lead is considered 20 to 100 times more toxic in soft water. In aquatic environments, most lead is found in bottom sediments. It is, therefore, a greater concern in benthic organisms than in planktonic or pelagic organisms. Toxicity of lead in water is dependent on pH, organic materials, and the presence/absence of other metals [Versar, 1979, Davies et al., 1976].

The primary mechanism of acute toxicity of lead to freshwater organisms is unknown. Invertebrate species appear more sensitive than vertebrate species [Spehar et al., 1978]. Lead inhibits plant growth, and reduces photosynthesis, mitosis, and water absorption [Eisler, 1988].

Lead is stored in humans in bone, kidneys, and liver. The major adverse effects in humans caused by lead include alterations in the hematopoietic and nervous systems. The toxic effects are generally related to the concentration of this metal in blood. Toxic blood concentration in children and in sensitive adults can cause severe, irreversible brain damage, encephalopathy, and possible death [EPA, 1984a]. Physiological and biochemical effects that occur even at low levels include enzyme inhibition, elevated erythrocyte protoporphyrin, interference with vitamin D metabolism, cognitive dysfunction in infants, electrophysiological dysfunction, and reduced childhood growth [ATSDR, 1988]. EPA has recently classified lead as a probable human carcinogen (Group B2) [EPA, 1990].

NICKEL

Nickel is a naturally occurring metal which constitutes approximately 0.008% of the earth's crust [Versar, 1979]. Nickel is used in making stainless steel and other alloys. It is also used in electroplating, in coin production, in Ni-Cd batteries. in ceramics, and as a catalyst.

Nickel appears to be a relatively mobile heavy metal due to the solubility of many of its salts. Sorption and precipitation are not as effective at immobilizing nickel as they are with other heavy metals. Nickel has an affinity for organic materials, hydrous iron, and manganese oxygen. Although nickel is bioaccumulated, the concentrations, reported for most freshwater organisms, indicate that partitioning into biota is not a dominant fate process [Versar, 1979].

Extensive epidemiological evidence indicates that inhalation of certain nickel compounds (nickel oxide and nickel subsulfide dusts, nickel carbonyl vapor, and soluble aerosols of nickel chloride, and nickel sulfate) causes cancer of the lung and nasal cavities in humans. Contact dermatitis has also been reported in humans exposed dermally to nickel compounds. Nickel carbonyl has been shown to cause birth defects in rats [ATSDR, 1987].

The major source of nickel uptake by humans is food (up to 900 μg/day). Airborne nickel has been detected at rural and urban sites at concentrations ranging from 1 to 60 ng/m^3. Higher levels have been detected in industrial settings [ATSDR, 1987].

In freshwater, toxicity depends on hardness; nickel tends to be more toxic in softer water [EPA, 1986b]. Acute values for exposure to a variety of nickel salts, expressed as nickel, range from 510 μg/L for *Daphnia magna* to 46,200 μg/L for banded killifish at comparable hardness levels. Chronic values range from 14.8 μg/L for *Daphnia magna* is soft water to 530 μg/L for the fathead minnow in hard water. Acute-chronic ratios for *Daphnia magna* range from 14 in hard water to 83 in soft water, and are approximately 50 in both hard and soft water for the fathead minnow. Residue data for the fathead minnow indicate a bioconcentration factor of 61. Freshwater algae experience reduced growth at nickel concentrations as low as 100 μg/L.

Acute values for saltwater species range from 152 μg/L for mysid shrimp to 350,000 μg/L for the mummichog. A chronic value of 92.7 μg/L is reported for the mysid shrimp, which gives an acute-chronic ratio of 5.5 for the species. Reduced growth is seen in saltwater algae at concentrations as low as 1,000 μg/L. Bioconcentration factors ranging from 299 to 416 have been reported for the oyster and mussel.

PETROLEUM HYDROCARBONS

Petroleum hydrocarbons are a group of compounds that are thick, dark yellow to brown, or green-black liquids which consist of a mixture of hydrocarbons from C_2H_2 and up. They are used as a source of gasoline, petro ether, petrolatum, fuel and lubricating oils, butane, and isopropyl alcohol. Gasoline, jet fuel, and mineral spirits are the petroleum hydrocarbons of primary concern in this risk evaluation.

Hydrocarbon-containing petroleum residues are decomposed in soil systems. Hydrocarbons degrade to carbon dioxide and water via several intermediates (organic acids, ketones, aldehydes, alcohols, and other hydrocarbon derivatives). Nonvolatile components of oils tend to stay tightly bound in soil, while volatile fractions may escape into the atmosphere. No significant movement of oil through surface runoff from rainfall or downward leaching occurs.

Gasoline is an aspiration hazard, defats the skin, and has been shown to cause kidney tumors in laboratory animals. It contains benzene and toluene which may be absorbed through the skin. Benzene is a cancer hazard that affects the blood. Primary routes of exposure are inhalation and skin contact. Eye contact with liquid gasoline may cause burning, tearing, redness, and transient corneal damage. Prolonged or repeated dermal contact may cause burning, redness, drying and cracking of the skin, and dermatitis. Exposure to mist or excessive vapor concentration may cause irritation of the nose, throat, and upper respiratory tract. Severe exposures may result in unconsciousness, coma, and death. Ingestion of gasoline may cause signs of central nervous system depression, headache, nausea, drowsiness, and dizziness.

Fuel oil is a combustible liquid and a skin irritant. Breathing oil mists may irritate the nose and throat. Chronic exposure to oil mists may lead to the development of lipoid pneumonia. Similarly refined and processed residual petroleum materials have been shown to cause skin cancer and liver damage in laboratory animals through prolonged skin contact. There is no direct evidence that fuel oil causes skin cancer or liver damage in humans.

PENTACHLOROPHENOL

Pentachlorophenol is a commercially produced pesticide which is used primarily in the preservation of wood.

Pentachlorophenol is moderately soluble in water and has a low vapor pressure. Primary removal processes in aquatic systems are photolysis and biodegradation. In soils, sorption is proportional to organic matter content and inversely proportional to pH. Pentachlorophenol has been shown to bioaccumulate in aquatic organisms.

Hydrolysis, oxidation, and volatilization are not important processes in the environmental fate of pentachlorophenol [EPA, 1979].

Human exposure to pentachlorophenol can result in adverse effects upon the liver, kidneys, eyes, skin, and cardiovascular, respiratory and nervous systems [Sittig, 1985]. EPA has recently classified pentachlorophenol as a probable human carcinogen (Group B2) based on the observation of liver, circulatory, and adrenal tumors in an oral study on laboratory mice [IRIS].

PHENOL

Phenol is naturally present in animal waste and decayed organic matter. Artificial sources of phenol include industrial wastewater, resins, plastics, fibers, adhesives, disinfectants, and iron, steel, aluminum, leather and rubber industries. Phenol is also found in cigarette smoke, throat lozenges, and car exhaust [Howard, 1989].

Biodegradation of phenol occurs rapidly in surface and subsurface soils (2-5 days) and in aquatic systems (hours to days in freshwater; weeks in salt water) under both aerobic and anaerobic conditions. Phenol is highly soluble and adsorbs poorly to soils; however, it is not usually detected in groundwater because of rapid biodegradation. In air, phenol exists primarily in the vapor phase and is removed rapidly through nitrate and hydroxyl radicals (half lives of 15 minutes and 0.61 days, respectively). Direct photodegradation and removal by rain may also occur. Phenol is not expected to bioconcentrate significantly in aquatic organisms [Howard, 1989].

Human exposure to phenol can result in liver and kidney damage, and in adverse effects on the central nervous system. Phenol is also extremely corrosive upon contact with any tissue [Sittig, 1985]. EPA classifies Phenol as Group D with respect to carcinogenicity [IRIS].

POLYNUCLEAR AROMATIC HYDROCARBONS

Polynuclear aromatic hydrocarbons (PAHs) are a class of chemical compounds characterized by a basic structure of two or more fused aromatic (benzene) rings. The compounds are fused by pairs of carbon atoms, resulting in a molecule with a carbon atom lying in a single plane with hydrogen atoms. The lowest molecular weight member of this group is naphthalene, with two fused rings. The highest molecular weight member is graphite. PAH compounds can be divided into two groups. These two groups are the lower molecular weight (two- to three-ring) compounds and the higher molecular weight (four- to seven-ring) compounds.

The physical properties of PAHs typically vary with increasing molecular weight. Vapor pressure and solubility decrease almost logarithmically with increasing molecular weight. Resistance to reduction and oxidation typically decreases with increasing molecular weight. These trends help to explain why the lower-ring-numbered and higher-ring numbered compounds differ substantially in their behavior and distribution in the environment.

In the case of PAH compounds, the lower-ring-numbered compounds have K_{oc} values in the 10^3 to 10^4 range. The higher-ring-numbered compounds have K_{oc} values from 10^5 to 10^6. K_{oc} values for PAHs are very high, indicating little tendency for mobility.

PAHs have been noted to be ubiquitous in the environment. In the past, PAH compounds were typically thought to result only from high-temperature pyrolysis of organic materials. Although this is the principal means of PAH generation, it has recently been shown that low-temperature transformation of sedimentary organic material to form fossil fuels, as well as direct biosynthesis by microbes and plants, are additional sources of PAHs. Anthropogenic sources also increase the loading of PAHs into the environment. This includes industrial activities such as coke and coal gas production, gas production from petroleum, oil refining, and preparation of acetylene from natural gas. Other sources include incineration of domestic and industrial wastes, power generation from fossil fuels, and automobile exhaust.

PAH compounds vary substantially in their acute toxicity to aquatic animals. In general, toxicity to species will increase with increasing molecular weight. However, the higher-ring-numbered PAHs have low acute toxicity, apparently due to their low solubilities. In most cases, crustaceans are the most sensitive species, polychaete worms are intermediate in sensitivity, and fish are the most resistant. Acute toxicity levels in water are several orders of magnitude higher than levels found in even the most polluted marine and freshwaters. Sediment levels occasionally approach concentrations similar to the acutely toxic level; however, being bound to the sediment renders PAHs considerably less toxic.

Biodegradation is thought to be the primary fate of PAHs in the environment [Sims and Overcash, 1983]. Some PAH compounds (particularly the higher molecular weight compounds) have been noted to be highly toxic, carcinogenic, mutagenic, and/or teratogenic to many species. PAHs have demonstrated toxicity via the oral and dermal routes, indicating that they are capable of passage across epithelial membranes. Additionally, research indicates that they are easily absorbed through the lungs. They tend to concentrate initially in the liver and kidneys until they are excreted. They eventually move to organs containing or surrounded by fat (e.g., mammary glands, adrenals).

Several of the PAHs have been shown to cause cancer in laboratory animals including, benzo(a)anthracene, benzo(o)pyrene, benzo(b)fluoranthene, benzo(k) fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene. These compounds are considered probable human carcinogens (EPA Group B2) [EPA, 1990].

TETRACHLOROETHYLENE

Tetrachloroethylene is not known to occur in nature. Artificial sources of teterachloroethylene include vapors from dry cleaning and metal cleaning, and wastewater from metal finishing, laundries, chemical manufacturing, plastic manufacturing, aluminum forming, and municipal treatment plants [Howard, 1990].

Tetrachloroethylene will volatilize rapidly if released to soils due to its high vapor pressure and low adsorption to soils. Biodegradation may be an important removal process in anaerobic soils, and may occur slowly in surface soils and groundwater. Tetrachloroethylene will leach rapidly into groundwater through sandy soils. Evaporation is the primary removal process in surface water systems with half-lives ranging from 3 hours to 14 days. Tetrachloroethylene exists in the vapor phase if released to the atmosphere. Photooxidation is the primary atmospheric removal process, with half-lives ranging from one hour to 2 months [Howard, 1990].

Tetrachloroethylene is ranked as a probable human carcinogen (Group B2) by EPA based on the observation of leukemia (inhalation exposure) and liver tumors (oral exposure) in studies on mice [EPA, 1990]. Exposure to tetrachloroethylene can also result in damage to the kidneys, liver, central nervous system and upper respiratory tract [Sittig, 1985].

TOLUENE

Toluene is a monocyclic, aromatic, colorless liquid. It is used in manufacturing benzoic acid, benzaldehyde, explosives, dyes, and many other organic compounds. Toluene functions as a solvent in products such as wood furniture cleaners.

From the available data, it appears that volatilization is the major route of removal from aquatic environments. Once volatilized, atmospheric photodestruction of toluene probably subordinates all other fates. Toluene will be adsorbed by sediments and suspended solids, but the degree to which this adsorption will interfere with volatilization is unknown. Toluene does not bioaccumulate in the environment [Arthur D. Little, 1987].

No data are available concerning the chronic toxicity of toluene to freshwater organisms. Little information is available on the toxicity of toluene to terrestrial species. Information on avian toxicity is not available. No information is available on the toxicity of toluene to plants.

Toluene is absorbed in humans following all routes of exposure [EPA, 1985c]. In humans, the primary acute effects of toluene vapors are central nervous system depression and narcosis. Also seen at low levels of exposure are irritation of the skin and eyes, and impairment of coordination and reaction time when inhaled. In humans, chronic exposure to toluene vapors has been associated with central and peripheral nervous system effects, hepatomegaly, and hepatic and renal function changes. Effects on the liver and central nervous system have also been observed in animals following oral exposure [EPA, 1987a].

TRICHLOROETHYLENE (TCE)

TCE is a halogenated organic compound very commonly used in industry, primarily as a solvent. Industries that use TCE include dry cleaning, fumigation, paint dilution, aerospace operations, and textile processing.

TCE is relatively mobile in the soil/groundwater system, particularly where soils have a low organic content. It is moderately soluble in water, but can be sorbed on soils with sufficiently high organic content. Transport mechanisms include volatilization in near surface soils and migration in groundwater. Most TCE applied to surface soils will volatilize. The persistence of TCE in soil/groundwater systems is not known, but in most cases it is believed that TCE will persist for at least months to years. TCE can be biodegraded into cis-1,2-DCE, trans-1,2-DCE, 1,1-

DCE, and vinyl chloride. TCE may bioaccumulate in organisms, but it does not appear to biomagnify in the food chain [Arthur D. Little, 1987].

TCE has been classified as a probable human carcinogen (EPA Group B2). Chronic exposure to TCE may affect the central nervous system and cause minor liver function impairments. Short-term high-level concentrations of TCE may cause depression of the central nervous system, kidney, liver and cardiovascular damage, and death due to ventricular fibrillation. Short-term, low-level exposure may cause irritation of the eyes, nose, throat, and skin [Sittig, 1985].

Limited data on the toxicity of trichloroethylene to aquatic organisms was available. Trichloroethylene has a demonstrated toxicity to freshwater aquatic life at a concentration as low as 45 mg/L. Acute toxicity could occur at lower concentrations with more sensitive species [Arthur D. Little, 1987].

No information on the toxicity of trichloroethylene to domestic animals or terrestrial wildlife was available in the literature reviewed.

XYLENES

Xylenes are mixtures of the ortho, meta, and para isomers. The meta form is usually the principal component. Xylenes may also contain 6 to 10 percent impurities such as benzene, ethylbenzene, trimethylbenzene, toluene, phenol, thiophene, pyridene, and nonaromatic hydrocarbons. Xylenes are widely used as fuel components and as solvents for inks, rubbers, gums, resins, adhesives, lacquers, paints, and insecticides. Xylenes are commonly used in the chemical industry as intermediates. Specifically, ortho-xylene is used in the manufacture of phthalic anhydride, which is a basic building block for plasticizers. Meta-xylene is an intermediate in the preparation of isophthalic acid, which is the base of unsaturated polyester resins. Commercially, para-xylene is the most important isomer. It is converted to terephthalic acid or dimethylterephthalate and used to make fibers, films, and resins.

The primary pathway of concern for soil/water systems is the migration of xylenes into groundwater used for drinking water supplies. Inhalation resulting from volatilization from surface soils may also be important. Xylenes are relatively mobile in soil/water systems, especially in aqueous phase. Volatilization through air-filled pores is also possible. They are resistant to hydrolysis but are probably biodegradable. Xylenes could persist for months to years (or longer) in the environment [Arthur D. Little, 1987].

The three xylene isomers have similar toxicological properties and are discussed together. Approximately 60 percent of an inhaled dose is absorbed, and absorption of orally-administered xylene is nearly complete. Dermal absorption is reported to be minor following exposure to xylene vapor, but may be significant following contact with the liquid [EPA, 1985d]. Liquid xylene and high vapor concentrations are irritating to the eyes and the vapor may cause transient, reversible damage to the cornea [Sax and Lewis, 1989]. Aspiration of liquid into the lungs may cause chemical pneumonitis, pulmonary edema, and hemorrhage [Arthur D. Little, 1987]. The effects of chronic exposure resemble those from acute exposure, but are more severe.

In humans, acute inhalation exposure to relatively high concentrations of xylenes adversely affects the central nervous system and lungs, and can irritate mucous membranes [EPA, 1987b]. Symptoms include dizziness, drowsiness, nausea, vomiting, abdominal pain, loss of appetite, pulmonary edema, and unconsciousness, as well as reversible effects on the liver and kidneys [Arthur D. Little, 1987].

ZINC

Zinc is a common trace metal generally associated with base metal and precious metal deposits. Zinc is used commercially in the manufacture of batteries, for galvanizing, and as an alloying agent. Zinc is an essential trace nutrient. Zinc compounds are commonly used in such products such as antidandruff shampoos and astringents.

Zinc is more mobile than most heavy metals in natural surface water systems, but is only moderately mobile in natural soil/water systems. In soil/groundwater systems, zinc can be sorbed onto hydrous iron and manganese oxides, clay minerals, and organic material which reduces its mobility. Eh and pH appear to be important factors in transportation fate. Zinc's solubility decreases in reducing environments. Volatilization of zinc is not an important process in the transportation fate of zinc [Versar, 1979].

Zinc bioaccumulates and is moderately toxic to aquatic life and vegetation. Zinc is an essential element for plants and animals. The toxicity of zinc is strongly influenced by water hardness, pH, temperature, and dissolved oxygen. Zinc toxicity increases with an increase in temperature, a reduction in dissolved oxygen, an increase in pH, and in soft water [EPA, 1986a].

The toxicity of zinc is considered to be very low. There is no known association between zinc and cancer. Small amounts of zinc are necessary for normal human growth and development. Ingestion of zinc salts can cause fevers, nausea, vomiting, stomach cramps, and diarrhea [EPA, 1984c]. Exposure to zinc chloride fumes can cause damage to the respiratory tract and nasal tract [Sax and Lewis, 1989].

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APPENDIX G
1987/1988 ANALYTICAL DATA

APPENDIX G
1987/1988 ANALYTICAL DATA

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APPENDIX G
1987/1988 ANALYTICAL DATA

INTRODUCTION

This appendix includes a summary of analytical results for the first stage of the SI and RI at Volk Field. Work performed by ES in 1987 and 1988 was done according to the 1987 Work Plan [ES, 1987]. Analytical results are summarized here for convenience. A more detailed discussion of these results can be found in both the SI [ES, 1989b] and the RI [ES, 1990b]. It should be noted that all groundwater and surface water data from 1987/1988 activities represent unfiltered data. Also, no data were collected from Sites 5 and 8 as part of the 1987/1988 field activities. Further discussion of the analytical results and maps showing the locations of the wells, surface water stations, and soil borings are presented in Volume I of this RI.

Soil samples were collected from 15 soil boring locations around the fire training pit at Site 1. Four groundwater monitoring wells were installed and sampled at Site 1 during the 1987 RI. Field activities at Site 2 in 1987 also included the installation and sampling of four monitoring wells. In addition, surface water samples were collected at two sites along the drainageway southeast of the landfill. Only one monitoring well was installed and sampled at Site 3/6 as part of the 1987 SI. Two soil samples were collected from the monitoring well boring. Eight soil borings were augered at Site 4 during the 1987 SI. No groundwater samples were collected at this site. Field activities at Site 7 in 1987 included the installation and sampling of three monitoring wells. Monitoring wells MW-1 through MW-3 were installed and sampled at Site 9 in 1987 as part of the SI. Finally, the 1987 SI at Site 10 included the installation and sampling of four monitoring wells.

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VOLK FIELD ANGB
CAMP DOUGLAS, WI
SUMMARY OF CHEMICAL ANALYSES FOR SOIL SAMPLES - SITE 1, FIRE TRAINING AREA

SAMPLE IDENTIFIER	DATE SAMPLED	PURGEABLE HALOCARBONS SW8010(ug/Kg)			AROMATIC VOLATILE ORGANICS SW8020(ug/Kg)			PETROLEUM HYDROCARBONS E418.1(mg/Kg)		PCB'S SW8080 (ug/Kg)	BASE/NEUTRAL ACID EXTRACTABLES SW8270(mg/Kg)			LEAD E239.2 (mg/Kg)
		CHEM NAME	DL	Results	CHEM NAME	DL	Result	DL	Results	Results	CHEM NAME	DL	Results	
VF1-B1-SS1-0.5	01/26/88	TETRACHLOROETHYLENE	0.03	0.94	BENZENE	0.2	16,000	100	22,000	ND	2-METHYLNAPHTHALENE	0.66	9.7	5.7
		TRICHLOROETHENE	0.12	33	ETHYLBENZENE	0.2	17,000							
					TOLUENE	0.2	3,600							
					XYLENES	0.4	83,000							
VF1-B1-SS2-3.5	01/26/88	TETRACHLOROETHYLENE	0.03	0.70	BENZENE	0.2	6,500	100	8,600	ND	NAPHTHALENE	0.66	7.3	0.8
		TRICHLOROETHENE	0.12	17	ETHYLBENZENE	0.2	6,300				2-METHYLNAPHTHALENE	0.66	15	
					TOLUENE	0.2	2,000							
					XYLENES	0.4	31,000							
VF1-B1-SS3-8.5	01/26/88	TETRACHLOROETHYLENE	0.03	0.58	BENZENE	0.2	19,000	100	8,600	ND	NAPHTHALENE	6.6	7.3	0.6
		TRICHLOROETHENE	0.12	14	ETHYLBENZENE	0.2	15,000				2-METHYLNAPHTHALENE	6.6	14	
					TOLUENE	0.2	5,700							
					XYLENES	0.4	60,000							
VF1-B2-SS1-0.5	01/26/88	-------		ND	-------		ND	100	260	ND	-------		ND	1.8
VF1-B2-SS2-3.5	01/26/8d	-------		ND	-------		ND	100	<100	ND	-------		ND	<0.5
VF1 B2 SS3-8.5	01/26/88	-------		ND	-------		ND	100	<100	ND	-------		ND	<0.5
VF1-B3-SS1-1.0	01/26/88	-------		ND	-------		ND	100	260	ND	-------		ND	1.7
VF1-B21-SS1-1.0 (duplicate of B3-SS1)	01/26/88	-------		ND	-------		ND	100	130	ND	-------		ND	1.6
VF1-B3-SS2-3.5	01/26/88	-------		ND	-------		ND	100	<100	ND	-------		ND	<0.5

VOLK FIELD ANGB
CAMP DOUGLAS, WI
SUMMARY OF CHEMICAL ANALYSES FOR SOIL SAMPLES - SITE 1, FIRE TRAINING AREA

SAMPLE IDENTIFIER	DATE SAMPLED	PURGEABLE HALOCARBONS SW8010(ug/Kg)			AROMATIC VOLATILE ORGANICS SW8020(ug/Kg)			PETROLEUM HYDROCARBONS E418.1(mg/Kg)		PCB'S SW8080 (ug/Kg)	BASE/NEUTRAL ACID EXTRACTABLES SW8270(mg/Kg)			LEAD E239.2 (mg/Kg)
		CHEM NAME	DL	Results	CHEM NAME	DL	Result	DL	Results	Results	CHEM NAME	DL	Results	
VF1-B3-SS3-8.5	01/26/88	-------		ND	-------		ND	100	<100	ND	-------		ND	<0.5
VF1-B4-SS1-0.5	01/26/88	TETRACHLOROETHYLENE	0.03	0.53	BENZENE	0.2	2,000	100	11,000	ND	-------		ND	62.0S
		TRICHLOROETHENE	0.12	8.0	ETHYLBENZENE	0.2	4,800							
					TOLUENE	0.2	2,500							
					XYLENES	0.4	9,800							
VF1-B22-SS1-0.5	01/26/88	TETRACHLOROETHYLENE	0.03	0.73	BENZENE	0.2	170	100	11,000	ND	-------		ND	85.0
(duplicate of B4-SS1)		TRICHLOROETHENE	0.12	41	ETHYLBENZENE	0.2	1,100							
					TOLUENE	0.2	1,000							
					XYLENES	0.4	15,000							
VF1-B4-SS2-3.5	01/26/88	-------		ND	-------		ND	100	220	ND	-------		ND	3.9
VF1-B4-SS3-8.5	01/26/88	-------		ND	BENZENE	0.2	41	100	1,500	ND	-------		ND	0.9
					ETHYLBENZENE	0.2	110							
					TOLUENE	0.2	51							
					XYLENES	0.4	190							
VF1-B5-SS1-0.0	01/27/88	-------		ND	-------		ND	100	280	ND	-------		ND	5.8
VF1-B5-SS2-3.5	01/27/88	-------		ND	-------		ND	100	600	ND	-------		ND	1.2
VF1-B5-SS3-10.0	01/27/88	-------		ND	BENZENE	0.2	110	100	420	ND	-------		ND	<0.5
					ETHYLBENZENE	0.2	360							
					TOLUENE	0.2	500							
					XYLENES	0.4	880							

VOLK FIELD ANGB

CAMP DOUGLAS, WI

SUMMARY OF CHEMICAL ANALYSES FOR SOIL SAMPLES - SITE 1, FIRE TRAINING AREA

SAMPLE IDENTIFIER	DATE SAMPLED	PURGEABLE HALOCARBONS SW8010(ug/Kg)			AROMATIC VOLATILE ORGANICS SW8020(ug/Kg)			PETROLEUM HYDROCARBONS E418.1(mg/Kg)		PCB'S SW8080 (ug/Kg)	BASE/NEUTRAL ACID EXTRACTABLES SW8270(mg/Kg)			LEAD E239.2 (mg/Kg)
		CHEM NAME	DL	Results	CHEM NAME	DL	Result	DL	Results	Results	CHEM NAME	DL	Results	
VF1-B6-SS1-0	01/27/88	-------		ND	BENZENE	0.2	120	100	830	ND	-------		ND	77.5
					ETHYLBENZENE	0.2	370							
					TOLUENE	0.2	800							
					XYLENES	0.4	2,200							
VF1-B6-SS2-3.5	01/27/88	TRICHLOROETHYLENE	0.12	5.7	BENZENE	0.2	1,200	100	3,000	ND	-------		ND	55.0
					ETHYLBENZENE	0.2	6,000							
					TOLUENE	0.2	2,600							
					XYLENES	0.4	25,000							
VF1-B6-SS3-8.5	01/27/88	TRICHLOROETHYLENE	0.12	8.6	BENZENE	0.2	970	100	3,200	ND	NAPHTHALENE	0.66	2.7	1.9
					ETHYLBENZENE	0.2	8,500				2-METHYLNAPHTHALENE	0.66	2.7	
					TOLUENE	0.2	1,800							
					XYLENES	0.4	84,000							
VF1-B7-SS1-0	01/27/88	-------		ND	-------		ND	100	<100	ND	-------		ND	1.8
VF1-B7-SS2-3.5	01/27/88	-------		ND	-------		ND	100	<100	ND	-------		ND	0.9
VF1-B7-SS3-8.5	01/27/88	-------		ND	-------		ND	100	<100	ND	-------		ND	<0.5
VF1-B8-SS1-0	01/28/88	-------		ND	-------		ND	100	160	ND	-------		ND	11.05
VF1-B8-SS2-3.5	01/28/88	-------		ND	-------		ND	100	<100	ND	-------		ND	0.5
VF1-B8-SS3-8.5	01/28/88	-------		ND	-------		ND	100	<100	ND	-------		ND	<0.5

VOLK FIELD ANGB

CAMP DOUGLAS, WI

SUMMARY OF CHEMICAL ANALYSES FOR SOIL SAMPLES - SITE 1, FIRE TRAINING AREA

SAMPLE IDENTIFIER	DATE SAMPLED	PURGEABLE HALOCARBONS SW8010(ug/Kg)			AROMATIC VOLATILE ORGANICS SW8020(ug/Kg)			PETROLEUM HYDROCARBONS E418.1(mg/Kg)		PCB'S SW8080 (ug/Kg)	BASE/NEUTRAL ACID EXTRACTABLES SW8270(mg/Kg)			LEAD E239.2 (mg/Kg)
		CHEM NAME	DL	Results	CHEM NAME	DL	Result	DL	Results	Results	CHEM NAME	DL	Results	
VF1-B9-SS1-0	01/28/88	....		ND	....		ND	100	<100	ND	....		ND	2.3
VF1-B26-SS1-0 (duplicate of B9-SS1)	01/28/88	....		ND	....		ND	100	<100	ND	....		ND	2.3
VF1-B9-SS2-3.5	01/28/88	....		ND	....		ND	100	100	ND	....		ND	0.9
VF1-B9-SS3-8.5	01/28/88	....		ND	....		ND	100	<100	ND	DIETHYL PHTHALATE	0.66	1.0	<0.5
VF-B10-SS1-0.5	02/09/88	....		ND	....		ND	100	570	ND	....		ND	4.4
VF-B10-SS2-3.5	02/09/88	....		ND	....		ND	100	<100	ND	....		ND	1.0
VF-B10-SS3-8.5	02/09/88	....		ND	....		ND	100	<100	ND	....		ND	<0.5
VF1-B11-SS1-1.0	02/09/88	....		ND	....		ND	100	<100	ND	....		ND	1.8
VF1-B11-SS2-3.5	02/09/88	....		ND	....		ND	100	<100	ND	....		ND	0.6
VF1-B11-SS3-8.5	02/09/88	TRICHLOROETHYLENE	0.12	3.3	BENZENE	0.2	15,000	100	2,900	ND	NAPHTHALENE	0.66	1.8	0.9
					ETHYLBENZENE	0.2	40,000				2-METHYLNAPHTHALENE	0.66	2.4	
					TOLUENE	0.2	37,000							
					XYLENES	0.4	88,000							
VF1-B12-SS1-1.0	02/09/88	....		ND	....		ND	100	<100	ND	....		ND	2.2
VF1-B12-SS2-3.5	02/09/88	....		ND	....		ND	100	<100	ND	....		ND	1.5

VOLK FIELD ANGB

CAMP DOUGLAS, WI

SUMMARY OF CHEMICAL ANALYSES FOR SOIL SAMPLES - SITE 1, FIRE TRAINING AREA

SAMPLE IDENTIFIER	DATE SAMPLED	PURGEABLE HALOCARBONS SW8010(ug/Kg)			AROMATIC VOLATILE ORGANICS SW8020(ug/Kg)			PETROLEUM HYDROCARBONS E418.1(mg/Kg)		PCB'S SW8080 (ug/Kg)	BASE/NEUTRAL ACID EXTRACTABLES SW8270(mg/Kg)			LEAD E239.2 (mg/Kg)
		CHEM NAME	DL	Results	CHEM NAME	DL	Result	DL	Results	Results	CHEM NAME	DL	Results	
VF1-B12-SS3-8.5	02/09/88	....		ND	....		ND	100	<100	ND	....		ND	0.7
VF1-B13-SS1-1.5	02/09/88	....		ND	....		ND	100	<100	ND	....		ND	0.8
VF1-B28-SS1-1.5 (duplicate of B13-SS1)	02/09/88	....		ND	....		ND	100	<100	ND	....		ND	2.4
VF1-B13-SS2-3.5	02/10/88	....		ND	....		ND	100	<100	ND	....		ND	0.6
VF1-B13-SS3-8.5	02/10/88	....		ND	....		ND	100	<100	ND	....		ND	<0.5
VF1-B14-SS1-1.0	02/10/88	....		ND	....		ND	100	<100	ND	....		ND	7.1
VF1-B14-SS2-3.5	02/10/88	....		ND	....		ND	100	<100	ND	....		ND	1.0
VF1-B14-SS3-8.5	02/10/88	....		ND	....		ND	100	<100	ND	....		ND	0.6
VF1-B15-SS1-0.5	02/10/88	....		ND	....		ND	100	<100	ND	....		ND	1.7
VF1-B15-SS2-3.5	02/10/88	....		ND	....		ND	100	<100	ND	....		ND	<0.5
VF1-B15-SS3-8.5	02/10/88	....		ND	....		ND	100	<100	ND	....		ND	<0.5

ND - Not Detected

DL - Detection Limit

S - Reported value was determined by the method of Standard Additions

VOLK FIELD ANGB
CAMP DOUGLAS, WI
SUMMARY OF CHEMICAL ANALYSES FOR GROUNDWATER SAMPLES - SITE 1, FIRE TRAINING AREA

SAMPLE IDENTIFIER	DATE SAMPLED	PURGEABLE HALOCARBONS E601(ug/L)			AROMATIC VOLATILE ORGANICS SW8020(ug/L)			PETROLEUM HYDROCARBONS E418.1(mg/L)		TOTAL DISSOLVED SOLIDS E160.1(mg/L)		PCB'S SW8080 (ug/L)	BASE/NEUTRALS ACID EXTRACTABLES E625(ug/L)			LEAD E239.2 (mg/L)
		CHEM NAME	DL	Results	CHEM NAME	DL	Results	DL	Results	DL	Results	Results	CHEM NAME	DL	Results	Results
VF 1 W1 GW1 ES	03/04/88	......		ND	BENZENE	0.2	4.9	1	<1	10	129	ND	NAPHTHALENE	2	2.3	0.010
					TOLUENE	0.2	0.44						BIS(2-ETHYLHEXYL)PHTHALATE	3	9.0	
					XYLENES	0.4	4.0									
VF 1 W2 GW1 ES	03/08/88	TRICHLOROETHENE	0.12	0.9	BENZENE	0.2	1.2	1	<1	10	82.0	ND	....		ND	0.005
					TOLUENE	0.2	7.0									
					XYLENES	0.4	51.8									
VF 1 W3 GW1 ES	03/06/88	1,1-DICHLOROETHANE	0.07	1.6	BENZENE	0.2	3,600	1	1.6	10	215	ND	NAPHTHALENE	2	11	0.005W
		TRANS-1,2-DICHLOROETHENE	0.10	4.5	ETHYLBENZENE	0.2	100						PHENOL	2	11	
		TRICHLOROETHENE	0.12	13.1	TOLUENE	0.2	1,827						2,4-DIMETHYLPHENOL	3	4	
					XYLENES	0.4	404									
VF 1 W4 GW1 ES	03/04/88	....		ND	BENZENE	0.2	450	1	<1	10	550	ND	NAPHTHALENE	2	19	0.006
					ETHYLBENZENE	0.2	51									
					TOLUENE	0.2	10.8									
					XYLENES	0.4	107									
VF 1 W5 GW1 ES (duplicate of 1 W1)	03/04/88			ND	BENZENE	0.2	4.5	1	<1	10	164	ND	......		ND	0.020
					XYLENES	0.4	4.7									
VF E11 GW1 ES	03/08/88	....		ND	.....		ND	1	<1	10	89.0	ND	....		ND	0.033
VF E12 GW1 ES	03/08/88	......		ND	....		ND	1	<1	10	57.0	ND	....		ND	0.025

VOLK FIELD ANGB
CAMP DOUGLAS, WI
SUMMARY OF CHEMICAL ANALYSES FOR GROUNDWATER SAMPLES - SITE 1, FIRE TRAINING AREA

SAMPLE IDENTIFIER	DATE SAMPLED	PURGEABLE HALOCARBONS E601(ug/L)			AROMATIC VOLATILE ORGANICS SW8020(ug/L)			PETROLEUM HYDROCARBONS E418.1(mg/L)		TOTAL DISSOLVED SOLIDS E160.1(mg/L)		PCB'S SW8080 (ug/L)	BASE/NEUTRALS ACID EXTRACTABLES E625(ug/L)			LEAD E239.2 (mg/L)
		CHEM NAME	DL	Results	CHEM NAME	DL	Results	DL	Results	DL	Results	Results	CHEM NAME	DL	Results	Results
VF-E13-GW1-ES	03/08/88	1,1-DICHLOROETHANE	0.07	12	BENZENE	0.2	8,270	1	26	10	220	ND	NAPHTHALENE	2	51	0.005
		TRANS-1,3-DICHLOROPROPENE	0.34	10	ETHYLBENZENE	0.2	535						BIS(2-ETHYLHEXYL)PHTHALATE	3	20	
		TRICHLOROETHENE	0.12	79	TOLUENE	0.2	12,700						PHENOL	2	27	
					XYLENES	0.4	1,740						PENTACHLOROPHENOL	4	76	
VF-E14-GW1-ES	03/09/88	TRICHLOROETHENE	0.12	0.7	BENZENE	0.2	29	1	18	10	191	ND	NAPHTHALENE	2	55	0.053
					ETHYLBENZENE	0.2	166						FLUORENE	2	5	
					TOLUENE	0.2	40						BIS(2-ETHYLHEXYL)PHTHALATE	3	1,100	
					XYLENES	0.4	900									
VF-E15-GW1-ES	03/09/88	TRANS-1,3-DICHLOROPROPENE	0.34	1.5	BENZENE	0.2	2,800	1	110	10	302	ND	NAPHTHALENE	2	30	0.270
		1,1,1-TRICHLOROETHANE	0.03	60	ETHYLBENZENE	0.2	390						PHENOL	2	20	
		TRICHLOROETHENE	0.12	6.5	TOLUENE	0.2	3,950									
					XYLENES	0.4	1,000									
VF-E16-GW1-ES	03/09/88	....		ND	....		ND	1	<1	10	43.0	ND	....		ND	0.009
VF-E17-GW1-ES	03/09/88	TRICHLOROETHENE	0.12	1.6	BENZENE	0.2	153	1	<1	10	109	ND	NAPHTHALENE	2	26	0.007
					ETHYLBENZENE	0.2	170						PHENOL	2	5	
					TOLUENE	0.2	470						PENTACHLOROPHENOL	4	5	
					XYLENES	0.4	694									

ND - Not Detected DL - Detection Limit
W - Post digestion spike for furnace AA analysis out of control limits (85-115%), while sample absorbance is less than 50% of spike absorbance.

VOLK FIELD ANGB
CAMP DOUGLAS, WI
SITE 2, FORMER LANDFILL C
SUMMARY OF CHEMICAL ANALYSES FOR GROUNDWATER AND SURFACE WATER SAMPLES

SAMPLE IDENTIFIER	DATE SAMPLED	PURGEABLE HALOCARBONS E601(ug/L)			AROMATIC VOLATILE ORGANICS SW8020(ug/L)			PETROLEUM HYDROCARBONS E418.1(mg/L)		TOTAL DISSOLVED SOLIDS E160.1(mg/L)		ORGANOCHLORINE PESTICIDES & PCB'S SW8080(ug/L)	BASE/NEUTRALS ACID EXTRACTABLES E625(ug/L)			METALS E206.2,E239.2,E245.1 E270.2,E280.7 (mg/L)	
		CHEM NAME	DL	Results	CHEM NAME	DL	Results	DL	Results	DL	Results	Results	CHEM NAME	DL	Results	ELEMENT	RESULTS
VF-2-W1-GW1-ES	03/04/88	-------		ND	-------		ND	1	<1	10	33.0	ND	BIS(2-ETHYLHEXYL)PHTHALATE	3	11	Cu Pb Zn	0.028 0.010 0.04
VF-2-W2-GW1-ES	03/04/88	-------		ND	-------		ND	1	<1	10	73.0	ND	-------		ND	Ag As Be Cr Cu Ni Pb Zn	0.0140 0.005 0.0016 0.038 0.030 0.028 0.009 0.06
VF-2-W3-GW1-ES	03/07/88	-------		ND	-------		ND	1	<1	10	70.0	ND	-------		ND	Zn	0.02
VF-2-W4-GW1-ES	03/06/88	-------		ND	-------		ND	1	<1	10	59.0	ND	-------		ND	Be Cr Cu Zn	0.0010 0.010 0.010 0.03
VF-2-W5-GW1-ES (duplicate of 2-W4)	03/06/88	-------		ND	-------		ND	1	<1	10	48.0	ND	-------		ND	Zn	0.03
VF-2-1-SW1-ES	03/07/88	-------		ND	-------		ND	1	<1	10	93.0	ND	-------		ND	Zn	0.02
VF-2-2-SW1-ES	03/07/88	-------		ND	-------		ND	1	<1	10	94.0	ND	-------		ND	Cu Pb Tl Zn	0.018 0.007 0.12 0.04

ND - Not Detected
N - Spiked samples recovery not within control limits.
B - Reported value is less than Reporting limit but greater than MDL.

VOLK FIELD ANGB
CAMP DOUGLAS, WI
SITE 3/6, FUEL SPILL SITE
SUMMARY OF CHEMICAL ANALYSES FOR SOIL SAMPLES

SAMPLE IDENTIFIER	DATE SAMPLED	PURGEABLE HALOCARBONS SW8010(ug/Kg)			AROMATIC VOLATILE ORGANICS SW8020(ug/Kg)			PETROLEUM HYDROCARBONS E418.1(mg/Kg)		LEAD E206.2 (mg/Kg)
		CHEM NAME	DL	Results	CHEM NAME	DL	Result	DL	Results	
VF3/6-B1-SS1-1.0	02/11/88	-------		ND	-------		ND	100	310	2.9
VF3/6-B1-SS2-3.5	02/11/88	-------		ND	ETHYLBENZENE	0.2	16	100	<100	1.3
					XYLENES	0.4	220			
VF3/6-B3-SS1-3.5 (duplicate of B1-SS2)	02/11/88	-------		ND	ETHYLBENZENE	0.2	6.6	100	<100	0.98S
					XYLENES	0.4	47			

ND - Not Detected
DL - Detection Limit
S - Reported value was determined by the method of Standard Additions.

VOLK FIELD ANGB
CAMP DOUGLAS, WI
SITE 3/6, FUEL SPILL SITE
SUMMARY OF CHEMICAL ANALYSES FOR GROUNDWATER SAMPLES

SAMPLE IDENTIFIER	DATE SAMPLED	PURGEABLE HALOCARBONS E601(ug/L)			AROMATIC VOLATILE ORGANICS SW8020(ug/L)			PETROLEUM HYDROCARBONS E418.1(mg/L)		LEAD E239.2 (mg/L)
		CHEM NAME	DL	Results	CHEM NAME	DL	Results	DL	Results	Results
VF-3/6-W1-GW1-ES	03/04/88	--------		ND	BENZENE	0.2	1.6	1	<1	0.005W
					TOLUENE	0.2	1.6			
					XYLENES	0.4	29.9			

ND - Not Detected
DL - Detection Limit
W - Post digestion spike for Furnace AA Analysis out of control limits (85-115%), while sample absorbance is less than 50% of spike absorbance.

VOLK FIELD ANGB
CAMP DOUGLAS, WI
SITE 4, TRANSFORMER DISPOSAL SITE
SUMMARY OF CHEMICAL ANALYSES FOR SOIL SAMPLES

SAMPLE IDENTIFIER	DATE SAMPLED	PCB'S SW8080 (ug/Kg)
VF4-B1-SS1-0	12/10/87	ND
VF4-B1-SS2-8.5	12/10/87	ND
VF4-B2-SS1-0	01/19/88	ND
VF4-B2-SS2-3.5	01/19/88	ND
VF4-B3-SS1-0	01/19/88	ND
VF4-B3-SS2-8.5	01/19/88	ND
VF4-B4-SS1-0	12/10/87	ND
VF4-B4-SS2-3.5	12/10/87	ND
VF4-B5-SS1-0	01/20/88	ND
VF4-B5-SS2-3.5	01/20/88	ND
VF4-B6-SS1-0	12/11/87	ND
VF4-B6-SS2-3.5	12/11/87	ND
VF4-B10-SS2-3.5 (duplicate of B6-SS2)	12/11/87	ND
VF4-B7-SS1-0	12/11/87	ND
VF4-B9-SS1-0 (duplicate of B7-SS1)	12/11/87	ND
VF4-B7-SS2-3.5	12/11/87	ND
VF4-B8-SS1-0	01/19/88	ND
VF4-B8-SS2-3.5	01/19/88	ND

ND - Not Detected

VOLK FIELD ANGB
CAMP DOUGLAS, WI
SITE 7, FORMER LANDFILL A
SUMMARY OF CHEMICAL ANALYSES FOR GROUNDWATER SAMPLES

SAMPLE IDENTIFIER	DATE SAMPLED	PURGEABLE HALOCARBONS E601(ug/L)		AROMATIC VOLATILE ORGANICS SW8020(ug/L)		PETROLEUM HYDROCARBONS E418.1(mg/L)		TOTAL DISSOLVED SOLIDS E160.1(mg/L)		ORGANOCHLORINE PESTICIDES & PCB'S SW8080 (ug/L)	BASE/NEUTRALS ACID EXTRACTABLES E625(ug/L)		METALS E206.2, E239.2, E270.2, E200.7(mg/L)	
		CHEM NAME	Results	CHEM NAME	Results	DL	Results	DL	Results	Results	CHEM NAME	Results	ELEMENT	Results
VF-7-W1-GW1-ES	03/03/88	--------	ND	--------	ND	1	<1	10	351	ND	--------	ND	Ag	0.05NB
													As	0.055W
													Be	0.003B
													Cd	0.029
													Cr	0.10
													Cu	0.076
													Ni	0.07
													Pb	0.044
													Zn	0.10
VF-7-W2-GW1-ES	03/03/88	--------	ND	--------	ND	1	<1	10	430	ND	--------	ND	As	0.026
													Cd	0.017
													Cr	0.09
													Cu	0.056
													Ni	0.03B
													Pb	0.012
													Zn	0.07
VF-7-W3-GW1-ES	03/03/88	--------	ND	--------	ND	1	<1	10	406	ND	--------	ND	Ag	0.03NB
													Cr	0.010B
													Cu	0.02B
													Zn	0.03

ND - Not Detected
DL - Detection Limit
W - Post digestion spike for Furnace AA Analysis out of control limits (85-115%), while sample absorbance is less than 50% of spike absorbance.
N - Spiked samples recovery not within control limits.
B - Reported value is less than Reporting limit but greater than MDL.

VOLK FIELD ANGB
CAMP DOUGLAS, WI
SITE 9, FORMER LANDFILL B
SUMMARY OF CHEMICAL ANALYSES FOR GROUNDWATER SAMPLES

SAMPLE IDENTIFIER	DATE SAMPLED	PURGEABLE HALOCARBONS E601(ug/L)		AROMATIC VOLATILE ORGANICS SW8020(ug/L)			PETROLEUM HYDROCARBONS E418.1(mg/L)		TOTAL DISSOLVED SOLIDS E160.1(mg/L)		ORGANOCHLORINE PESTICIDES & SW8080 (ug/L)	BASE/NEUTRALS ACID EXTRACTABLES E625(ug/L)		METALS E206.2, E239.2, E270.2, E200.7 (mg/L)	
		CHEM NAME	DL Results	CHEM NAME	DL	Results	DL	Results	DL	Results	Results	CHEM NAME	Results	ELEMENT	Results
VF-9-W1-GW1-ES	03/03/88	--------	ND	--------		ND	1	<1	10	64.0	ND	-------	ND	Cr	0.010B
														Cu	0.01
														Tl	0.10
														Zn	0.020
VF-9-W2-GW1-ES	03/03/88	--------	ND	--------		ND	1	<1	10	94.0	ND	-------	ND	Ag	0.18N
														Cr	0.01B
														Cu	0.02B
														Pb	0.006
														Zn	0.03
VF-9-W3-GW1-ES	03/03/88	--------	ND	BENZENE	0.2	1.9	1	<1	10	178	ND	-------	ND	Cu	0.02B
				ETHYLBENZENE	0.2	2.1								Zn	0.02
				TOLUENE	0.2	0.8									
				XYLENES	0.4	7.1									

ND - Not Detected
DL - Detection Limit
N - Spiked samples recovery not within control limits.
B - Reported value is less than Reporting limit but greater than MDL.

VOLK FIELD ANGB
CAMP DOUGLAS, WI
SITE 10, MUNITIONS BURIAL SITE
SUMMARY OF CHEMICAL ANALYSES FOR GROUNDWATER SAMPLES

SAMPLE IDENTIFIER	DATE SAMPLED	PURGEABLE HALOCARBONS E601(ug/L)			AROMATIC VOLATILE ORGANICS SW8020(ug/L)			PETROLEUM HYDROCARBONS E418.1(mg/L)		BASE/NEUTRAL ACID EXTRACTABLES E625(ug/L)			LEAD E239.2 (mg/L)
		CHEM NAME	DL	Results	CHEM NAME	DL	Results	DL	Results	CHEM NAME	DL	Results	Results
VF-10-W1-GW1-ES	03/07/88	-------		ND	-------		ND	1	<1	-------		ND	<0.005W
VF-10-W2-GW1-ES	03/07/88	-------		ND	-------		ND	1	<1*			ND	0.008W
VF-10-W3-GW1-ES	03/07/88	-------		ND	-------		ND	1	<1			ND	<0.005W
VF-10-W4-GW1-ES	03/07/88	-------		ND	BENZENE	0.2	114	1	<1	NAPHTHALENE	2	2	0.006W
					ETHYLBENZENE	0.2	16.2						
					TOLUENE	0.2	100						
					XYLENES	0.4	45.1						
VF-10-W5-GW1-ES (duplicate of 10-W4)	03/07/88	-------		ND	BENZENE	0.2	167	1	<1	NAPHTHALENE	2	2	0.006W
					ETHYLBENZENE	0.2	16.6						
					TOLUENE	0.2	149						
					XYLENES	0.4	58.7						

DL - Detection Limit
ND - Not Detected
W - Post digestion spike for furnace AA Analysis out of control limits (85-115%), while sample absorbance is less than 50% of spike absorbance.