1. Keywords

2. Start Date: FY 01
End Date: FY 01

3. HQ Division:

4. Phase:

5. Program NO: 38

6. Survey Type: GROUND-WATER CONSULTATION

7. INSTALLATION OR SOURCE OF INFORMATION (CITY & STATE OR COUNTY ARE ESSENTIAL)
ZZ - NOT APPLICABLE

8. Authors:

9. ARLOC/Activity: 11933 WRAMC
Location: WALTER REED AMC
State: DC

10. Project Control Number: 38-EH-7240-01

11. Title: GROUND-WATER CONSULTATION, FUEL RECOVERY AREA, FOREST GLEN ANNEX, WRAMC, 21-22 AUGUST 2001

12. DSA:

JD0197 GW

DEPARTMENT OF THE ARMY
U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE
5158 BLACKHAWK ROAD
ABERDEEN PROVING GROUND, MARYLAND 21010-5403

REPLY TO
ATTENTION OF

06 SEP 2001

MCHB-TS-EGW (40)

MEMORANDUM FOR Commander, Walter Reed Army Medical Center, (MCWR-GEO / Mr. Flippo), 6825 16th Street NW, Washington, D.C. 20307-5001

SUBJECT: Ground-Water Consultation No. 38-EH-7240-01, Fuel Recovery Area, Forest Glen Annex, Walter Reed Army Medical Center, Silver Spring, Maryland, 21-22 August 2001

Two copies of the subject final report are enclosed.

FOR THE COMMANDER:

Encl

JOHN W. BAUER
Program Manager
Ground Water and Solid Waste

CF(w/encl) :
CDR, MEDCOM, ATTN: MCHO
CDR, POPM-SA, ATTN: MCPO-SA(EXSUM ONLY)
CDR, MEDDAC, FT MEADE, ATTN: PVNTMED SVC
CDR, USAEC, ATTN: SFIM-AEC-EQ
CDR, USAEC, ATTN: TECH INFO CTR
CDR, USACHPPM-N

U.S. Army Center for Health Promotion and Preventive Medicine

USCHPPM

GROUND-WATER CONSULTATION NO. 38-EH-7240-01
FUEL RECOVERY AREA
FOREST GLEN ANNEX
WALTER REED ARMY MEDICAL CENTER
SILVER SPRING, MD
21-22 AUGUST 2001

Readiness Thru Health

U.S. Army Center for Health Promotion and Preventive Medicine

The lineage of the U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) can be traced back over 50 years. This organization began as the U.S. Army Industrial Hygiene Laboratory, established during the industrial buildup for World War II, under the direct supervision of the Army Surgeon General. Its original location was at the Johns Hopkins School of Hygiene and Public Health. Its mission was to conduct occupational health surveys and investigations within the Department of Defense's (DOD's) industrial production base. It was staffed with three personnel and had a limited annual operating budget of three thousand dollars.

Most recently, it became internationally known as the U.S. Army Environmental Hygiene Agency (AEHA). Its mission expanded to support worldwide preventive medicine programs of the Army, DOD, and other Federal agencies as directed by the Army Medical Command or the Office of The Surgeon General, through consultations, support services, investigations, on-site visits, and training.

On 1 August 1994, AEHA was redesignated the U.S. Army Center for Health Promotion and Preventive Medicine with a provisional status and a commanding general officer. On 1 October 1995, the nonprovisional status was approved with a mission of providing preventive medicine and health promotion leadership, direction, and services for America's Army.

The organization's quest has always been one of excellence and the provision of quality service. Today, its goal is to be an established world-class center of excellence for achieving and maintaining a fit, healthy, and ready force. To achieve that end, the CHPPM holds firmly to its values which are steeped in rich military heritage:

- ★ *Integrity is the foundation*
- ★ *Excellence is the standard*
- ★ *Customer satisfaction is the focus*
- ★ *Its people are the most valued resource*
- ★ *Continuous quality improvement is the pathway*

This organization stands on the threshold of even greater challenges and responsibilities. It has been reorganized and reengineered to support the Army of the future. The CHPPM now has three direct support activities located in Fort Meade, Maryland; Fort McPherson, Georgia; and Fitzsimons Army Medical Center, Aurora, Colorado; to provide responsive regional health promotion and preventive medicine support across the U.S. There are also two CHPPM overseas commands in Landstuhl, Germany and Camp Zama, Japan who contribute to the success of CHPPM's increasing global mission. As CHPPM moves into the 21st Century, new programs relating to fitness, health promotion, wellness, and disease surveillance are being added. As always, CHPPM stands firm in its commitment to Army readiness. It is an organization proud of its fine history, yet equally excited about its challenging future.

DEPARTMENT OF THE ARMY
U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE
5158 BLACKHAWK ROAD
ABERDEEN PROVING GROUND, MARYLAND 21010-5403

REPLY TO
ATTENTION OF

EXECUTIVE SUMMARY
GROUND-WATER CONSULTATION NO. 38-EH-7240-01
FUEL RECOVERY AREA
FOREST GLEN ANNEX, WALTER REED ARMY MEDICAL CENTER
SILVER SPRING, MARYLAND
21-22 AUGUST 2001

1. PURPOSE. The purpose of this study was to determine if the ground water near Building 512 is contaminated with petroleum products. This study provides information to help determine the impact of suspected contamination on human health and the environment.

2. CONCLUSION. Fuel is present in the soil and as a sheen on the ground water at monitoring wells MW-01A and MW-01B.

3. RECOMMENDATION. Begin monthly measurements for fuel in monitoring wells MW-01A and MW-01B, and report those findings to the Maryland Department of the Environment.

DEPARTMENT OF THE ARMY
U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE
5158 BLACKHAWK ROAD
ABERDEEN PROVING GROUND, MARYLAND 21010-5403

REPLY TO
ATTENTION OF

MCHB-TS-EGW

GROUND-WATER CONSULTATION NO. 38-EH-7240-01
FUEL RECOVERY AREA
FOREST GLEN ANNEX, WALTER REED ARMY MEDICAL CENTER
SILVER SPRING, MARYLAND
21-22 AUGUST 2001

1. REFERENCE.

1.1 Memorandum, USACHPPM, MCHB-TS-EGW, 7 July 1998, subject: Hydrogeologic Investigation No. 38-EH-8209-98, Forest Glen Annex, Walter Reed Army Medical Center, Silver Spring, Maryland, 11-14 May 1998.

1.2 Memorandum, USACHPPM, MCHB-TS-EGW, 29 August 2000, subject: Preliminary Assessment No. 38-EH-4949-00, Forest Glen Annex, Walter Reed Army Medical Center, Silver Spring, Maryland, 27-31 March 2000.

1.3 Report, Environmental Service and Technology Corporation, Monthly Operations Report – April 2001, Groundwater Pump and Treat System, Building 500/Forest Glen Annex, 22 May 2001.

2. AUTHORITY. Electronic Mail, 27 July 2001, Additional Monitoring Wells at Forest Glen, Ms. Lisa Strutz, Walter Reed Army Medical Center.

3. PURPOSE. The purpose of this study was to determine if the ground water near Building 512 is contaminated with petroleum products. This study provides information to help determine the impact of suspected contamination on human health and the environment.

4. INTRODUCTION.

4.1 Personnel Conducting the Study. The project manager for this consultation was Mr. Wayne Fox, Supervisory Geologist, Ground Water and Solid Waste Program, United States Army Center for Health Promotion and Preventive Medicine (USACHPPM). Mr. Fox was assisted by Mr. Mark Farro, Engineering Technician, USACHPPM, and Mr. Mark Pippen, Engineering Technician.

4.2 Background. In 1988, 14 underground storage tanks (USTs) containing No. 2 fuel oil were located near Buildings 500 and 512 (reference 1.1). All USTs have been removed and, in March 1994, a fuel recovery system was installed. A complete detailed history of the site is described in reference 1.1. The fuel recovery system has been unable to remove all the fuel from subsurface and monitoring well MW-101 has recently had an apparent thickness of over 1 foot of fuel oil on the ground water.

5. PROPERTY DESCRIPTION AND ENVIRONMENTAL SETTING.

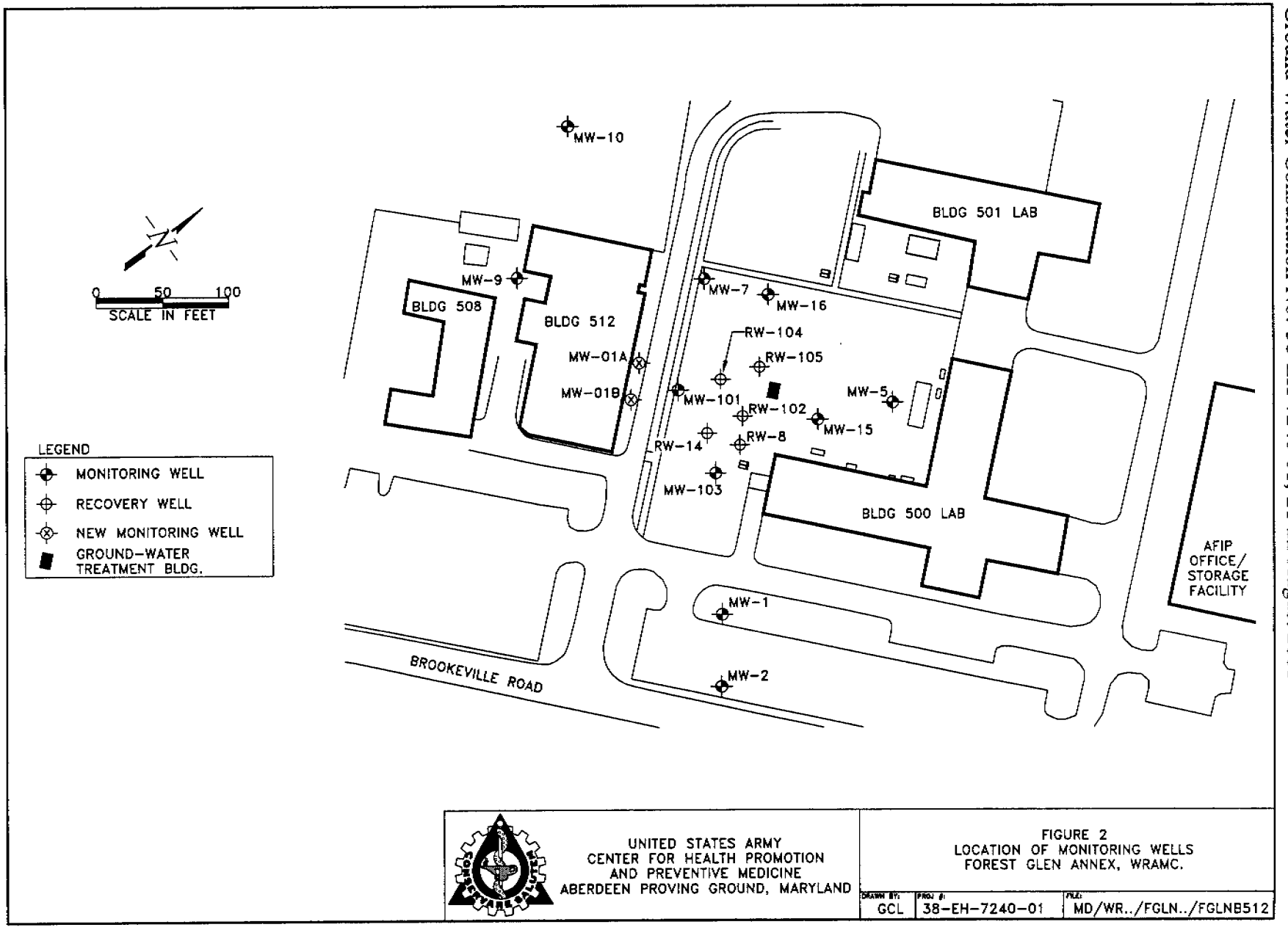
5.1 Location and Property Description. The Forest Glen Annex, WRAMC is located in the city of Silver Spring, Montgomery County, Maryland and covers 164 acres (reference 1.2). The coordinates of the installation are between 77° 3' 0.20" and 77° 3' 40.14" west longitude, and 39° 0 '4.52" and 39° 0' 48.23" north latitude. Figure 1 is a detailed map of the installation.

5.2 Site Description. The fuel recovery area is located immediately northeast of Building 512 as shown on Figure 2.

5.3 Geology. Underlying the Forest Glen Annex is the Kensington quartz diorite. The Kensington quartz diorite was intruded into the Wissahickon schist and was subsequently metamorphosed. Little of the original igneous structure remains. The gneiss is mostly plagioclase (33.1%) and quartz (39.0%) and is strongly schistose. The uppermost portion of the unit is saprolite (weathered rock) of varying thickness. An approximately 15-mile long wedge of the Kensington quartz diorite runs north/south, roughly parallel to Rock Creek with the Forest Glen Annex near the middle. This wedge is bounded by Wissahickon schist east and west of the installation (reference 1.2)

5.4 Geohydrology. Bedrock does not act as an aquifer at the Forest Glen Annex. Ground water may be present in fractures in the rock, but yields would not be sufficient for more than one household. Ground water is present in the soils and saprolite at the site. Ground-water flow generally follows the surface contours and discharges to Rock Creek. The ground water is encountered in the saprolite in higher elevations and in the soils closer to surface drainage.

6. **FIELD OBSERVATIONS.** Two monitoring wells were drilled down gradient from existing monitoring well MW-101 as shown on Figure 2. The drilling and monitoring well construction techniques are described in Appendix A. The soil encountered during drilling was a sandy silt with flakes of muscovite mica characteristic of a saprolite. Saprolite is a residual soil that results from weathering of igneous or metamorphic rock. Drilling logs in Appendix B provide a detailed description of all subsurface material encountered. Based on fuel odor in the soil samples, both monitoring wells are contaminated with fuel. When saturated drill cuttings were inspected, a fuel sheen was observed for both boreholes. Monitoring wells were


MW-10
BLDG 501 LAB
MW-9
MW-7
MW-16
BLDG 508
BLDG 512
RW-104
MW-01A
RW-105
MW-01B
MW-101
MW-5
RW-102
MW-15
RW-14
RW-8
MW-103
BLDG 500 LAB
AFIP OFFICE/ STORAGE FACILITY
MW-1
MW-2
BROOKEVILLE ROAD
0 50 100
SCALE IN FEET
LEGEND
MONITORING WELL
RECOVERY WELL
NEW MONITORING WELL
GROUND-WATER TREATMENT BLDG.
UNITED STATES ARMY
CENTER FOR HEALTH PROMOTION
AND PREVENTIVE MEDICINE
ABERDEEN PROVING GROUND, MARYLAND
FIGURE 2
LOCATION OF MONITORING WELLS
FOREST GLEN ANNEX, WRAMC.
DRAWN BY: GCL
PROJ #: 38-EH-7240-01
FILE: MD/WR../FGLN../FGLNB512

constructed in both boreholes as described in Appendix A and the construction details are provided in Appendix B. Based on ground-water elevations from all monitoring wells near the site, the ground-water flow is toward the west-southwest (reference 1.3) during static pumping conditions at the fuel recovery wells. During well development of monitoring well MW-01A, a fuel odor was detected and a broken sheen of fuel was noted on the purged ground water. Ground water from monitoring well MW-01B had a strong fuel odor and globules of fuel were noted floating on the ground water. The bailers used to develop monitoring well MW-01B were coated with black fuel after 2 gallons of water were bailed from the well. On 29 August 2001, both monitoring wells were checked for fuel. A measurable thickness of fuel was not detected on the ground water at that time.

9. CONCLUSION. Fuel is present in the soil and as a sheen on the ground water at monitoring wells MW-01A and MW-01B.

10. RECOMMENDATION. Begin monthly measurements for fuel in monitoring wells MW-01A and MW-01B, and report those findings to the Maryland Department of the Environment.

Wayne A. Fox

WAYNE A. FOX, P.G.
Supervisory Geologist

APPROVED:

John W. Bauer

JOHN W. BAUER, P.G.
Program Manager
Ground Water and Solid Waste Program

APPENDIX A

DRILLING, MONITORING WELL CONSTRUCTION, AND DEVELOPMENT TECHNIQUES

1. DRILLING TECHNIQUES. Monitoring wells at the site were drilled with a 9-inch hollow stem auger to a depth of approximately 24 feet. Drill cuttings were used to fully describe the subsurface material. Detailed drilling logs are provided in Appendix B.

2. MONITORING WELL CONSTRUCTION TECHNIQUES. The monitoring wells were screened in the uppermost aquifer with 17 feet of well screen. Monitoring wells were constructed using 4-inch inside diameter (ID) schedule 40 PVC pipe with flush threaded joints. Monitoring well screens were 4-inch ID schedule 40 pipe with 0.010-inch slots and flush threaded joints. A sand pack was placed around the well screen to a depth above the top of the well screen. Above the sand pack, a bentonite seal was installed and then cement was installed to the ground surface. Appendix B shows a summary of well construction data for each monitoring well. Following monitoring well construction, the elevation of the top of the PVC casing was surveyed to the nearest 0.01-foot for subsequent water table elevation measurements.

3. MONITORING WELL DEVELOPMENT. Monitoring well development was accomplished by surging and bailing. No water or air was introduced into the monitoring well during development.

4. MONITORING WELL MEASURING TECHNIQUES. Water levels and fuel measurements were measured in each monitoring well at the site with a battery operated fuel/water interface probe. The fuel/water interface probe was lowered into the well and used to measure the depth to fuel and water from the top of the well casing. Measurements were taken to the nearest 0.01 feet. These measurements were subtracted from the elevation at the top of the casing to give the ground-water elevation inside the well above mean sea level. A measurable fuel thickness was not encountered in the monitoring wells. A clear acrylic bailer was lowered into each monitoring well to determine if any fuel was present.

5. DECONTAMINATION. All reusable sampling containers, collection devices, and equipment were thoroughly decontaminated prior to use and after each sample collection.

6. INVESTIGATION-DERIVED WASTE. Drill cuttings, well development purge water, decontamination station wastewater, and plastic sheets were placed in 55-gallon drums with the appropriate label identifying the material. Personal protective equipment (PPE) was placed in plastic trash bags and disposed as solid waste.

APPENDIX B

DRILLING LOGS AND MONITORING WELL SUMMARY

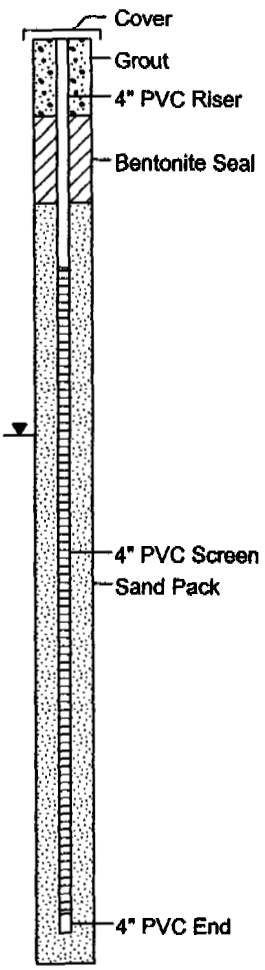
USACHPPM
Readiness thru Health

LOG OF MW-01A

WALTER REED ARMY MEDICAL CENTER
WELL CONSTRUCTION DIAGRAM
PROJECT NO. 38-EH-7240-01
LOCATION: Forest Glen Bldg. 512

DATE	: 21 August 2001	Auger	: 9" OD Hollow stem
Geologist	: Wayne Fox		
Technician	: Mark Farro		
Technician	: Mark Pippen		
Drill Rig	: Acker ADII		

Well: MW-01A
316.08 TOC elev. in ft.



DESCRIPTION

Silt, with sand, medium to fine grained, contains muscovite mica flakes (tan 0-1) (gray-brown 1-2.5). Dry. No fuel odor.

Silt and gravel, coarse, with sand, medium to fine grained, gray-brown. Moist. No fuel odor.

Silt, with sand, fine grained, muscovite mica flakes, medium gray-brown. Moisture increasing. No fuel odor.

Silt, with sand, fine grained, and clay, muscovite mica flakes, gray. Faint fuel odor.

Silt, with sand, fine grained, and clay, color change to gray brown, muscovite mica flakes. Moderate fuel odor.

Silt, with sand, medium to fine grained, and occasional unweathered rock, gray-brown, hard drilling, rock encountered at 12' and 13'-13.5'. Moderate fuel odor.

Silt and sand, medium to fine grained, medium gray, muscovite mica flakes, drilling slow, weathered material more dense. Saturated. Faint to moderate fuel odor.

Silt, with sand, medium to fine grained, medium gray, muscovite mica flakes. Cuttings have spots of sheen from fuel, Moderate fuel odor.

Note: Fuel Oil visible on augers as they were removed from the borehole.
Sheen of fuel on surface of ground-water.
Well developed with double disposable bailers and removed 15 gallons. Water level bailed down to 5' of water, then constant recovery.

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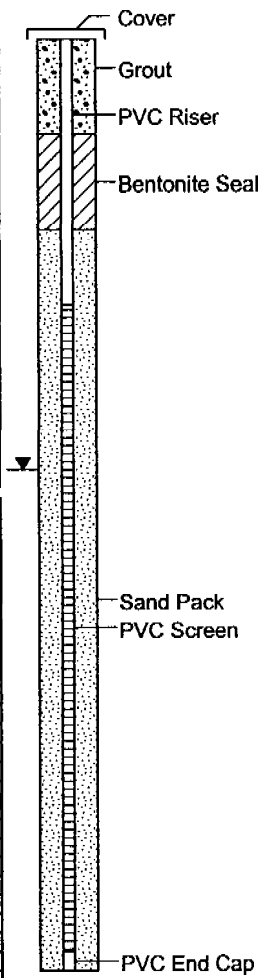
USACHPPM
Readiness thru Health

LOG OF MW-01B

WALTER REED ARMY MEDICAL CENTER
WELL CONSTRUCTION DIAGRAM
PROJECT NO. 38-EH-7240-01
LOCATION: Forest Glen Bldg. 512

DATE	: 22 August 2001	Auger	: 9" OD Hollow stem
Geologist	: Wayne Fox		
Technician	: Mark Farro		
Technician	: Mark Pippen		
Drill Rig	: Mobile B80		

Well: MW-01B
316.90 TOC elev. in ft.



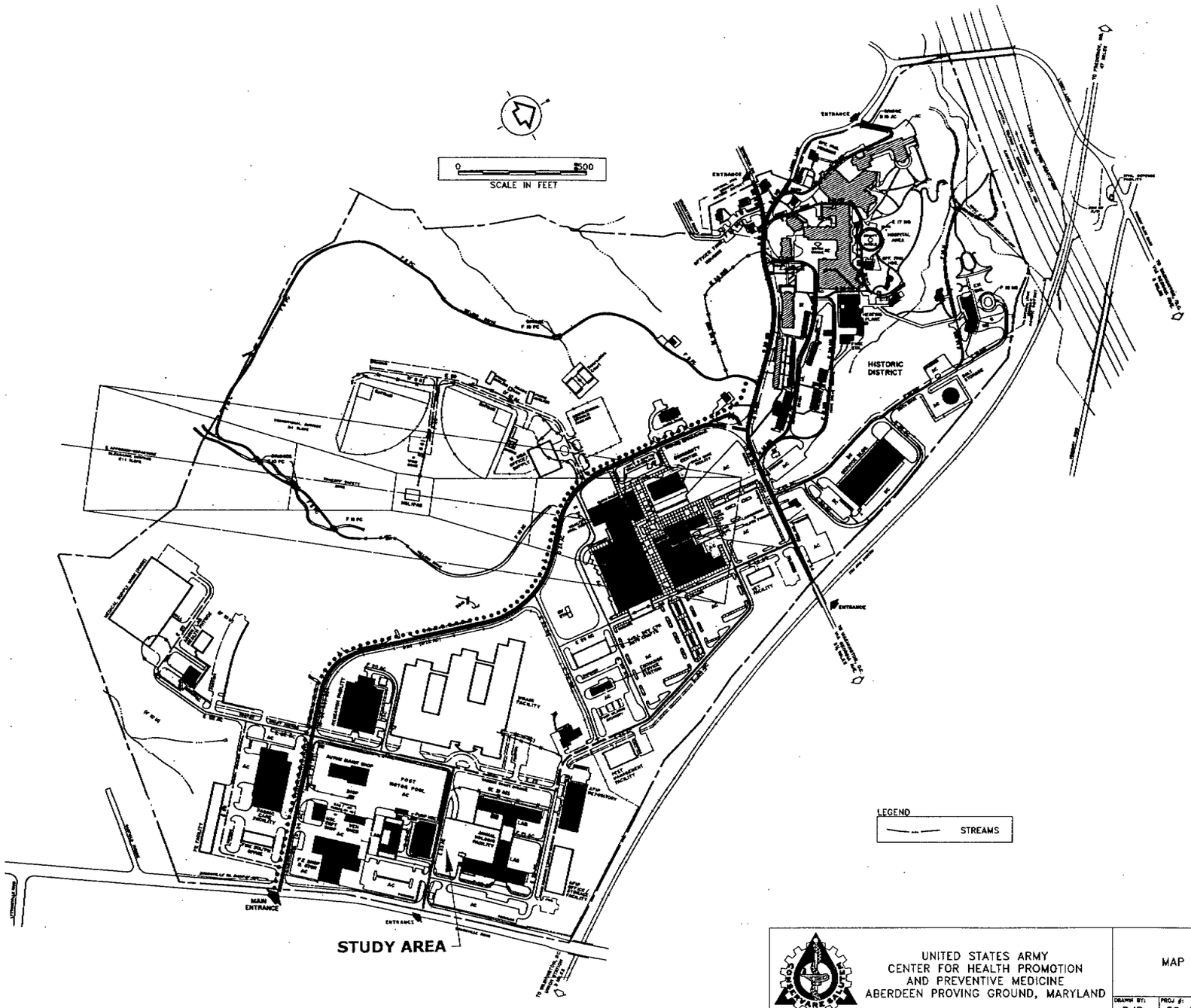
DESCRIPTION
Silt, with sand, fine grained, tan. No fuel odor.
Silt and sand, medium to fine grained, and muscovite mica flakes, trace gravel, tan. No fuel odor.
Silt, with sand, fine grained, muscovite mica flakes, tan. No fuel odor.
Silt and sand, medium to fine grained, trace of gravel, muscovite mica flakes, gray-brown. Fiant fuel odor.
Silt and sand, medium to fine grained, muscovite mica flakes, trace of gravel, tan. Moderate fuel odor.
Silt and sand, medium to fine grained, muscovite mica flakes, trace of gravel, gray-brown. Moderate fuel odor.
Silt, clay, with sand, medium to fine grained, trace gravel, muscovite mica flakes, weathered rock, gray-brown. Several rocks encountered, drilling slow (12.5'-14'). Moderate fuel odor.
Silt, clay, sand, medium to fine grained, muscovite mica flakes, trace of gravel, gray-brown. Moist. Strong fuel odor.
Silt, clay, and sand, medium to fine grained, muscovite mica flakes, gray-brown. Moist. Strong fuel odor.
Silt and sand, medium to fine grained, muscovite mica flakes, tan. Saturated. No fuel odor.
Note: Fuel Oil visible on augers as they were removed from the borehole. Sheen of fuel on surface of ground-water. Well developed with double disposable bailers and removed 15 gallons. Water level bailed down to 5' of water, then constant recovery.

09-04-2001 C:\Progra clmw0

TABLE. GROUND-WATER MONITORING WELL CONSTRUCTION SUMMARY

WELL NUMBER	MW-01A	MW-01B				
1. Height of Monitoring Well Casing Above Ground Level	0.10	0.08				
2. Total Depth of Well Below Ground Level	23.49	24.47				
3. Depth to Top of Well Screen Below Ground Level	6.49	7.47				
4. Well Screen Length	17	17				
5. Well Screen Slot Size (inches)	0.010"	0.010"				
6. Well Diameter (inches)	4"	4"				
7. Monitoring Well Casing Material	PVC	PVC				
8. Monitoring Well Screen Material	PVC	PVC				
9. Grout Thickness Below Ground Level	2.0	2.4				
10. Depth to Top of Bentonite Seal Below Ground Level	2.0	2.4				
11. Bentonite Seal Thickness	2.3	2.4				
12. Depth to Top of Sand Pack from Ground Surface	4.3	4.8				
13. Elevation - Top of Monitoring Well Casing	316.08	316.90				
14. Elevation at Ground Level	315.98	316.82				
15. Depth to Static Water Level						
a. Date Measured	22 Aug 01	22 Aug 01				
b. From Top of Monitoring Well Casing	10.50	11.40				
c. From Ground Level	10.40	11.32				
d. Water Level Elevation	305.58	305.50				

Comments: All measurements are in feet unless otherwise stated.



UNITED STATES ARMY
CENTER FOR HEALTH PROMOTION
AND PREVENTIVE MEDICINE
ABERDEEN PROVING GROUND, MARYLAND

FIGURE 1
MAP OF FOREST GLEN ANNEX, WRAMC.,
AND THE STUDY AREA

DRAWN BY:	PROJ #:	FILE:
DJB	38-EH-7240-01	MD/WR../FGLN../FGLNSTDY