UNITED STATES ARMY ENVIRONMENTAL HYGIENE AGENCY

ABERDEEN PROVING GROUND, MD 21010-5422

GEOHYDROLOGIC STUDY NO. 38-26-8916-90
FORT WINGATE DEPOT ACTIVITY
GALLUP, NEW MEXICO
16-20 APRIL 1990

REPORT FILMED

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DEPARTMENT OF THE ARMY
U. S. ARMY ENVIRONMENTAL HYGIENE AGENCY
ABERDEEN PROVING GROUND, MARYLAND 21010-5422

REPLY TO ATTENTION OF

26 JUN 1990

HSHB-ME-SG (40)

MEMORANDUM FOR Commander, U.S. Army Materiel Command, ATTN: AMCSG, 5001 Eisenhower Avenue, Alexandria, VA 22333-0001

SUBJECT: Geohydrologic Study No. 38-26-8916-90, Fort Wingate Depot Activity, Gallup, New Mexico, 16-20 April 1990

Copies of report with Executive Summary are enclosed.

FOR THE COMMANDER:

Paul R. Thies

PAUL R. THIES
LTC, MS
Chief, Waste Disposal Engineering Division

Encl

CF:
HQDA(SGPS-PSP) (wo/encl)
HQDA(ENVR-E) (w/encl)
DA, USAEHSC, ATTN: CEHSC-F (w/encl)
Cdr, DESCOM, ATTN: AMSDS-EN-FD (w/encl)
Cdr, HSC, ATTN: HSCL-P (w/encl)
Cdr, Ft Wingate DA, ATTN: SDSTE-FW-CO-A (5 cy) (w/encl)
Cdr, WBAMC, ATTN: PVNTMED Svc (2 cy) (w/encl)
Cdr, USATHAMA, ATTN: CETHA-TE-E (w/encl)
Cdr, USATHAMA, ATTN: CETHA-RM(TIC) (2 cy) (w/encl)
Cdr, USAEHA-W (w/encl)

38-26-8916-90
COMPLETED
26 Jun 90

Geohydrologic Study No. 38-26-8916-90, 16-20 Apr 90

CONTENTS

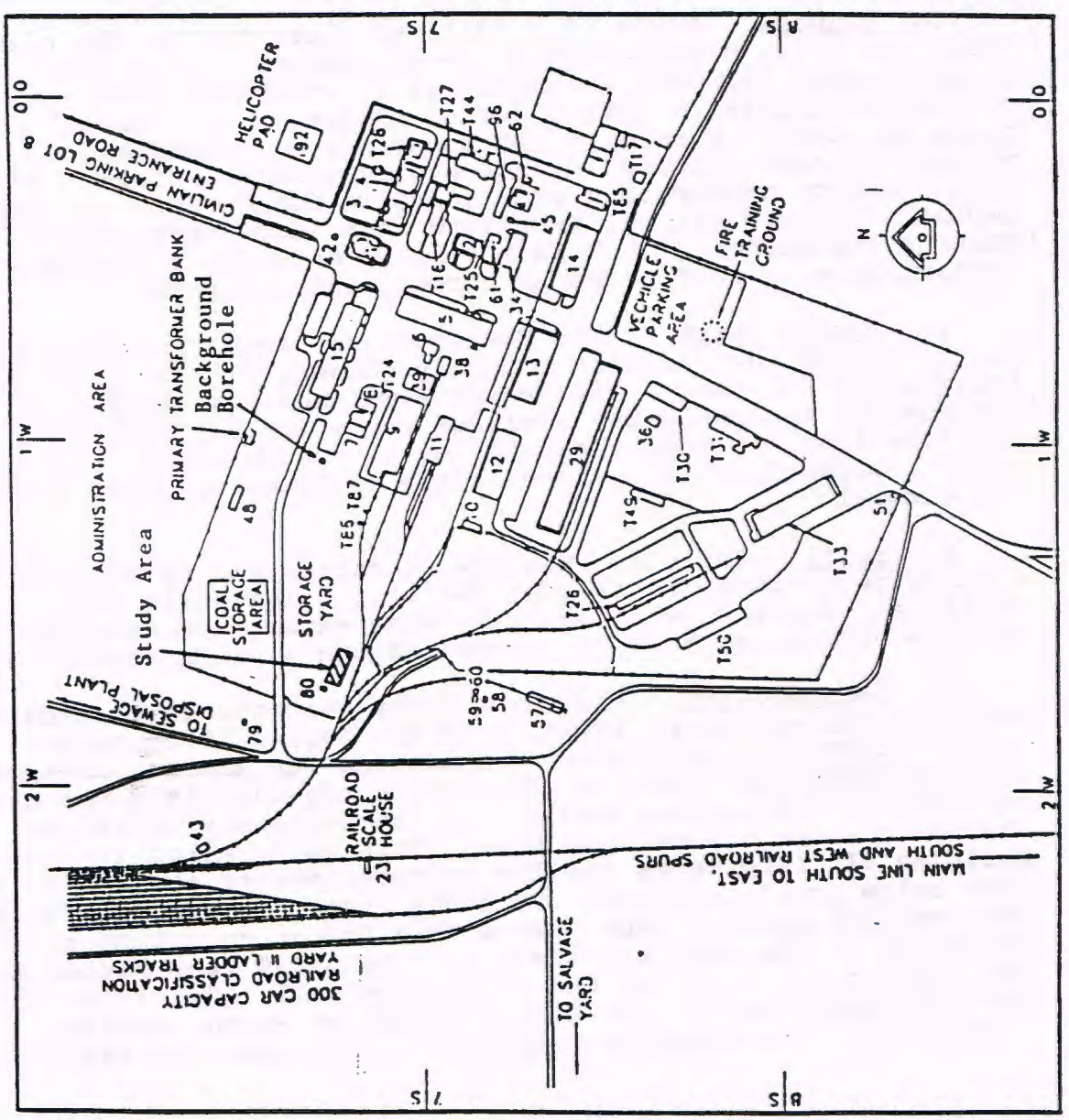

FIGURE 1. Facilities within FWDA Administration Area (adapted from an FWDA map)

The Chinle Formation acts as a barrier to the downward movement of ground water (reference 5).

i. Description of Storage Yard Activities. The Storage Yard area is shown on Figure 1. The fenced-in area is approximately 700 feet by 400 feet. The approximate dates of usage are 1970 to present. The area is used primarily to store items being turned in to DRMO or awaiting pickup by a recycling contractor. When enough wastes were accumulated, the recycler was contacted for pickup. Batteries full of electrolyte were also stored here, later to be emptied and turned in to DRMO. Specific wastes include metal parts and equipment to be turned in to DRMO, waste oil and solvent sludge stored in 55-gallon drums awaiting pickup by recycler, empty 55-gallon drums and battery electrolyte containers, and full batteries (reference 6). The area where the leaking drums contaminated the surface soil is located in the southwest part of the Storage Yard (Figure 1).

5. FINDINGS AND DISCUSSION.

a. Methodology. Nine soil borings were drilled in the study area at locations shown in Figures 1 and 2. Soil borings were selected on the basis of visually identified spill sites and general drum storage area definition. All boreholes were drilled with a 6-inch diameter hollow stem auger with soil samples taken with a 3-inch diameter split-spoon sampler at 0 to 1.5, 4 to 5.5, and 9 to 10.5 feet. No odor or soil staining was present in the 4.0 foot sample in all boreholes; therefore, sampling was stopped with the 9 to 10.5 foot soil sample to be sure the contaminated soil zone would be identified. The borehole numbers are designated BGRD and SY-1 through SY-8. The sample number after the borehole number in the Tables indicates the depth to the top of the sampled interval in feet below ground surface. Detailed drilling logs were written for each borehole as provided in Appendix B. Soil samples were placed in the appropriate container and shipped in ice chests to the USAEHA laboratories. Soil samples were taken from nine boreholes to identify the presence of contamination at the site. Soil samples taken from the background borehole were tested for metals only using extraction procedure toxicity methodology. All other soil samples were tested for petroleum hydrocarbons, volatile and extractable organics, and metals using extraction procedure toxicity methodology. Appendix C provides a listing of the analytical parameters and quantitation limits used for this study.

b. Soil Contamination. The shallow soils at the study area were dry red-brown silt and fine grained sand. Chemical analyses of these soils for volatile organic compounds showed low

concentrations of methylene chloride (6 to 15 µg/kg) in 3 of 24 samples and acetone (13 to 36 µg/kg) in 19 of 24 samples. The presence of these two compounds is probably an indication of laboratory contamination. The distribution pattern of acetone in the boreholes does not relate to spill locations at the site. All metals analyses were below the quantitation limits listed in Table C-3. The semivolatile or extractable organic compounds listed in Table C-2 were generally below the quantitation limits; however, the few detected compounds are presented in Table 1. None of the compounds listed in Table 1 (or acetone and methylene chloride) are toxic at the concentrations detected (reference 7). The results of the analyses for total petroleum hydrocarbons are provided in Table 2. As expected, the samples taken at the location of surface staining had the higher concentrations of petroleum hydrocarbons. The concentrations of petroleum hydrocarbons in the soil samples in the same borehole drops by at least one order of magnitude between sampled depths for the sites of highest contamination (SY-1, SY-5, and SY-7). This indicates that the waste oil was not particularly mobile in this subsurface environment and the amount of waste oil spilled at the site was small. Petroleum hydrocarbons were also analyzed using the gas chromatograph which is a good method for identifying fuels; however, no fuels were found at a detection limit of 14 µg/g.

TABLE 1. RESULTS OF SOIL ANALYSES FOR ORGANIC COMPOUNDS*

Semivolatile Organic Compounds	Borehole Number and Sample Depth+ SY-1-0	SY-4-0
pyrene	890	<330
bis (2-ethlhexyl) phthalate	2850	<330
fluoranthene	<330	700
phenanthrene	<330	790

* Only those organic compounds detected in soil samples are listed in this table. A list of all organic compounds analyzed under this study and their respective detection limits are shown in Appendix C.
+ Concentrations in µg/kg.

c. Contaminated Soil Remedial Action. Waste oil is not considered a hazardous waste in the State of New Mexico; however, waste oil identified in the soil may require excavation, treatment, or disposal at an appropriate landfill. At the present time the State of New Mexico has no criteria for this type of remedial action; however, the State determines the appropriate remedial action on a site by site basis.

6. CONCLUSIONS.

a. No significant contamination was found in the soil, except for petroleum hydrocarbons.

b. Spill sites at the former drum storage area of the Storage Yard show significant contamination from waste oil to depths of less than 9 feet below ground surface.

c. Petroleum hydrocarbons found at the former drum storage area of the Storage Yard do not represent a source of groundwater contamination.

7. RECOMMENDATION. Negotiate remedial actions or alternatives with the State regarding fuel-contaminated soil.

for WAYNE A. FOX
Geologist
Waste Disposal Engineering Division

APPROVED:

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

APPENDIX B

DRILLING LOGS

US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

PROJECT Fort Wingate DATE 21 April 90

LOCATION Storage Yard DRILLERS Smithson, Farro, Fox

DRILL RIG Acker AD II with 6 inch hollow stem auger BORE HOLE SY-1

(feet) DEPTH	SAMPLE TYPE / BLOWS PER 6 IN	DESCRIPTION	REMARKS
0	SS	Silt, some fine grained sand red-brown	Oil stained top 6 inches
		Silt and clay, red-brown	
		Silt, some fine grained sand and clay, red-brown	Dry, no odor
5	SS		
10	SS	Sand, fine grained, red-brown	Dry, no odor
		Bottom of Hole	

AEHA Form 130, 1 Nov 82

Replaces HSHB Form 7B, 1 Jun 80, which will be used.

US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

PROJECT Fort Wingate DATE 21 April 90

LOCATION Storage Yard DRILLERS Smithson, Farro, .. Fox

DRILL RIG Acker AD II with 6 inch hollow stem auger BORE HOLE SY-3

(feet) DEPTH	SAMPLE TYPE / BLOWS PER 6 IN.	DESCRIPTION	REMARKS
0	SS	Silt, some clay, trace of sand, red-brown	Dry, no stain or odor
5	SS	Sand, medium to fine grained, trace of silt	Dry, no odor
		Silt, trace of sand, red-brown	
10	SS		Dry, no odor
		Bottom of Hole	

AEHA Form 130, 1 Nov 82

Replaces HSHB Form 78, 1 Jun 80, which will be used.

US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

PROJECT Fort Wingate DATE 22 April 90

LOCATION Storage Yard DRILLERS Smithson, Farro, Fox

DRILL RIG Acker AD II with 6 inch hollow stem auger BORE HOLE SY-5

(feet) DEPTH	SAMPLE TYPE / BLOWS PER 6 IN.	DESCRIPTION	REMARKS
0	SS	Silt with fine grained sand, red-brown	Petroleum odor top 1 foot
5	SS	Sand, fine to medium grained, silt and thin gravel lens, red-brown	Dry, no odor
10	SS	Bottom of Hole	Caliche Dry, no odor

AEHA Form 130, 1 Nov 82

Replaces HSHB Form 78, 1 Jun 80, which will be used.

US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

PROJECT Fort Wingate DATE 22 April 1990

LOCATION Storage Yard DRILLERS Smithson, Farro, Fox

DRILL RIG Acker AD II with 6 inch hollow stem auger BORE HOLE SY-7

(feet) DEPTH	SAMPLE TYPE / BLOWS PER 6 IN.	DESCRIPTION	REMARKS
0	SS	Silt, with fine grained sand, red-brown	Strong Petroleum odor top 1 foot
		Sand, fine grained, and silt red-brown	Dry, no odor
5	SS		
10	SS	Bottom of Hole	Dry, no odor

AEHA Form 130, 1 Nov 82

Replaces HSHB Form 78, 1 Jun 80, which will be used.

APPENDIX C

COMPOUNDS ANALYZED AND QUANTITATION LIMITS

TABLE C-2. SEMIVOLATILE ORGANIC COMPOUNDS ANALYZED* AND QUANTITATION LIMITS IN µg/L

Organic Compound	Quantitation limit in µg/L
phenol	330.
bis (2-chloroethyl) ether	330.
2-chlorophenol	330.
1,3-dichlorobenzene	330.
1,4-dichlorobenzene	330.
benzyl alcohol	330.
1,2-dichlorobenzene	330.
2-methylphenol	330.
bis (2-chloroisopropyl) ether	330.
4-methylphenol	330.
N-nitrosodi-n-propylamine	330.
hexachloroethane	330.
nitrobenzene	330.
isophorone	330.
2-nitrophenol	330.
2,4-dimethylphenol	330.
benzoic acid	1700.
bis (2-chloroethoxy) methane	330.
2,4-dichlorophenol	330.
1,2,4-trichlorobenzene	330.
naphthalene	330.
4-chloroaniline	330.
hexachlorobutadiene	330.
4-chloro-3-methylphenol	330.
2-methylnaphthalene	330.
hexachlorocyclopentadiene	330.
2,4,6-trichlorophenol	330.
2,4,5-trichlorophenol	1700.
2-chloronaphthalene	330.
2-nitroaniline	1700.
dimethyl phthalate	330.
acenaphthylene	330.
3-nitroaniline	1700.
acenaphthene	330.
2,4-dinitrophenol	1700.
4-nitrophenol	1700.
dibenzofuran	330.
2,4-dinitrotoluene	330.
2,6-dinitrotoluene	330.
diethyl phthalate	330.
4-chlorophenyl phenyl ether	330.
fluorene	330.
4-nitroaniline	1700.
2-methyl-4,6-dinitrophenol	1700.
N-nitrosodiphenylamine	330.
4-bromophenyl phenyl ether	330.
hexachlorobenzene	330.
pentachlorophenol	1700.
phenanthrene	330.
anthracene	330.
di-n-butyl phthalate	330.
fluoranthene	330.
pyrene	330.
butyl benzyl phthalate	330.
3,3'-dichlorobenzidine	670.
benzo (a) anthracene	330.
bis (2-ethylhexyl) phthalate	330.
chrysene	330.
di-n-octyl phthalate	330.
benzo (b) fluoranthene	330.
benzo (K) fluoranthene	330.
benzo (a) pyrene	330.
indeno (1,2,3-cd) pyrene	330.
dibenzo (a,h) anthracene	330.
benzo (ghi) perylene	330.

*EPA Method 8270

APPENDIX D

TOTAL PETROLEUM HYDROCARBONS ANALYTICAL METHOD

SUBJECT: Total Petroleum Hydrocarbon Content of Fort Wingate Soils

DATE: 12 June 90

SUMMARY: Twenty-four soils from Fort Wingate were analyzed for total and petroleum hydrocarbon content. Hydrocarbon values measured in these soils ranged from 11,300 to less than one microgram/gram (see Table).

EXPERIMENTAL PROCEDURES:

1. Soil samples were extracted using EPA method 3550, a method published in the EPA publication Test Methods for Evaluating Solid Waste, SW846, Third Edition. Thirty gram portions of each sample were mixed with 60 grams of anhydrous sodium sulfate and sonicated with three 100 ml portions of Freon-113. The resulting extracts were filtered and concentrated to appropriate volumes using Kuderna Danish concentrators.

2. The extracts were then analyzed by USAEHA Standard Operating Procedure 102.2 (EPA Method 418.1) using quantitative infrared spectroscopy. The analysis procedure included an optional treatment of samples with deactivated silica gel if the total hydrocarbon content was measured at greater than 100 microgram/gram. The silica gel treatment removed potential polar hydrocarbon interferences such as humic acids and other biological degradation products, and reduced the hydrocarbon measure to strictly petroleum hydrocarbon material.

Analyst	Reviewed	Data Release Authorized
Mark Harvison	Paul M. Sebula	Robert J. Valis
Chemist, SAB	Chemist, SAB	Chief, SAB

TABLE C-3. METALS ANALYZED USING EXTRACTION PROCEDURE TOXICITY METHODS AND QUANTITATION LIMITS IN mg/L

METAL	QUANTITATION LIMITS (mg/L)
Arsenic	0.50
Barium	10.0
Cadmium	0.10
Chromium	0.50
Mercury	0.020
Lead	0.50
Selenium	0.10
Silver	0.50

TABLE C-1. VOLATILE ORGANIC COMPOUNDS ANALYZED* AND QUANTITATION LIMITS IN µg/kg

Organic Compound	Quantitation limit in µg/L
chloromethane	10.
bromomethane	10.
vinyl chloride	10.
chloroethane	10.
methylene chloride	5.
acetone	10.
carbon disulfide	5.
1,1-dichloroethylene	5.
1,1-dichloroethane	5.
1,2-dichloroethylene (total)	5.
chloroform	5.
1,2-dichloroethane	5.
2-butanone	10.
1,1,1-trichloroethane	5.
vinyl acetate	10.
carbon tetrachloride	5.
bromodichloromethane	5.
1,2-dichloropropane	5.
cis-1,3-dichloropropene	5.
trichloroethylene	5.
dibromochloromethane	5.
1,1,2-trichloroethane	5.
benzene	5.
trans-1,3-dichloropropene	5.
bromoform	5.
4-methyl-2-pentanone	10.
2-hexanone	10.
tetrachloroethylene	5.
1,1,2,2-tetrachloroethane	5.
toluene	5.
chlorobenzene	5.
ethylbenzene	5.
styrene	5.
xylenes (total)	5.

*EPA Method 8260

US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

PROJECT Fort Wingate DATE 22 April 1990

LOCATION Storage Yard DRILLERS Smithson, Farro, Fox

DRILL RIG Acker AD II with 6 inch hollow stem auger BORE HOLE SY-8

(feet) DEPTH	SAMPLE TYPE / BLOWS PER 6 IN.	DESCRIPTION	REMARKS
0	SS	Silt, with fine grained sand, red-brown	Slight Petroleum odor to 1 foot
5	SS	Sand, fine grained, with silt red-brown	Dry, no odor
		Silt, with fine grained sand, red-brown	
10	SS		Dry, no odor
		Bottom of Hole	

AEHA Form 130, 1 Nov 82

Replaces HSHB Form 78, 1 Jun 80, which will be used.

US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

PROJECT Fort Wingate DATE 22 April 90

LOCATION Storage Yard DRILLERS Smithson, Farro, Fox

DRILL RIG Acker AD II with 6 inch hollow stem auger BORE HOLE SY-6

(feet) DEPTH	SAMPLE TYPE / BLOWS PER 6 IN	DESCRIPTION	REMARKS
0	SS	Silt, with fine grained sand, red-brown	Dry, no odor
5	SS	Sand, fine grained, red-brown	Dry, no odor
		Silt, with fine grained sand, red-brown	
10	SS	Bottom of Hole	Dry, no odor

AEHA Form 130, 1 Nov 82

Replaces HSHB Form 78, 1 Jun 80, which will be used.

US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

PROJECT: Fort Wingate
DATE: 22 April 90
LOCATION: Storage Yard
DRILLERS: Smithson, Farro, Fox
DRILL RIG: Acker AD II with 6 inch hollow stem auger
BORE HOLE: SY-4

(feet) DEPTH	SAMPLE TYPE / BLOWS PER 6 IN.	DESCRIPTION	REMARKS
0	SS	Silt and some fine grained sand, red-brown	Dry, no odor
5	SS	Sand, fine grained, with silt red-brown	Dry, no odor
		Silt and some fine grained sand, red-brown	
10	SS	Bottom of Hole	Dry, no odor

AEHA Form 130, 1 Nov 82

Replaces HSHB Form 78, 1 Jun 80, which will be used.

US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

PROJECT Fort Wingate DATE 21 April 90

LOCATION Storage Yard DRILLERS Smithson, Farro, Fox

DRILL RIG Acker AD II with 6 inch hollow stem auger BORE HOLE SY-2

(feet) DEPTH	SAMPLE TYPE / BLOWS PER 6 IN.	DESCRIPTION	REMARKS
0	SS	Silt and clay, trace of sand, red-brown	Dry, stained top 6 inches
5	SS	Sand, medium to fine grained, and silt, red-brown	Dry, no odor
		Silt and clay, trace of sand, red-brown	
10	SS	Bottom of Hole	Dry, no odor

AEHA Form 130, 1 Nov 82

Replaces HSHB Form 78, 1 Jun 80, which will be used.

US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

PROJECT Fort Wingate DATE 21 April 90

LOCATION Storage Yard DRILLERS Smithson, Farro, Fox

DRILL RIG Acker AD II with 6 inch hollow stem auger BORE HOLE BGRD

* SS = Split Spoon

DEPTH (feet)	SAMPLE TYPE / BLOWS PER 6 IN.	DESCRIPTION	REMARKS
0	SS*	Silt with sand, fine grained red-brown	Dry, no odor
		Clay and silt, red-brown	Dry, no odor
5	SS	Silt with sand, fine grained, red-brown	
10	SS	Sand, fine grained, red-brown	Dry, no odor
		Bottom of Hole	

AEHA Form 130, 1 Nov 82

Replaces HSHB Form 78, 1 Jun 80, which will be used.

APPENDIX A

REFERENCES

1. Letter, New Mexico Health and Environment Department, 2 October 1989, subject: Notice of Violation NM6213820974.

2. Letter, FWDA, 3 November 1989, subject: Response to Notice of Violation NM6213820974 (with enclosure identifying the hazardous waste characteristics and constituents, and PCB content).

3. Letter, USAEHA, HSE-ES-G/WP, 21 August 1981, subject: Army Pollution Abatement Program Study, Hazardous Waste Management Consultation, Fort Wingate Depot Activity, Gallup, NM, 14-15 May 1981 (USAEHA Control No. 81-26-8263-81).

4. Installation Environmental Assessment, Tooele Army Depot, Fort Wingate Depot Activity, Gallup, New Mexico, August, 1982, prepared by Inland Pacific Engineering Company.

5. Environmental Survey of Fort Wingate Depot Activity, Gallup, New Mexico 87301, Final Report, Environmental Science and Engineering, Inc., 19 September 1981.

6. Memorandum, USAEHA, HSHB-ME-SE, 23 November 1988, subject: Interim Final Report, Ground-Water Contamination Survey No. 38-26-0307-89, Evaluation of Solid Waste Management Units, Fort Wingate Depot Activity, Gallop, New Mexico, 11-15 July 1988.

7. Sax, N. I. and R. J. Lewis, Sr., Dangerous Properties of Industrial Materials, 7th Edition, 3 Volumes, Van Nostrand Reinhold, N.Y., 1989.

TABLE 2. FORT WINGATE SOIL PETROLEUM HYDROCARBON CONTENT

USAEHA #	FIELD #	HYDROCARBON CONTENT (UG/G)
A8059	SY-1-0	11,300*
A8060	SY-1-4	754*
A8061	SY-1-9	13
A8062	SY-2-0	<1
A8063	SY-2-4	7
A8064	SY-2-9	<1
A8065	SY-3-0	56
A8066	SY-3-4	4
A8067	SY-3-9	<1
A8068	SY-4-0	48
A8069	SY-4-4	38
A8070	SY-4-9	11
A8071	SY-5-0	2850*
A8072	SY-5-4	270
A8073	SY-5-9	94
A8074	SY-6-0	<1
A8075	SY-6-4	1
A8076	SY-6-9	<1
A8077	SY-7-0	2290*
A8078	SY-7-4	282*
A8079	SY-7-9	25
A8080	SY-8-0	17
A8081	SY-8-4	23
A8082	SY-8-9	30

* Petroleum hydrocarbon content verified by reanalysis after silica gel treatment (see Appendix D)

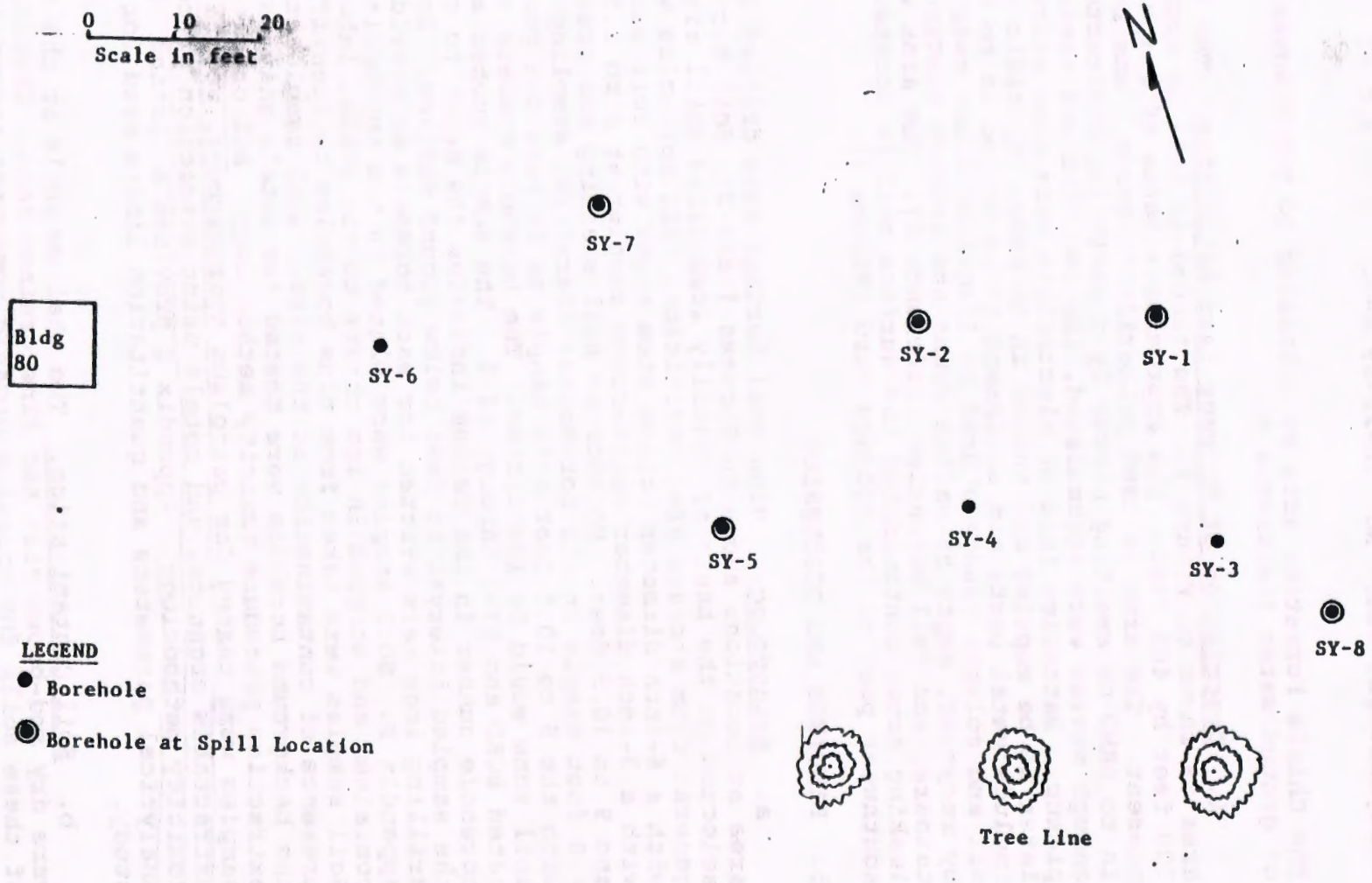

FIGURE 2. Location of Soil Borings at the Storage Yard.

d. Physiography and Topography. The FWDA is uniquely situated on a flat valley amid the geologic formations which provide its natural borders: to the north, the Puerco River and Wingate cliffs; to the east, a broad valley leading to the Zuni Mountains; to the west, the steeply dipping "Hogback"; and to the south, the foothills of the Zuni Mountains. The installation occupies the southern tip of the Colorado Plateau Physiographic Province. Within FWDA, small ridges of tilted sedimentary rocks are abundant. Most of the FWDA facilities are situated on the flat river valley except for the Demolition Area and several igloo areas; these are near the foothills of the Zuni Mountains.

e. Climate. Semiarid conditions characterize the climate at FWDA, and it is designated as the semidesert biotic zone. Annual precipitation has been estimated at 11 inches at FWDA with much of the precipitation coming during summer storm events. Climate plays an important role in determining the contamination migration potential via surface and subsurface waters. At FWDA water lost to evaporation and transpiration greatly exceeds the amount of precipitation, resulting in a large negative water balance (reference 3). This severely restricts the movement of contaminants to surface water streams and aquifers.

f. Surface Water. The Puerco River flows from west to east just north of installation boundary; however, this River is dry for most of the year. The Puerco River and its south fork provide the surface water drainage route for the FWDA area with the flow from the depot being directed to the north. In general, surface water flow is limited to the episodes of heavy rainfall and snowmelt.

g. Soils. Soils at FWDA are characterized by sandy loams with large percentages of clay and silt. The soils are relatively shallow, with bedrock being exposed or near the ground surface over as much as 25 percent of the area (reference 4).

h. Geohydrology. The three major geologic units underlying FWDA are the surficial alluvium of the Puerco River valley, Chinle Claystone, and Glorieta Sandstone/San Andres Limestone. The sandstone and limestone formations together form the major aquifer for the region, and supply the necessary water for FWDA through the use of one deep well. This well, which is located at Building 61, intercepts the San Andres-Glorieta aquifer at 1,350 feet below ground surface. Recharge areas for the aquifer are in the southern part of FWDA, where this formation outcrops. The elevation at the unit's outcrop is some 3,000 feet higher than the aquifer elevation at the production well. Overlying the Glorieta sandstone is the Chinle Formation which consists of 1,100 feet of alternating claystone, siltstone, and sandstone.

DEPARTMENT OF THE ARMY
U. S. ARMY ENVIRONMENTAL HYGIENE AGENCY
ABERDEEN PROVING GROUND, MARYLAND 21010-5422

REPLY TO ATTENTION OF

HSHB-ME-SG

GEOHYDROLOGIC STUDY NO. 38-26-8916-90
FORT WINGATE DEPOT ACTIVITY
GALLUP, NEW MEXICO
16-20 APRIL 1990

1. REFERENCES. Appendix A contains a list of references.

2. AUTHORITY.

a. AEHA Form 250-R, AMC, 17 January 1990.

b. Memorandum, USAEHA, HSHB-ME, 14 March 1990, subject: USAEHA Schedule of Field Services, FY 90.

3. PURPOSE. Our purpose in performing this study was to conduct a focused, limited, environmental sampling program to identify the presence of hazardous waste constituents in soil at the Storage Yard west of the Administrative Area.

4. GENERAL.

a. Personnel Contacted.

(1) MAJ Timothy A. Ensman, Commander, Fort Wingate Depot Activity (FWDA).

(2) Mr. Frank J. O'Donovan Jr, Chief, Installation Support Division, FWDA.

b. Location and Mission. Fort Wingate Depot Activity is located 11 miles east of Gallup, New Mexico, and approximately 130 miles west of Albuquerque. The installation occupies approximately 34 square miles. The FWDA presently operates under the command of Tooele Army Depot as a storage facility for the care, preservation, and maintenance of assigned commodities. Included in its services are limited shipping and receiving, and ammunition demilitarization.

c. Regulatory Considerations. As documented in the 2 October 1989 Notice of Violation (reference 1), waste oil drums previously located in the Storage Yard (Figure 1) were leaking onto the ground. During early September 1989, all barrels were sampled and were subsequently identified in terms of their contents (reference 2). The barrels were shipped to the Kirtland AFB, Defense Reutilization and Marketing Office (DRMO) Facility on 1 February 1990. This Geohydrologic Study addresses concerns about surface contamination mentioned in reference 1.

DEPARTMENT OF THE ARMY
U.S. ARMY ENVIRONMENTAL HYGIENE AGENCY
ABERDEEN PROVING GROUND, MARYLAND 21010-5422

REPLY TO ATTENTION OF

EXECUTIVE SUMMARY
GEOHYDROLOGIC STUDY NO. 38-26-8916-90
FORT WINGATE DEPOT ACTIVITY
GALLUP, NEW MEXICO
16-20 APRIL 1990

1. PURPOSE. Our purpose in performing this study was to conduct a focused, limited, environmental sampling program to identify the presence of hazardous waste constituents in soil at the Storage Yard west of the Administrative Area.

2. CONCLUSIONS. No significant contamination was found in the soil, except for petroleum hydrocarbons. Spill sites at the former drum storage area of the Storage Yard show significant contamination from waste oil to depths of less than 9 feet below ground surface. Petroleum hydrocarbons found at the former drum storage area of the Storage Yard do not represent a source of ground-water contamination.

3. RECOMMENDATION. Negotiate remedial actions or alternatives with the State regarding fuel-contaminated soil.

Under the command jurisdiction of the U.S. Army Health Services Command, AEHA's mission is to support the worldwide preventive medicine programs of the Army and other Department of Defense and Federal agencies.

The Agency is unique with the variety of scientific disciplines working together in one military unit to protect the health and well being of soldiers and civilians and enhance the environment.

This is accomplished through support in environmental quality, occupational and environmental health, toxicology, industrial hygiene, radiation and entomological sciences, pest management, and laboratory services. Various types of field services are provided upon request.