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Final Report

on

Hydrogeological and Environmental Investigation of the Equalization Basin of the Wastewater Treatment Plant, Building 470 Radford Army Ammunition Plant, Radford, Virginia

(Hercules Purchase Order: VA04228)

Submitted to

Hercules, Inc.
Radford Army Ammunition Plant
Caller Service 1
Radford, VA 24141-0299

from

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Geophex Job Number: 194
October 5, 1990

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October 5, 1990

Mr. Robert C. Webb
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Radford Army Ammunition Plant
Caller Service 1
Radford, VA 24141-0299

Ref: Hydrogeological and Environmental Investigation of the Equalization Basin of the Wastewater Treatment Plant, Building 470, Radford Army Ammunition Plant, Radford, Virginia *(Hercules Purchase Order: VA04228, dated June 25, 1990)*

Dear Mr. Webb:

Attached is the Phase II Final Report for the referenced contract. The reporting format as it is may be suitable to include the whole report as an attachment to your Part B Permit Application. Should you prefer some other format, we would gladly accommodate the request. Kindly review the report and advise us if you have any suggestions or revisions.

I would like also to remind you that we will be able to assist you additionally in preparing your Part B Permit Application.

We enjoyed working on this project and appreciate your coordination throughout the project. We also hope that Geophex will have future opportunities to continue our technical services to you and RAAP.

Sincerely,

I.J. Won, PhD, PG
Project Manager

Encl:
ijw/ah

Geophex Job # 194

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1.0 Purpose of the Investigation

Geophex, Ltd. was tasked on June 25, 1990, by Hercules, Inc., to provide geotechnical and hydrogeological information necessary to satisfy the requirements for a RCRA Part B Hazardous Waste Permit Application for the Equalization Basin of the Biological Wastewater Treatment Plant, Building 470, Radford Army Ammunition Plant (RAAP), Radford, Virginia. The Basin is also known as the Solid Waste Management Unit (SWMU) Number 10 and has been declared a hazardous waste facility because of K044 sludge resulting from manufacturing and processing of explosives.

The task consisted of two phases. Phase I involved mainly (1) inspecting existing groundwater monitor wells, (2) reviewing all existing monitoring data, and (3) recommending additional work to support the Part B Permit Application. After reviewing our Phase I report submitted on July 31, 1990, RAAP authorized Geophex to proceed with Phase II that consisted of (1) installing two additional monitor wells including a deep well into the bedrock, (2) conducting comprehensive analyses of six water samples, (3) performing aquifer tests to derive the hydrologic characteristics, and (4) preparing a supporting document for the permit application. This report covers the summary of the two phases.

2.0 General Hydrogeologic Information

2.1 Regional Geology and Hydrogeology

2.1.1 Geography

Radford Army Ammunition Plant (RAAP) is located in the mountains of southwest Virginia in Pulaski and Montgomery Counties. Figure 1 shows RAAP in the Official Virginia State Highway Map. Figure 2 shows the location of SWMU 10 on a US Geological Survey 7.5 minute Radford Quadrangle Map.

RAAP lies in one of a series of narrow valleys typical of the eastern range of the Appalachian. Oriented in a NE-SW direction, the valley is about 25 miles long. The plant is along the New River in the relatively narrow northeast end of the valley. As seen in Figure 2, the New River divides RAAP into two areas. Within the New River meander is the "horseshoe" area that contains the NG (nitroglycerin) No.2 Area, the Cast Propellant Area, and Continuous Propellant Area. Also located within the horseshoe area are former landfills, a hazardous waste landfill, an active sanitary landfill, and the Waste Propellant Burning Ground. South of the New River is the main manufacturing area, which includes the Finishing Area, the TNT (trinitrotoluene) Area, the NG, NC(nitrocellulose), and Acid Area, the Automated Propellant Area, and the Administration Area.

2.1.2 Regional Geology

The region is characterized by folded and thrusted-faulted strata of mostly sedimentary rocks formed between 600 and 300 million years ago. The area is within the Blacksburg-Pulaski synclinorium over the Pulaski Fault thrust sheet. Figure 3 show a simplified surface geology map of the RAAP area. The thrust sheet has been eroded exposing sandstones and shales of McCrady and Price Formation (Mississippian) to the east of the main area. The Elbrook Formation is the major rock unit at RAAP (Figure 3). The formation, ranging 1,400 feet to 2,000 feet in thickness, contains thick, bedded, blue-gray dolomite interspersed with limestones and shales. Sinkholes, solution channels, and pinnacle surfaces are common within the formation.

Unconsolidated sediments (overburden) covers the major portion of RAAP. The overburden is composed of alluvial sediments deposited by the New River, residual soils placed by weathering of parent bedrock, and colluvial deposits from slope wash. In general, there is an upwards textural fining, with gravels and silty, clayey sands forming the basal unit followed by fine micaceous silts and clays. Thickness of the alluvial deposits varies from a few feet to 50 feet, with an average of about 20 feet.

2.1.3 Regional Hydrogeology

Several borings within the horseshoe area of RAAP indicate that the water table within the flood plain is about the same elevation as the surface water of the river (USATHAMA, Installation Assessment of RAAP, Records Evaluation Report No. 103, 1976). The water table away from the river becomes extremely variable, mainly because of sporadic impervious layers, solution cavities, and the varying overburden thicknesses.

The groundwater beneath RAAP is mainly derived from the infiltration of surface water through the unsaturated soil into bedrock that stores water in fractures, bedding planes, foliation surfaces, and solution cavities. Limestone and dolomite of the Elbrook formation is severely fractured, foliated, and faulted as a result of movement along the Pulaski fault. The topographic map often shows evidence of solution cavities and collapse structures within less competent limestone units.

Groundwater levels in the bedrock or soil aquifers generally respond immediately to heavy precipitation and may rise several feet in short time. The New River is the main groundwater discharge at RAAP as it is for regional groundwater flow. The saturated zone can be in either soil or bedrock. Groundwater supplies are presently of comparable in quality to that of the superior, surface water supplies in the area. Many supplies contain, however, high level of dissolved solids derived from minerals (mostly carbonates and some sulfides) in the bedrock formation.

The New River varies from 200 to 1,000 feet in width. Next to SWMU 10, the river is about 600 feet wide and about 4 to 6 feet deep. The flow is regulated by a control structure located about 7 miles to the south. Stroubles Creek, the largest tributary of the New River, originates in the southeastern corner of RAAP (Figure 2). Larger surface drainages within RAAP and their flow directions are indicated in Figure 3. The State of Virginia classified Stroubles Creek and the stretch of New River within RAAP as water generally satisfactory for beneficial uses including public and municipal water supply, contact recreation, and fish and aquatic life (USATHAMA, 1976).

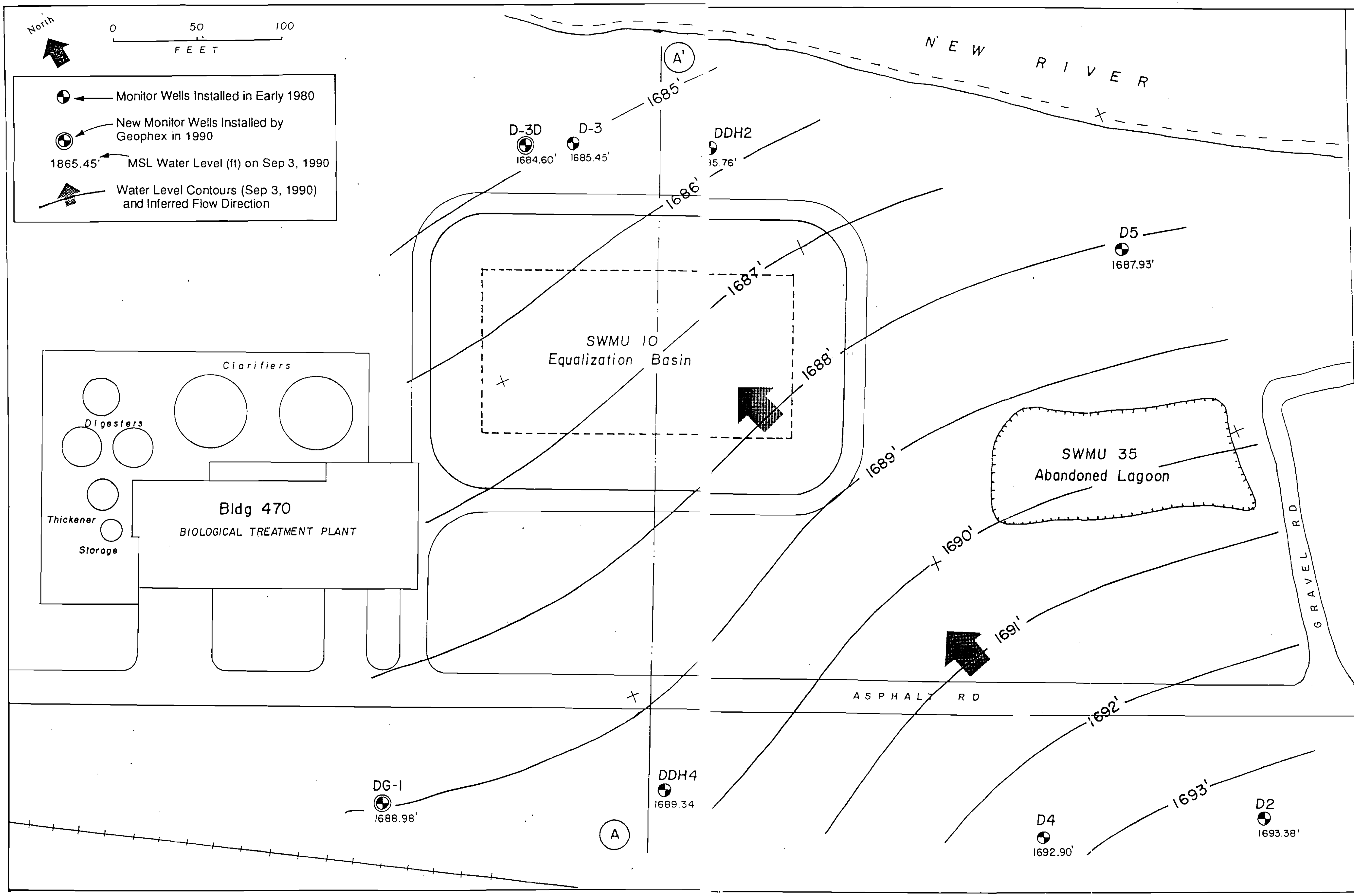


Figure 4. Site details, monitor wells, groundwater contours, and inferred flow direction.

Geophex

2.2 Site Hydrogeology

Discussions on specific geology and hydrogeology at the SWMU 10 site are based on:

- Six nearby existing groundwater monitor wells installed in early 1980s,
- Two additional monitor wells, including a 65-ft deep well, installed by Geophex during this investigation, and
- Two rounds of aquifer tests of all usable monitor wells.

Figure 4 shows the locations of all old and new monitor wells near the Equalization Basin and the treatment plant. The map is prepared by combining data that were included in a report by the NUS Corp in 1980 and another report by Dames & Moore in 1990 (RCRA Facility Investigation Work Plan for RAAP, submitted to USATHAMA on June 8, 1990).

Two monitor wells, DG-1 and D-3D (see Figure 4 for locations), were added during this study. DG-1 was expected to refine the up-gradient conditions. D-3D was intended to detect the deep aquifer contamination, if any, and to determine any vertical, groundwater flow component. These wells were drilled using a Reich T-650 air-rotary rig. An 8-inch diameter hole was initially drilled to the top of bedrock followed with a 6-inch temporary casing to prevent cave-in. A 6-inch hole was then drilled to the desired depth. The wells were completed using 2-inch PVC screens and casings followed with sand pack, bentonite, and portland cement/bentonite grout. The temporary 6-inch casing was removed during the grouting. Well completion records and drill logs are included in Appendix A.

Based on the water table data obtained by Geophex on September 3, 1990, we show in Figure 4 the water level contours (thick solid lines) and flow directions (shaded arrows). Table 1 shows summary data for all monitor wells including hydraulic conductivities determined by Geophex by means of slug tests. Monitor well D5 (Figure 4) was also tested but it was severely clogged either by fine silt or possibly carbonate deposition during past 10 years. Appendix A includes slug test data for all monitor wells. Hydraulic conductivities were derived by two methods, one by Hvorslev (1951) and the other by Cooper et al (1967). The Cooper method is not well suited for highly productive groundwater regimes and, therefore, we relied on the Hvorslev method for the final interpretation.

Table 1 shows the estimated flow speed for an assumed effective, formation porosity of 10%, which may be considered to be representative of the bedrock of the area. The average groundwater flow speed appears to be about 200 ft/year.

Figure 5 shows a cross-section based on the drill-logs and local topographic map contained. The thickness of the overburden material at this site varies from 14 feet to 26 feet, generally increasing away from New River. Owing to (a) the well-drained overburden soils, (b) the relatively high hydraulic conductivities observed from the aquifer test data, and (c) the high fracture or cavity densities within the limestone basement to at least several hundred feet in depth, it is most likely that the local groundwater regime is well connected both horizontally and vertically. The hydraulic connections, however, may not be isotropic or homogeneous but depend on fracture or cavity orientations that can cause channelling and tunneling of the groundwater flow.

Table 1. Monitor wells and groundwater flow characteristics.

Well	Total Depth (feet)	Hydraulic Conductivity Method 1 (1) (ft/day)	Hydraulic Conductivity Method 2 (1) (ft/day)	Flow Speed (Note 2) (ft/year)
DG-1	35.0	2.43	1.12	133
D-3	35	2.5	0.05	137
D-3D	64.0	0.73	0.03	40
D-4	35	8	93	438
DDH2	30	3.8	0.36	208
DDH4	34.3	2.80	-	153

Note 1. Method 1 is based on Hvorslev (1951) and Method 2 is based on Cooper et al. (1967).
Note 2. Flow speeds based on the measured groundwater gradient of 1.5 % and an assumed formation porosity of 10%.

One of the purpose of Well D-3D was to detect any vertical, groundwater flow component by comparing its water table with that of the nearby D-3. Presently, the water table of D-3D (deep well) is about 0.8 feet lower than that of D-3 (shallow well). Taking an average hydraulic conductivity from the two wells from Table 1, and a vertical screen separation of about 30 feet, we estimate an average, downward, vertical flow component of about 0.5 feet/day.

Combining this value with the horizontal flow components shown in Table 1, we can construct vectorial flow components at the two screened depths, which are also shown in Figure 5. Although the data are very limited and the results may be approximate, we infer based on this exercise that (1) the groundwater flow has a slight downward component, (2) the downward component increases with depth relative to the horizontal component, and (3) the total flow speed decreases rapidly with depth.

3.0 Contaminant Plume Description

3.1 Contamination Source

The waste-water that flows into SWMU 10 is from manufacturing of solvent propellant, solventless propellant, and nitroglycerin. The principal waste ingradients are alcohol, ether, and acetone. The average flow is approximately 1.3 million gallons per day with a maximum of 2.6 gallons per day. The amount of alcohol, ether, and acetone varies greatly depending on the formulations of propellants being processed. The average concentration of solvents is estimated to be 250 to 300 ppm.

The concern of this study is the potential leakage of any hazardous constituents through the basin's soil/cement/clay liner and possible degradation of groundwater quality resulting from the leakage. In June 1990, RAAP sampled the sludge and had it analyzed for all parameters under Toxicity Characteristics Leaching Procedure (TCLP) test. The results are summarized in Table 2 and the complete laboratory report is included in Appendix B. None of the TCLP parameters exceeded their regulatory limits.

Table 2. TCLP analysis of a sludge sample from wastewater treatment lagoon, SWMU 10, RAAP; (Date: June 25, 1990; Sample ID: CVLC #4910; Analysis by Central Virginia Laboratories and Consultants, Lynchburg, VA)

Parameter	Concentration (mg/l)	Regulatory Level (mg/l)
2,2-Dichlorobenzene	<0.003	7.5
1,2-Dichloroethane	<0.033	0.5
1,1-Dichloroethylene	<0.003	0.7
2,4-Dinitrotoluene	<0.010	0.13
Endrin	<0.0002	0.02
Heptachlor (& OH)	<0.0005	0.008
Hexachlorobenzene	<0.010	0.13
Hexachlorobutadiene	<0.010	0.5
Hexachloroethane	<0.010	3.0
Lead	0.7	5.0
Lindane	<0.001	0.4
Mercury	<0.0002	0.2
Methoxychlor	<0.001	10.0
Methyl Ethyl Ketone	<0.100	200.0
Nitrobenzene	<0.010	2.0
Pentachlorophenol	<0.050	100.0
Pyridine	<0.010	5.0
Selenium	<0.001	1.0
Silver	<0.025	5.0
Tetrachloroethylene	<0.003	0.7
Toxaphene	<0.005	0.5
Trichloroethylene	<0.003	0.5
2,4,5-Trichlorophenol	<0.010	400.0
2,4,6-Trichlorophenol	<0.010	2.0
2,4,5-TP (Silvex)	<0.001	1.0
Vinyl Chloride	<0.003	0.2

Parameter	Results (mg/1)	Limit (mg/1)*
Corrosivity	8.05 S.U.	2<pH<12.5
Ignitability	<212 °F	140 °F

***40 CFR 261 Established Limit**

3.2 Groundwater Contamination Study

3.2.1 Groundwater Analyses

Six groundwater samples from as many monitor wells and a duplicate sample (see Figure 4) were collected in August 1990 and analyzed for TCLP metals, volatile organics (under SW846 Method 8240) and semi-volatile organics (under SW846 Method 8270), and various reactivity parameters. The results are tabulated in Tables 3, 4, and 5.

Table 3. TCLP Metals, reactivity, corrosivity, explosivity, and other parameters for monitor well water samples (September 1990; analysis by IEA, Inc., Research Triangle Park, N.C.; for original laboratory reports, see Appendix B).

		Monitor Wells		
Parameters	Unit	D-3	D-3D	DG-1
Toxicity Characteristic Leaching Procedure (TCLP) Metals				
Mercury	mg/l	<0.0005	<0.0005	<0.0005
Silver	mg/l	<0.50	<0.50	<0.50
Arsenic	mg/l	<0.50	<0.50	<0.50
Barium	mg/l	<10	<10	<10
Cadmium	mg/l	<0.10	<0.10	<0.10
Chromium	mg/l	<0.50	<0.50	<0.50
Lead	mg/l	<0.50	<0.50	<0.50
Selenium	mg/l	<0.10	<0.10	<0.10
Cyanide	mg/l	<0.01	<0.01	<0.01
Sulfide	mg/l	<1.0	<1.0	<1.0
Corrosivity	mm/yr	<6.35	<6.35	<6.35
Reactivity				
pH	none	7.1	7.2	7.3
Reactivity toward water	none	not reactive	not reactive	not reactive
Sulfide Reactivity	-	BQL	BQL	BQL
Cyanide Reactivity	-	BQL	BQL	BQL
Explosive Nature	none	not reactive	not reactive	not reactive
Overall Reactivity	none	not reactive	not reactive	not reactive

Note: BQL - Below Quantitation Limit

From these data in Tables 3, 4, and 5, we note that, of some 120 parameters tested, only one shallow well (D-3) water sample contained a trace amount of one parameter above the quantitation limit. The parameter, *di-n-butylphthlate* (see Table 5), is presently unregulated.

All phthlate compounds are commonly used as plasticizers. *Di-n-butylphthlate* is colorless, odorless, stable oily liquid, and are often used in adhesive, nail-polish remover, elasticizer, explosive, and solid rocket propellant. USEPA proposed on July 25, 1990 (Federal Register, Vol. 55, No. 143, Page 30370; also personal communication with Mr. Mike Dette of USATHAMA) to include only one phthlate compound, *di-2-ethylhexylphthlate,* at a proposed Maximum Concentration Limit (MCL) of 4 ug/l. According to the same publication, *di-n-butylphthlate* is being considered (not yet proposed) by EPA to be included in the future proposals at an MCL level of 40 mg/l and an MCL Goal (MCLG) of 0.8 mg/l.

The level of 28 ug/l detected in D-3 is far below its either MCL or MCLG that are under consideration. A nearby deeper well, D-3D, did not show any detectable parameters, implying that the contamination, if any, is limited to shallow depth. Based on these extensive analytic data obtained in 1990, we conclude that the Basin has not affected or degraded the groundwater quality at this site.

Table 4. Summary analytic data for water samples for Volatile Organics (SW846-8240). See Figure 4 for monitor well locations (September 1990; All analyses by IEA, Inc., Research Triangle Park, N.C.). All units are in microgram/liter (ug/l).

Parameter	Drinking Water Standards (ug/l)	D-3 (ug/l)	D-3D (ug/l)	DG-1 (ug/l)
Acetone	-	<100	<100	<100
Benzene	1	<5	<5	<5
Bromodichloromethane	-	<5	<5	<5
Bromoform	0.19	<5	<5	<5
Bromomethane	-	<10	<10	<10
2-Butanone	-	<100	<100	<100
Carbon disulfide	-	<5	<5	<5
Carbon tetrachloride	0.3	<5	<5	<5
Chlorobenzene	300	<5	<5	<5
Dibromochloromethane	-	<5	<5	<5
Chloroethane	-	<10	<10	<10
2-Chloroethylvinyl ether	-	<10	<10	<10
Chloroform	0.19	<5	<5	<5
Chloromethane	-	<10	<10	<10
1,1-Dichloroethane	-	<5	<5	<5
1,2-Dichloroethane	0.38	<5	<5	<5
1,1-Dichloroethene	7	<5	<5	<5
1,2-Dichloroethene (total)	-	<5	<5	<5
1,2-Dichloropropane	0.56	<5	<5	<5
cis-1,3-Dichloropropene	-	<5	<5	<5
trans-1,3-Dichloropropene	-	<5	<5	<5
Ethylbenzene	29	<5	<5	<5
2-Hexanone	-	<50	<50	<50
Methylene chloride	5	<5	<5	<5
4-Methyl-2-pentanone	-	<50	<50	<50
Styrene	0.014	<5	<5	<5
1,1,2,2-Tetrachloroethane	-	<5	<5	<5
Tetrachloroethene (PCE)	0.7	<5	<5	<5
Toluene	1,000	<5	<5	<5
1,1,1-Trichloroethane	200	<5	<5	<5
1,1,2-Trichloroethane	-	<5	<5	<5
Trichloroethene (TCE)	2.8	<5	<5	<5
Vinyl acetate	-	<50	<50	<50
Vinyl chloride	0.015	<10	<10	<10
Xylenes (total)	400	<5	<5	<5

Note 1. All quantities preceded by "<" denote data "below quantitation limit" set by laboratory.

Table 5. Base/Neutral/Acid Extratables of Monitor Well Water Samples under SW846-8270

Compound	Wells D-3	D-3D	DG1	DDH2	DDH4	D4	D6(=D-3D)
Acenaphthene	<10	<10	<10	<10	<10	<10	<10
Acenaphthylene	<10	<10	<10	<10	<10	<10	<10
Anthracene	<10	<10	<10	<10	<10	<10	<10
Benzoic acid	<50	<50	<50	<50	<50	<50	<50
Benzo(a)anthracene	<10	<10	<10	<10	<10	<10	<10
Benzo(b)fluoranthene	<10	<10	<10	<10	<10	<10	<10
Benzo(k)fluoranthene	<10	<10	<10	<10	<10	<10	<10
Benzo(g,h,i)perylene	<10	<10	<10	<10	<10	<10	<10
Benzo(a)pyrene	<10	<10	<10	<10	<10	<10	<10
Benzyl alcohol	<20	<20	<20	<20	<20	<20	<20
bis(2-Chloroethoxy) methane	<10	<10	<10	<10	<10	<10	<10
bis(2-Chloroethyl) ether	<10	<10	<10	<10	<10	<10	<10
bis(2-Chloroisopropyl) ether	<10	<10	<10	<10	<10	<10	<10
bix(2-Ethylhexyl) phthalate	<10	<10	<10	<10	<10	<10	<10
4-Bromophenyl phenyl ether	<10	<10	<10	<10	<10	<10	<10
Benzyl butyl phthalate	<10	<10	<10	<10	<10	<10	<10
4-Chloroaniline	<20	<20	<20	<20	<20	<20	<20
2-Chloronaphthalene	<10	<10	<10	<10	<10	<10	<10
4-Chloro-3-methylphenol	<20	<20	<20	<20	<20	<20	<20
2-Chlorophenol	<10	<10	<10	<10	<10	<10	<10
4-Chlorophenyl phenyl ether	<10	<10	<10	<10	<10	<10	<10
Chrysene	<10	<10	<10	<10	<10	<10	<10
Dibenzo (a,h) anthracene	<10	<10	<10	<10	<10	<10	<10
Dibenzofuran	<10	<10	<10	<10	<10	<10	<10
Di-n-butylphthalate	**28**	<10	<10	<10	<10	<10	<10
1,3-Dichlorobenzene	<10	<10	<10	<10	<10	<10	<10
1,4-Dichlorobenzene	<10	<10	<10	<10	<10	<10	<10
1,2-Dichlorobenzene	<10	<10	<10	<10	<10	<10	<10
3,3-Dichlorobenzidine	<20	<20	<20	<20	<20	<20	<20
2,4-Dichlorophenol	<10	<10	<10	<10	<10	<10	<10
Diethyl phthalate	<10	<10	<10	<10	<10	<10	<10
2,4-Dimethylphenol	<10	<10	<10	<10	<10	<10	<10
Dimethyl phthalate	<10	<10	<10	<10	<10	<10	<10
4,6-Dinitro-2-methylphenol	<50	<50	<50	<50	<50	<50	<50
2,4-Dinitrophenol	<50	<50	<50	<50	<50	<50	<50
2,4-Dinitrotoluene	<10	<10	<10	<10	<10	<10	<10
2,6-Dinitrotoluene	<10	<10	<10	<10	<10	<10	<10
Di-n-octylphthalate	<10	<10	<10	<10	<10	<10	<10
Fluoranthene	<10	<10	<10	<10	<10	<10	<10
Fluorene	<10	<10	<10	<10	<10	<10	<10
Hexachlorobenzene	<10	<10	<10	<10	<10	<10	<10
Hexachlorobutadiene	<10	<10	<10	<10	<10	<10	<10
Hexachlorocyclopentadiene	<10	<10	<10	<10	<10	<10	<10
Hexachloroethane	<10	<10	<10	<10	<10	<10	<10
Indeno (1,2,3-cd) pyrene	<10	<10	<10	<10	<10	<10	<10
Isophorone	<10	<10	<10	<10	<10	<10	<10
2-Methylnaphthalene	<10	<10	<10	<10	<10	<10	<10
2-Methylphenol (o-cresol)	<10	<10	<10	<10	<10	<10	<10
4-Methylphenol (p-cresol)	<10	<10	<10	<10	<10	<10	<10
Naphthalene	<10	<10	<10	<10	<10	<10	<10
2-Nitroaniline	<50	<50	<50	<50	<50	<50	<50
3-Nitroaniline	<50	<50	<50	<50	<50	<50	<50
4-Nitroaniline	<50	<50	<50	<50	<50	<50	<50
Nitrobenzene	<10	<10	<10	<10	<10	<10	<10
2-Nitrophenol	<10	<10	<10	<10	<10	<10	<10
4-Nitrophenol	<50	<50	<50	<50	<50	<50	<50
N-Nitroso-di-n-propylamine	<10	<10	<10	<10	<10	<10	<10
N-Nitrosodiphenylamine	<10	<10	<10	<10	<10	<10	<10
Pentachlorophenol	<50	<50	<50	<50	<50	<50	<50
Phenanthrene	<10	<10	<10	<10	<10	<10	<10
Phenol	<10	<10	<10	<10	<10	<10	<10
Pyrene	<10	<10	<10	<10	<10	<10	<10
1,2,4-Trichlorobenzene	<10	<10	<10	<10	<10	<10	<10
2,4,5-Trichlorophenol	<10	<10	<10	<10	<10	<10	<10
2,4,6-Trichlorophenol	<10	<10	<10	<10	<10	<10	<10

Note: All units are in microgram/liter or ug/l. All analyses performed by IEA, Inc., RTP, NC.

3.2.2 Comparison with Previous Analyses

In order to gain some historical perspective for the site, we also looked into a 1980 report prepared by NUS Corp, which contains chemical data for four old monitor wells at this site. This is the only study of this nature for the site known to us. Table 6, compiled from the 1980 NUS report, lists all available analytic data for groundwater samples. All water samples exhibited very low metal contents, well below the Drinking Water Standards, under the Extraction Procedure (EP) Toxicity test. Some parameters such as nitrate, sulfate, dissolved solids, and specific conductance, however, show noticeable increase in down-gradient wells. These parameters may be partially attributed to the waste water streams and partially to the natural background condition within the limestone formation that is known to contain high dissolved solids (see Section 2.1.3).

Table 6. Selected Analytic Data from the 1980 NUS Report

Parameters	Up-gradient Wells D2	Up-gradient Wells D4	Down-gradient Wells D3	Down-gradient Wells D5	Drinking Water Standards
EP Toxicity Parameters (mg/l)					
Arsenic	<0.005	<0.005	<0.005	<0.005	0.05
Barium	0.2	0.2	0.2	0.2	1.0
Calcium	68	39	184	106	-
Chloride	13	16	13	11	250
Cyanide	0.002	<0.001	0.006	<0.001	0.154
Iron	10	0.4	2.7	0.06	0.3
Lead	<0.05	<0.05	<0.05	<0.05	0.05
Zinc	0.13	<0.02	0.31	0.03	5.0
Nitrate	3.7	1.7	21	<0.2	10
Dissolved Solids	335	224	904	467	500
Specific Conductance (µmhos)	600	510	1,250	800	-
Sulfate	38	11	310	87	250

Organic Compounds (ug/l)

Note: The NUS report does not list these for each well but only for up- and down-gradient wells.

Parameters	Up-gradient Wells	Down-gradient Wells	Drinking Water Standards
1,2-dichloroethane	<1	<1	0.38
1,1,1-trichloroethane	1	-	200
Chloroform	<1	-	0.19
1,1-dichloroethylene	3	2	7
Trichlorofluoromethane	5	3	-
Bis (2-ethylhexyl) phthlate (DEHP)	8	12, 10	-
Buthyl benzl phthlate	2	1, 1	-
Di-n-butyl phthlate	-	5, 4	-
Di-n-octyl phthlate	<1	-	-

"-" Not Analyzed or not reported

Most of organic parameters, listed in Table 6, are below the regulated levels. One parameter worth discussing is another phthlate compound *bis (2-ethylhexyl) phthlate,* alias DEHP, which in its pure form is classified as a U-code (defined as Non-acutely Hazardous Waste) waste, U028, by the EPA. DEHP is a semi-volatile organic, petroleum-derived compound and is used also as plasticizer. While all U-code wastes are considered hazardous, the EPA has not established an MCL for DEHP. According to USATHAMA (Mr. Mike Dette; personal communication), DEHP is commonly found in trace amount in K044 wastes. The present SW-846 edition does not include any analytic standards for the K044 waste, but the forthcoming 4th edition is expected to contain such standards. A draft guideline by Agency for Toxic Substance and Disease Reference (ATSDR) indicates the DEHP's Oral Reference Dose to be 0.02 mg/kg/day (USEPA, 1987). The DEHP level in Table 6 is below this oral reference dosage.

One comment on the NUS's analytic data: since the lagoon was not fully operational in 1980, it is not clear how much this lagoon alone contributed to the water quality data observed in 1980 and whether an adjacent lagoon (SWMU 35; presently abandoned; see Figure 4) had influenced the results.

Based on the analytic data from 1980 and from this study in 1990, it can be argued that the facility, historically, has not affected the groundwater quality during its operation. It is, of course, counter-argued that two data sets 10 years apart cannot justify such a conclusion.

4.0 Conclusions

Based on the extensive environmental, geological, and hydrological data compiled from the present and past investigations, we present the following conclusions:

- The complete TCLP analysis (Table 2) performed in June 1990 on the source sludge from the facility indicates that the source sludge is not considered hazardous within the pertinent regulations;

- Comprehensive analyses of seven groundwater samples in August 1990, which included TCLP metals, volatile and semi-volatile organics, and various reactivity parameters, show that the groundwater under SWMU 10 is not contaminated. Of some 120 tested parameters, only one shallow well (D-3) water sample contained a trace amount of one parameter above the quantitation limit. The parameter, *di-n-butylphthlate,* is presently unregulated and its detected level of 28 ug/l is far below the level being contemplated by the EPA for their future regulatory proposals. A nearby deeper well (D-3D) did not show any detectable parameters, implying that the contamination, if any, is limited to shallow depth.

- The conclusions stated in the two preceding paragraphs are based on samples collected this year only and, therefore, it may not be representative of conditions for the past 11 years during which the plant has been in operation. However, the groundwater samples collected and analyzed in 1980 (shortly after the plant started) also indicated that the contamination, if any, was insignificant (Table 6). It may be argued, therefore, that the facility, historically, has not affected the groundwater quality during its operation.

- Aquifer test data indicate that the groundwater under SWMU 10 migrates at a velocity of about 200 feet per year, with a slight downward flow component, and discharges into the adjacent New River and the horseshoe area. There are no known groundwater supply wells in the vicinity. Within the local area, the site geology appears more or less uniform and does not show any particular, pervasive fracture pattern that may cause preferred groundwater flow paths.

References

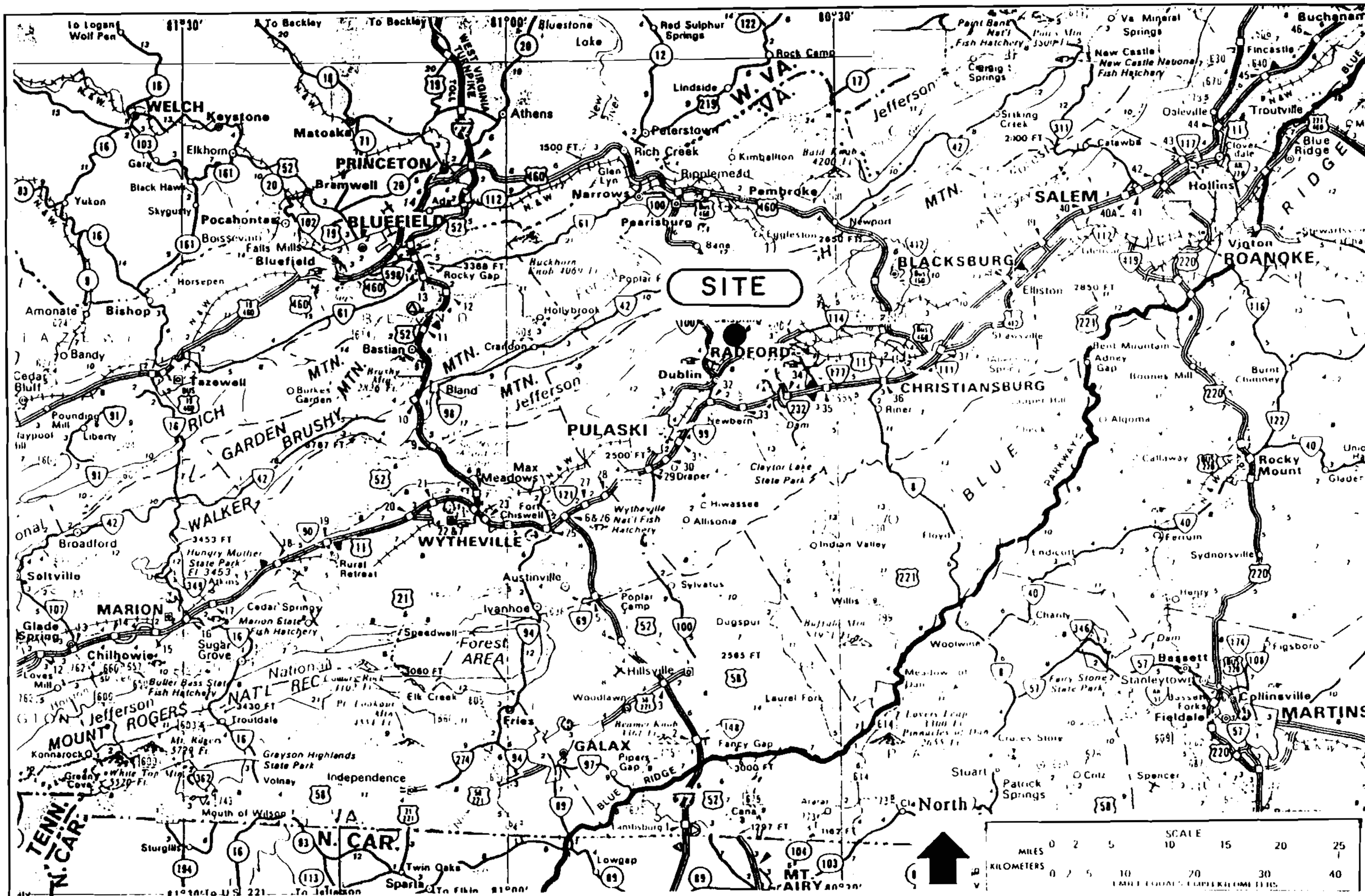
Cooper, H.H., Jr., Bredehoeft, J.D., and Papadopulos, I.S., 1967, Response of a finite diameter well to an instantaneous charge of water, US Geological Survey Water Resources Research Bulletin, No. 3, p.264-269.

Dames & Moore, 1990, RCRA Facility Investigation Work Plan for RAAP, submitted to USATHAMA on June 8, 1990.

Hvorslev, M.J., 1951, Time Lag and Soil Permeability in Groundwater Observations, Bul. No. 36, Waterway Experiment Station, Corps of Engineers, Vicksburg, MS.

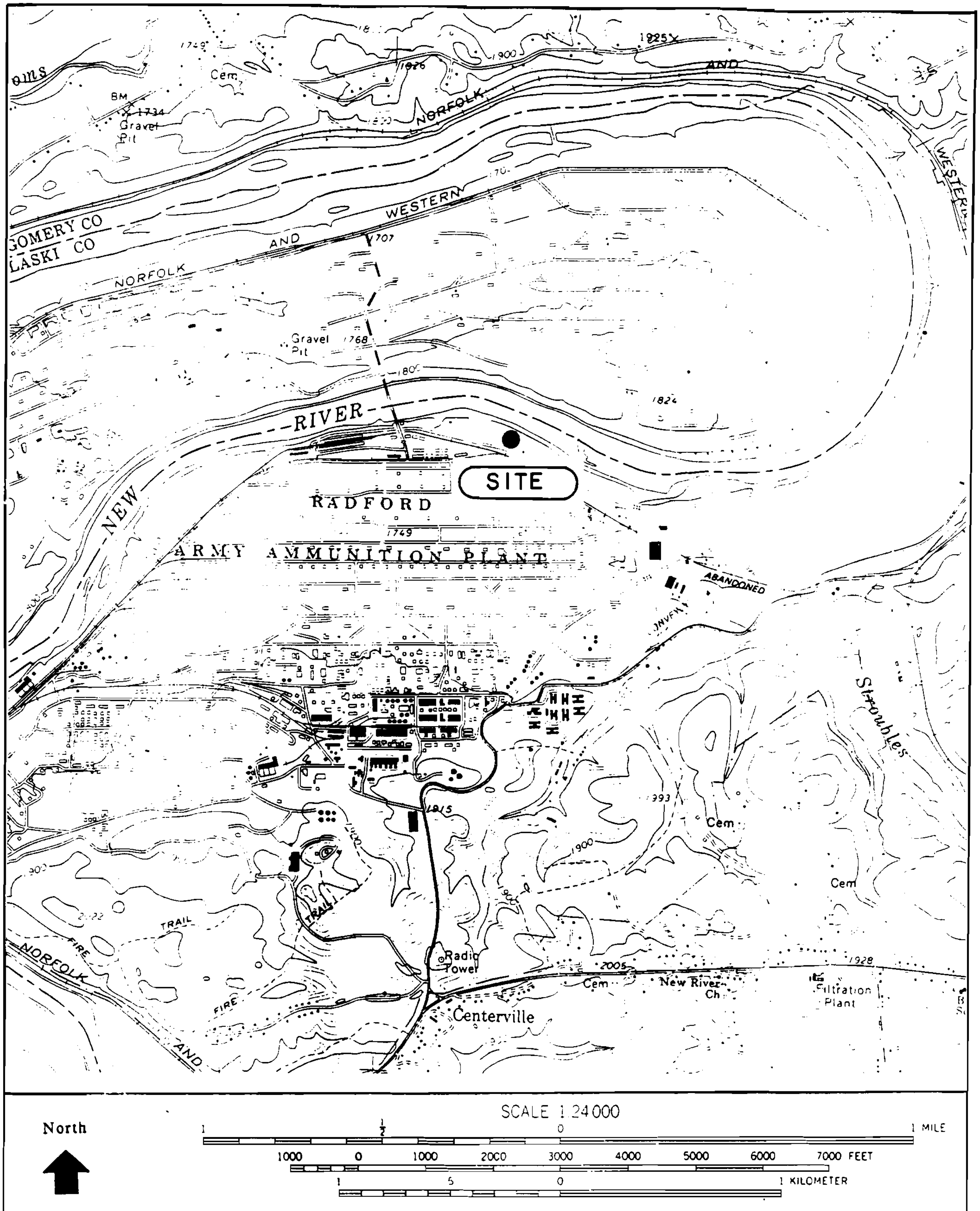
USATHAMA, 1976, Installation Assessment of RAAP, Records Evaluation Report No. 103.

USEPA, 1987, Integrated Risk Information System, Volume 1, US EPA Office of Health and Environmental Assessment, EPA-600-8-86-0328.



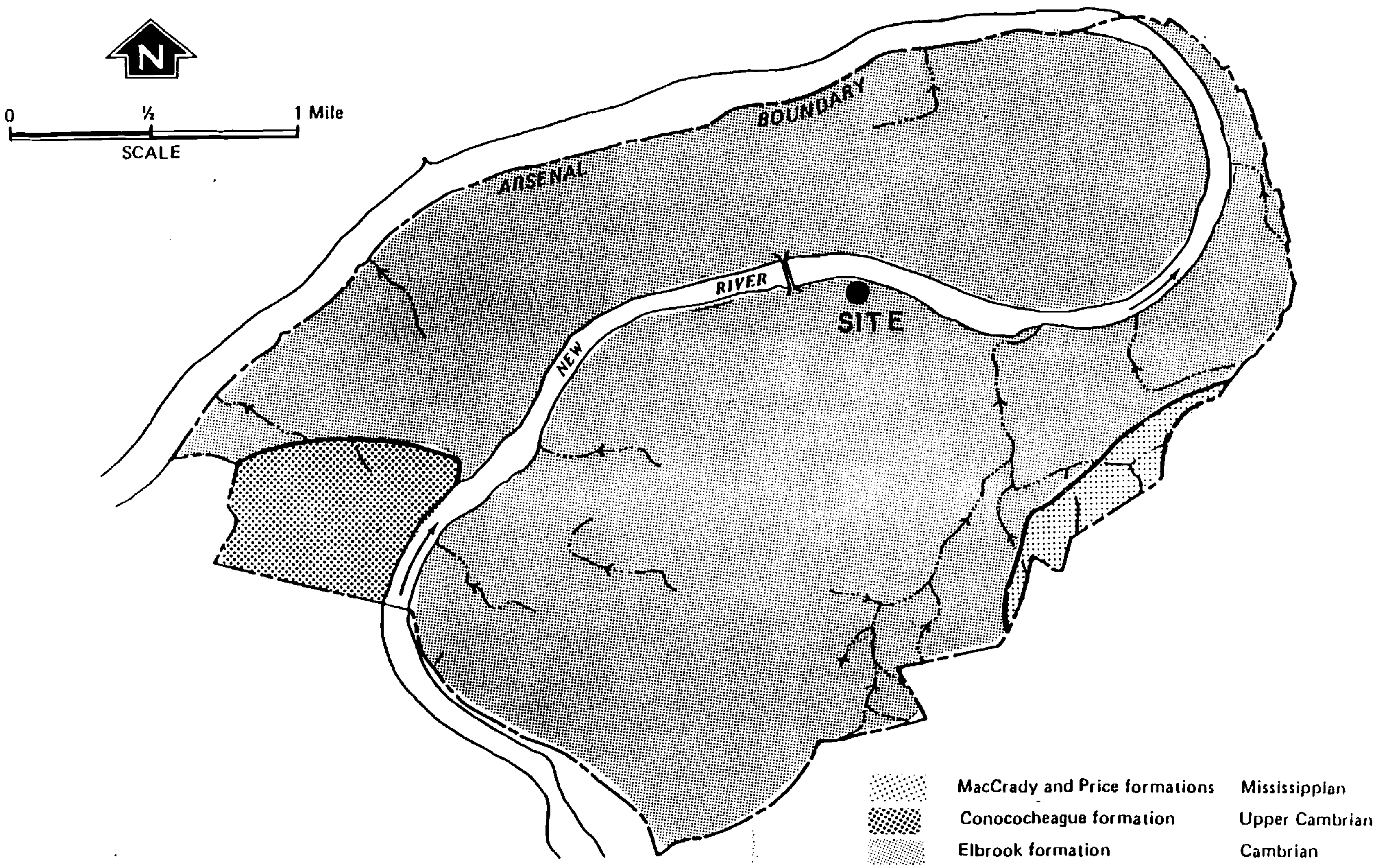
Geophex

Figure 1. Site location on the Official Virginia State Highway Map.



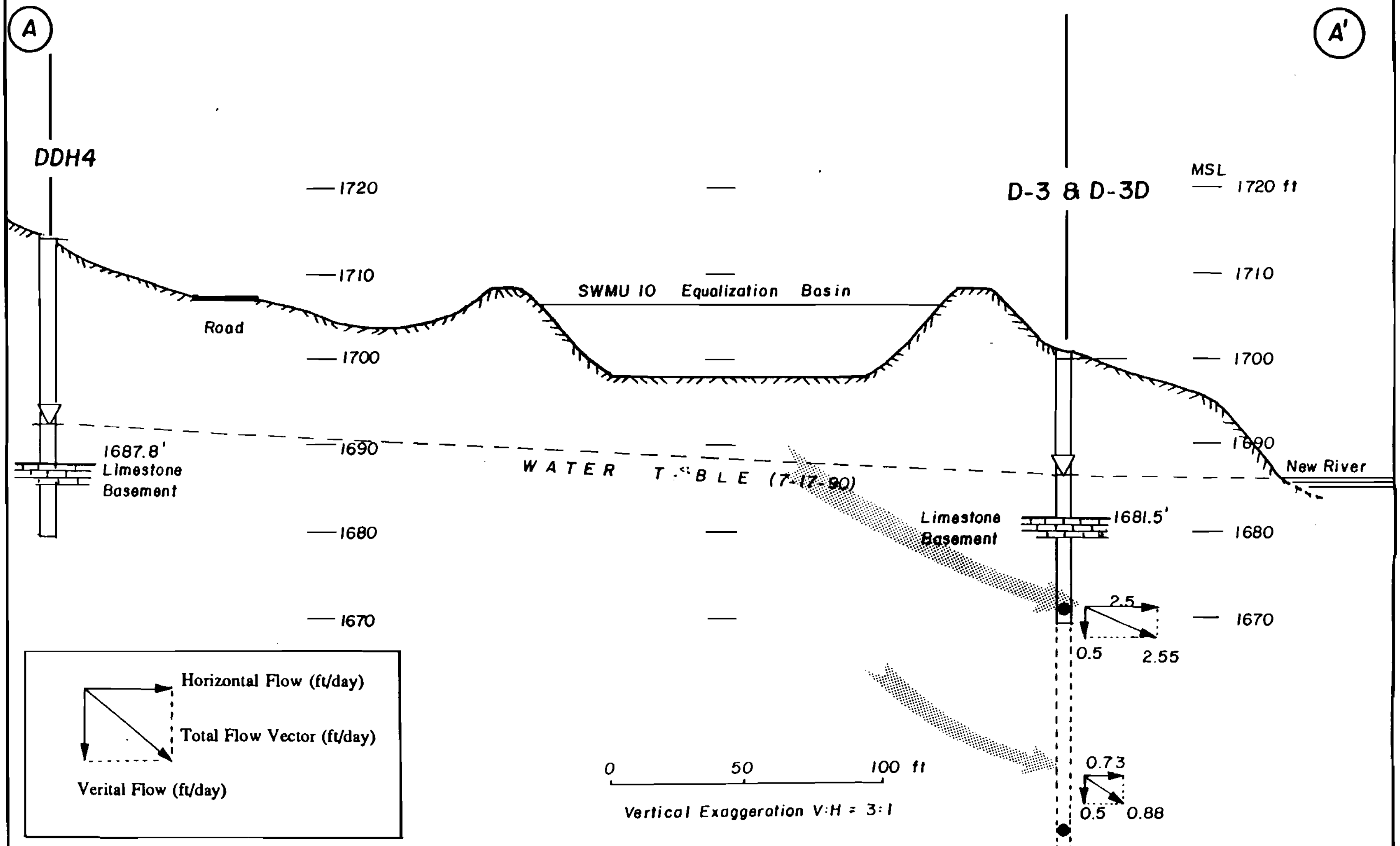
Geophex

Figure 2. location of SWMU 10 on a US Geological Survey 7.5 minute Radford Quadrangle Map.



Geophex

Figure 3. Simplified surface geology map with major drainages.



Geophex

Figure 5. Cross-section A-A' at SWMU 10.

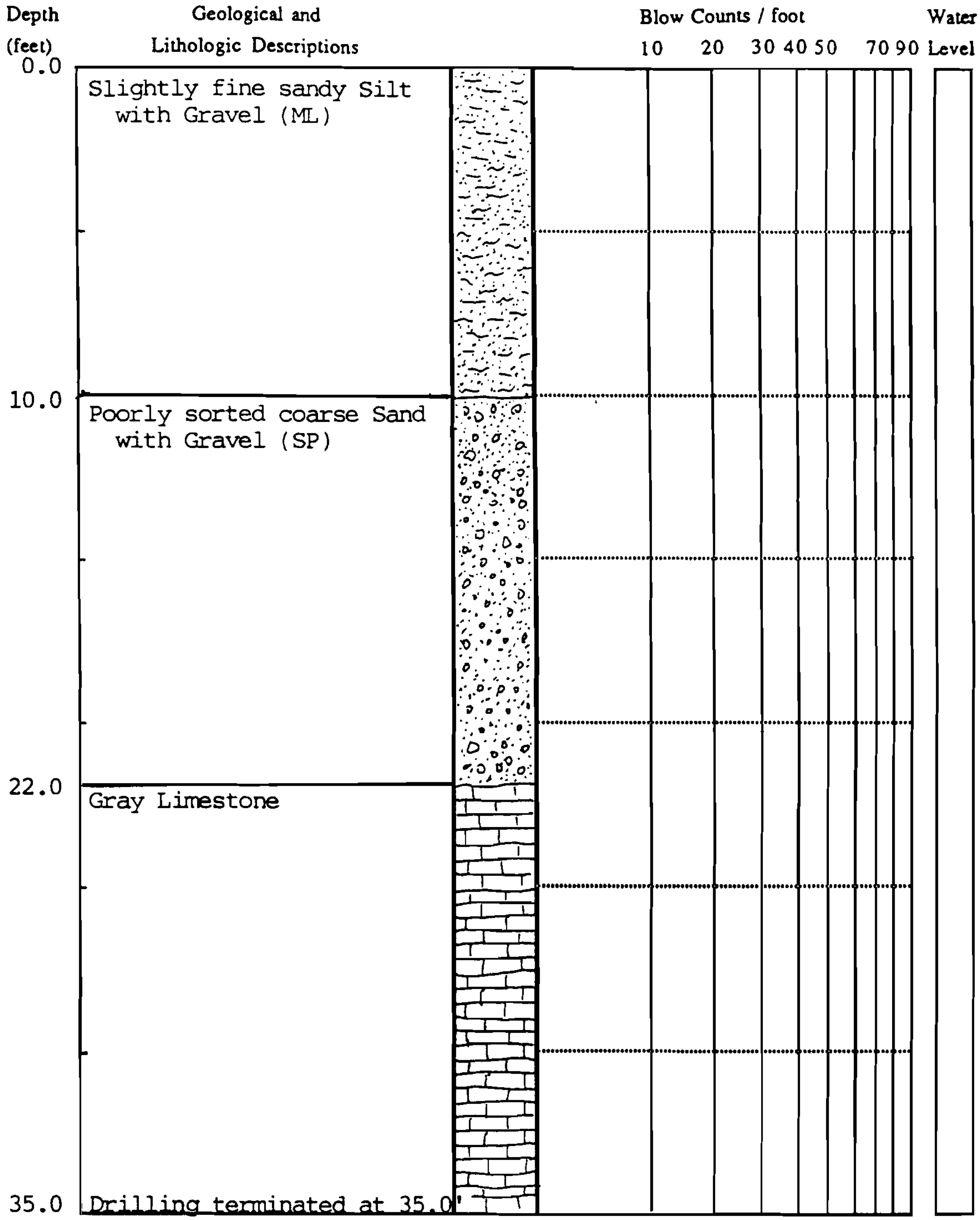
Appendix A

Drill logs, Well Completion Records, and Aquifer Test Data

Drill Logs

Well Completion Records

Aquifer Test Data



Boring and sampling meets ASTM D-1586; Core drilling meets ASTM D-2113; Penetration is the number of blows of 140-pound hammer falling 30 inches required to drive a 1.4-inch ID sampler one foot.

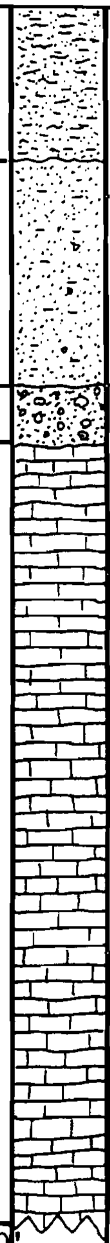
Test Boring Records

Boring No. DG-1 Site Radford AAP

Job No. 194 Date 900827

Geophex

Depth (feet)	Geological and Lithologic Descriptions
0.0	Dark brown slightly clayey Silt (ML)
8.0	Brown silty fine Sand (ML)
20.0	Brown poorly sorted sandy Gravel (GP)
23.0	Gray Limestone
64.0	Drilling terminated at 64.0'



Blow Counts / foot: 10 20 30 40 50 70 90

Water Level

Boring and sampling meets ASTM D-1586; Core drilling meets ASTM D-2113; Penetration is the number of blows of 140-pound hammer falling 30 inches required to drive a 1.4-inch ID sampler one foot.

Test Boring Records

Boring No. D3D Site Radford AAP

Job No. 194 Date 900828

Geophex

Well Number: DG-1

Drilling Method: Air Rotary

Date Started: 900827

Drilling Fluids: Air/Water

Date Finished: 900828

Static Water Level: 23.09 Date: 900903

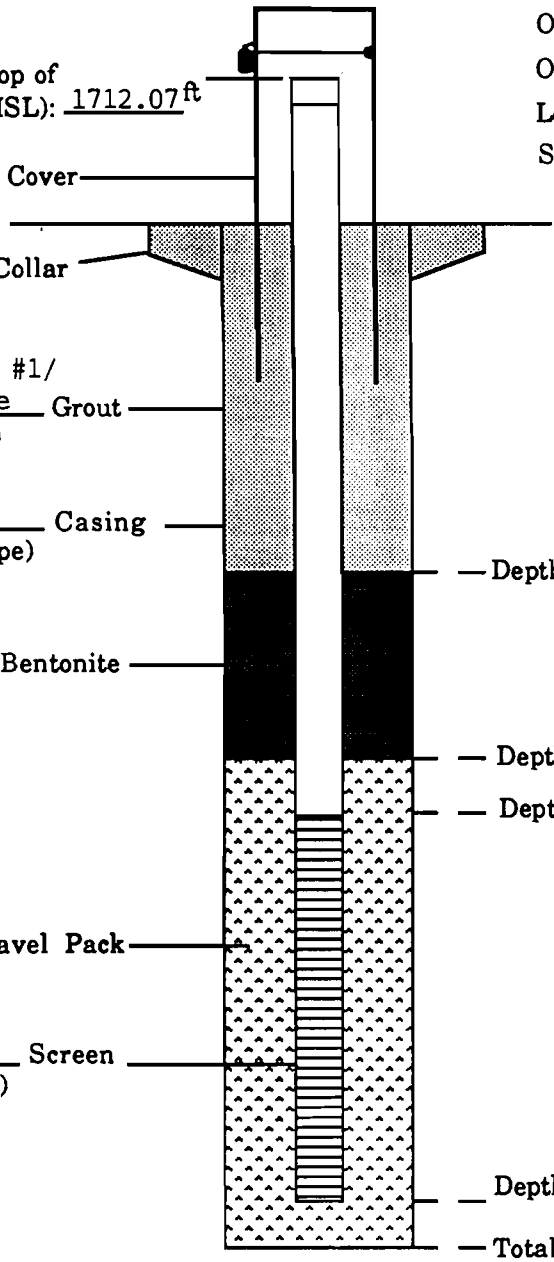
Geologist/Engineer: Daw

Observed By:

Remarks: Elevation to top of casing (TOC) is relative to D3 TOC. D3 TOC is assumed to be 1702.94 feet MSL.

All depths referenced to ground surface

Above-Ground Well



O.D. of Borehole: 6 in

O.D. of Casing: 2 in

Length of Screen: 10 ft

Screen Opening Size: .020 in

Depth to Top of Bentonite: 16.8 ft

Depth to Top of Gravel: 19.8 ft

Depth to Top of Screen: 22.8 ft

Depth to Bottom of Screen: 32.8 ft

Total Depth: 35.0 ft

Not to Scale

Geophex	PROJECT: Radford AAP	Job No: 194 Figure No. Site:

Well Number: D3D

Drilling Method: Air Rotary

Date Started: 900828

Drilling Fluids: Air/Water

Date Finished: 900828

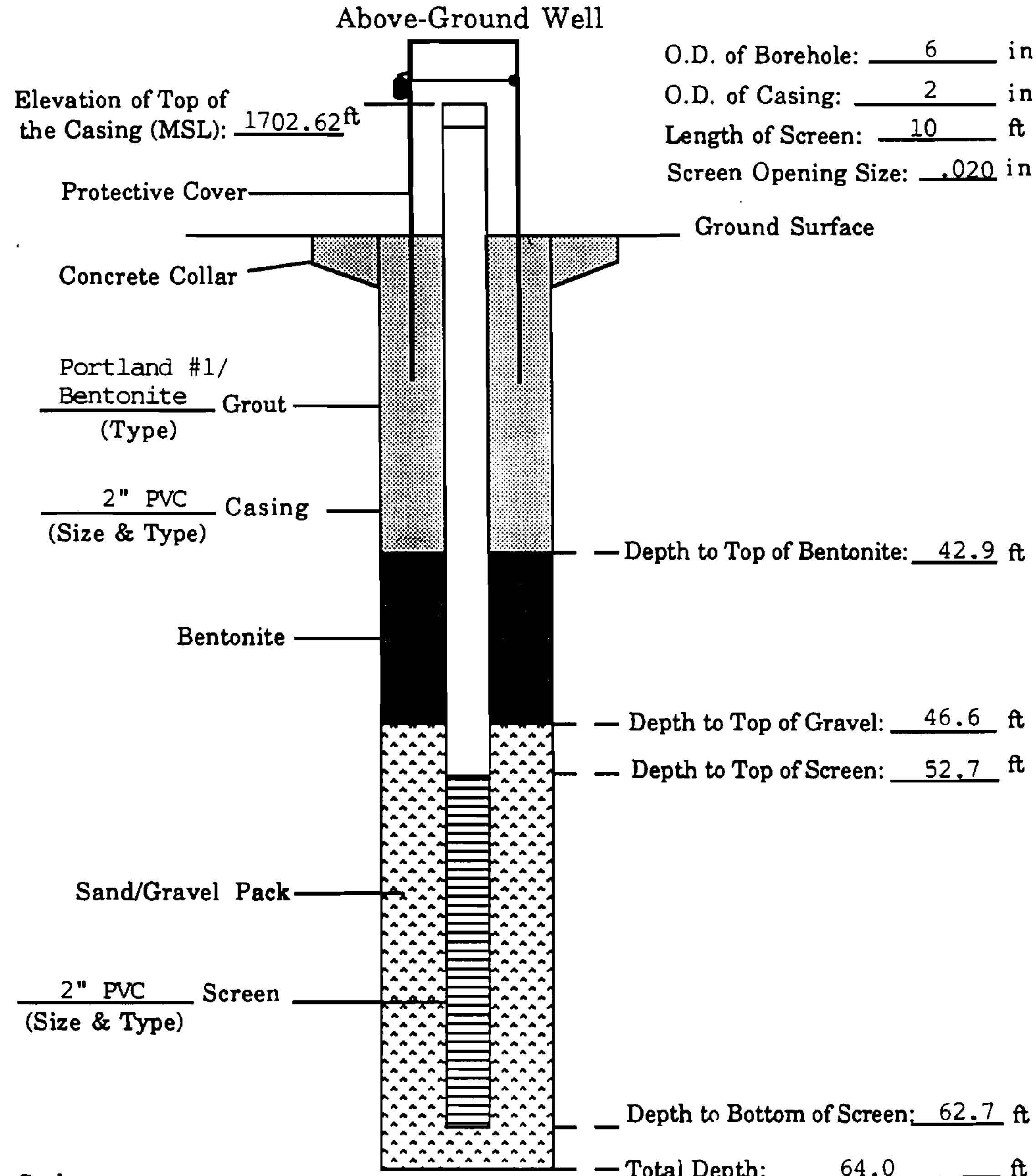
Static Water Level: 18.02 Date: 900903

Geologist/Engineer: Daw

Observed By:

Remarks: Elevation to top of casing (TOC) is relative to D3 TOC. D3 TOC is assumed to be 1702.94 feet MSL.

All depths referenced to ground surface



Not to Scale

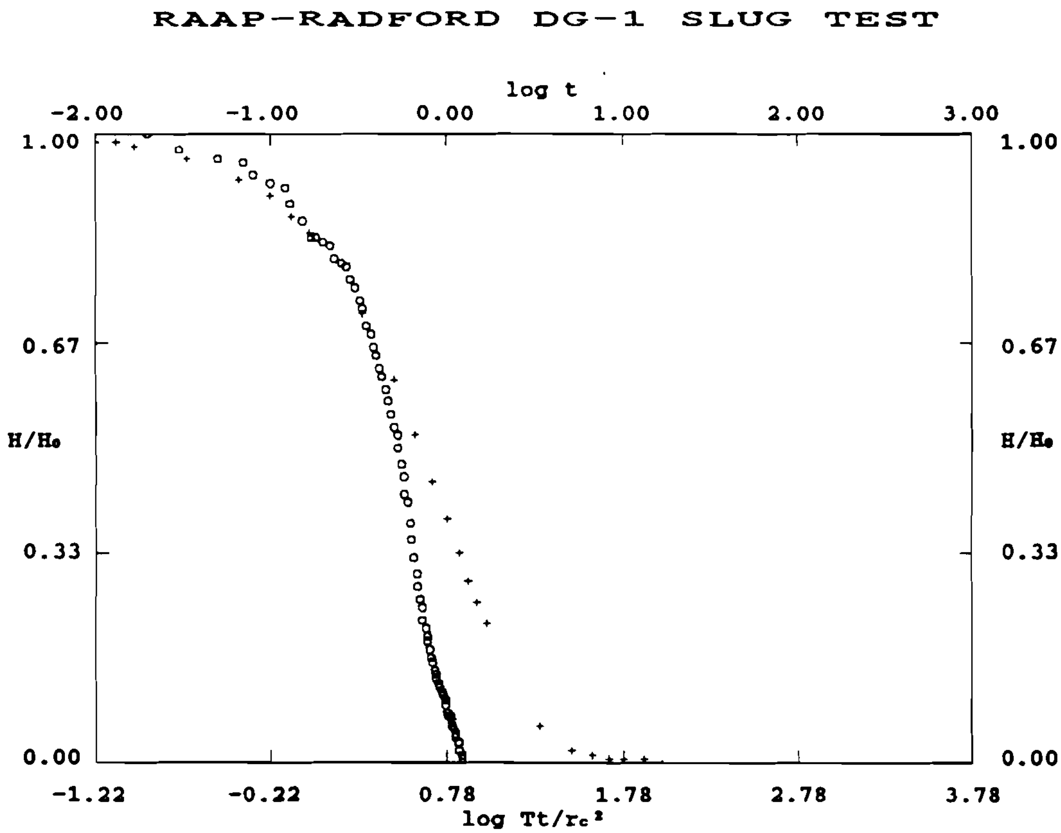
Geophex	PROJECT: Radford AAP	Job No: 194 Figure No. Site:

Field Estimate of Hydraulic Conductivity	*Geophex, Ltd.*

Geophex Job Number 194 Client RAAP Location Radford, VA

Engineer/Geologist Daw/Napier Test Date 900903

Well ID DG-1	Water Depth 23.09 ft Boring Dia 8 in Casing Dia 2 in Remarks



o - Data

\+ - Type Curve
Slug Test: alpha =-10.0

SOLUTION

```
Transmissivity = 7.81E-003 sq ft/min
Aquifer Thick. = 1.00E+001 ft
Hydraulic Cond.= 7.81E-004 ft/min     1.12 ft/day
Storativity    = 7.67E-012
```

Hvorslev method 2.43 ft/day

k = 2.43 ft/day

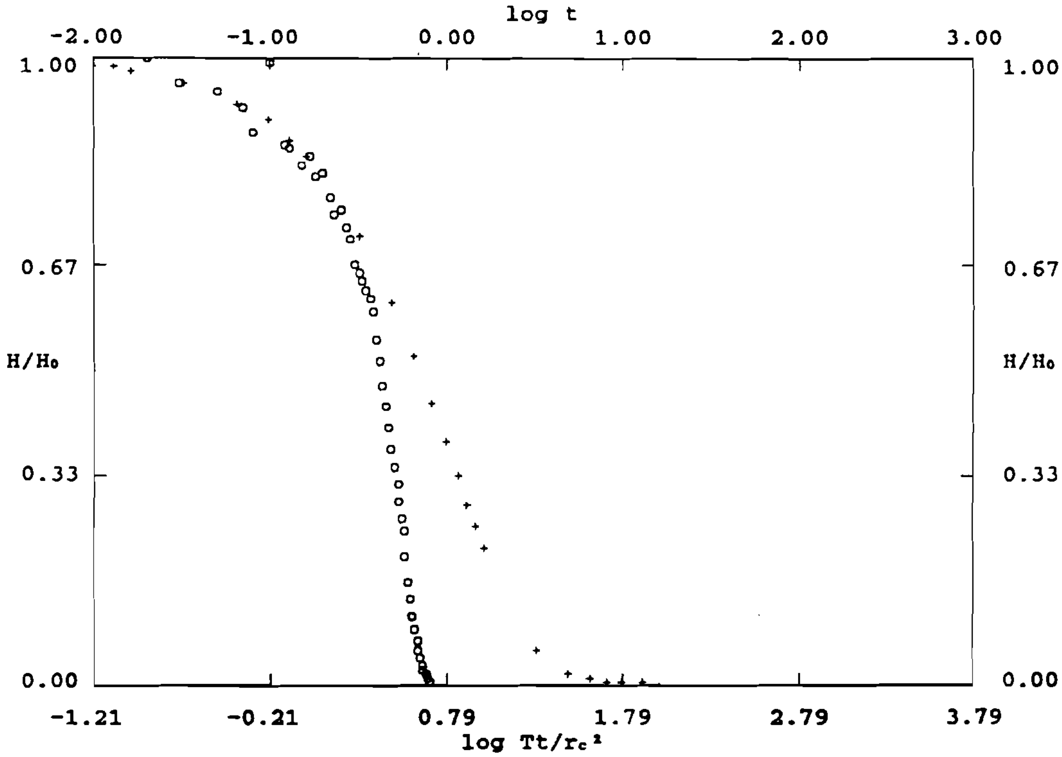
Field Estimate of Hydraulic Conductivity	*Geophex, Ltd.*

Geophex Job Number 194 Client RAAP Location Radford, VA

Engineer/Geologist Daw/Napier Test Date 900903

Well ID D-3	Water Depth 17.49 ft Boring Dia 8 in Casing Dia 2 in Remarks

RAAP-RADFORD D-3 SLUG TEST



o - Data

+ - Type Curve
Slug Test: alpha =-10.0

SOLUTION

Transmissivity = 4.99E-004 sq ft/min
Aquifer Thick. = 1.50E+001 ft
Hydraulic Cond.= 3.33E-005 ft/min 0.05 ft/day
Storativity = 5.18E-013

Hvorslev 2.5

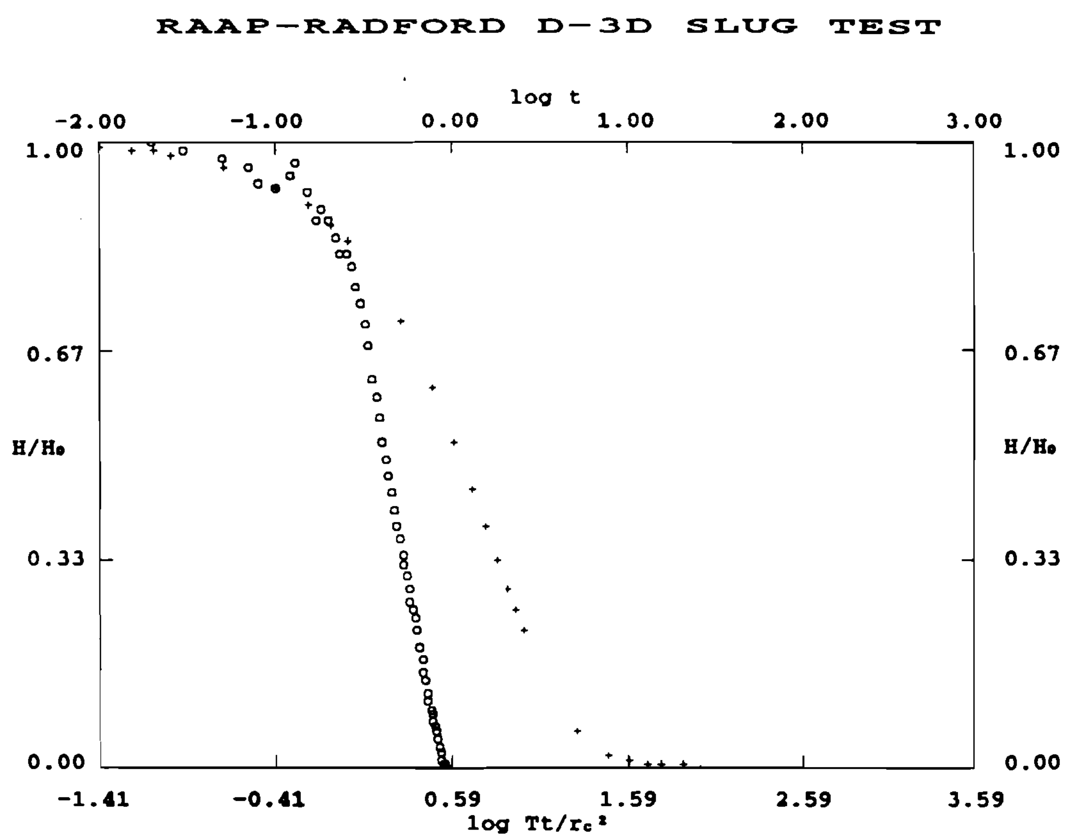
k = 2.5 ft/day

Field Estimate of Hydraulic Conductivity	*Geophex, Ltd.*

Geophex Job Number 194 Client RAAP Location Radford, VA

Engineer/Geologist Daw/Napier Test Date 900903

Well ID D-3D	Water Depth 18.02 ft Boring Dia 8 in Casing Dia 2 in Remarks



o - Data

\+ - Type Curve
Slug Test: alpha =-10.0

SOLUTION

Transmissivity = 3.15E-004 sq ft/min
Aquifer Thick. = 1.50E+001 ft
Hydraulic Cond.= 2.10E-005 ft/min 0.03 ft/day
Storativity = 5.18E-013
Hvorslev Method 0.23 ft/day

k = 0.03 ft/day

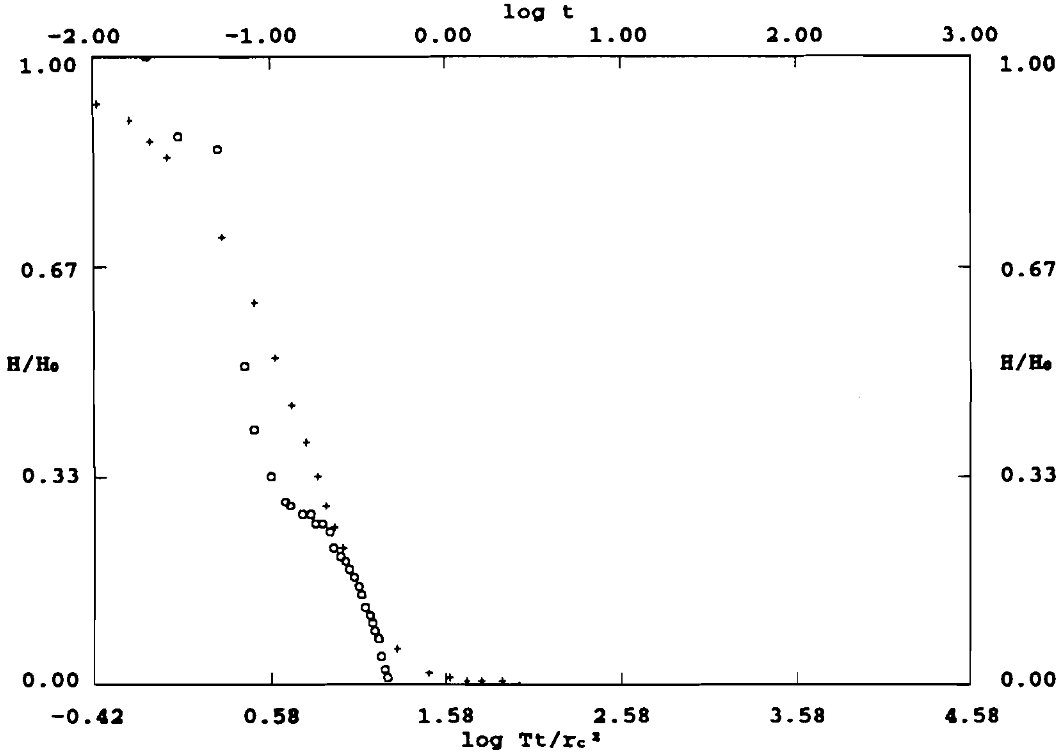
Field Estimate of Hydraulic Conductivity	*Geophex, Ltd.*

Geophex Job Number 194 Client RAAP Location Radford, VA

Engineer/Geologist Daw/Napier Test Date 900903

Well ID D-4	Water Depth 23.28 ft Boring Dia 3 in Casing Dia 2 in Remarks

RAAP-RADFORD D-4 SLUG TEST



o - Data

\+ - Type Curve
Slug Test: alpha =-10.0

SOLUTION

```
Transmissivity = 9.73E-001 sq ft/min
Aquifer Thick. = 1.50E+001 ft
Hydraulic Cond.= 6.49E-002 ft/min
Storativity    = 1.51E-010
```

k = 8 ft/day

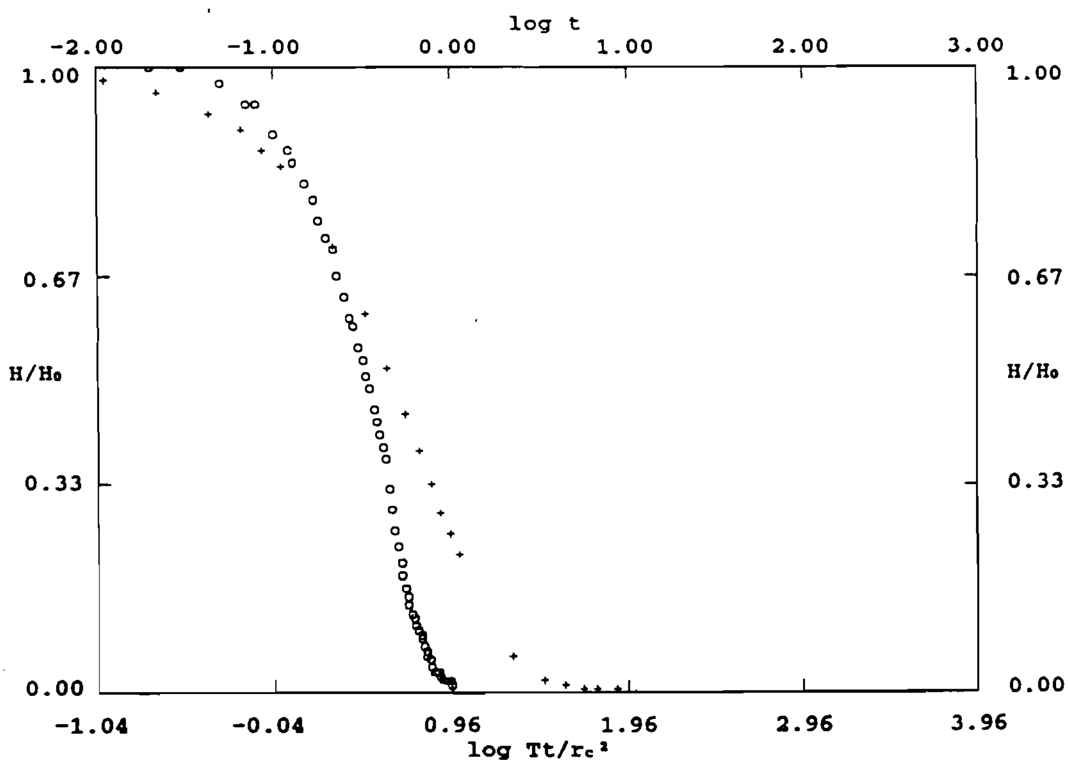
Field Estimate of Hydraulic Conductivity	*Geophex, Ltd.*

Geophex Job Number 194 Client RAAP Location Radford, VA

Engineer/Geologist Daw/Napier Test Date 900903

Well ID DDH2	Water Depth 16.73 ft Boring Dia 8 in Casing Dia 2 in Remarks

RAAP–RADFORD DDH–2 SLUG TEST



o – Data

+ – Type Curve
Slug Test: alpha =-10.0

SOLUTION

Transmissivity = 4.02E-003 sq ft/min
Aquifer Thick. = 1.60E+001 ft
Hydraulic Cond.= 2.51E-004 ft/min 0.36 ft/day
Storativity = 2.61E-012

Hvorslev method ~~2.0~~ 3.8 ft/day

k = 3.8 ft/day

Appendix B:

Analytic Data for Sludge and Groundwater Samples

Analytic Data for Source Sludge Sample

Analytic Data for Groundwater Samples

CENTRAL VIRGINIA
LABORATORIES & CONSULTANTS

P.O. Box 10938 Lynchburg, Virginia 24506
OFFICE: 2418 Langhorne Road • 804-847-2852

SAMPLE IDENTIFICATION: CVLC #4910 CUSTOMER: Waste

CONTAMINANT	CONCENTRATION (mg/l)	REGULATORY LEVEL (mg/l)
,4-Dichlorobenzene	<0.003	7.5
1,2-Dichloroethane	<0.003	0.5
,1-Dichloroethylene	<0.003	0.7
2,4-Dinitrotoluene	<0.010	0.13
ndrin	<0.0002	0.02
Heptachlor (& OH)	<0.0005	0.008
exachlorobenzene	<0.010	0.13
hexachlorobutadiene	<0.010	0.5
exachloroethane	<0.010	3.0
ead	0.7	5.0
Lindane	<0.001	0.4
ercury	<0.0002	0.2
Methoxychlor	<0.001	10.0
ethyl Ethyl Ketone	<0.100	200.0
Nitrobenzene	<0.010	2.0
entachlorophenol	<0.050	100.0
Pyridine	<0.010	5.0

CVLC
CENTRAL VIRGINIA
LABORATORIES & CONSULTANTS

P.O. Box 10938 Lynchburg, Virginia 24506
OFFICE: 2418 Langhorne Road • 804-847-2852

C LC Page 3
Hercules Incorporated
June 25, 1990

SAMPLE IDENTIFICATION: CVLC #4910 CUSTOMER: Waste

CONTAMINANT	CONCENTRATION (mg/l)	REGULATORY LEVEL (mg/l)
Selenium	<0.001	1.0
Silver	<0.025	5.0
Tetrachloroethylene	<0.003	0.7
Toxaphene	<0.005	0.5
Trichloroethylene	<0.003	0.5
2,4,5-Trichlorophenol	<0.010	400.0
2,4,6-Trichlorophenol	<0.010	2.0
2,4,5-TP (Silvex)	<0.001	1.0
Vinyl Chloride	<0.003	0.2

Parameter	Results(mg/l)	Limit(mg/l)*
Corrosivity	8.05 S.U.	2<pH<12.5
Ignitability	>212°F	140°F

*40 CFR 261 Established Limit

Sincerely,

Janet M. Zwetolitz
Laboratory Manager

JMZ/kom

IEA LABORATORY RESULTS

IEA Project #: 646-017
Client Name: Geophex, LTD

Sample #	Client ID	Parameter	Results		Date Analyzed
		TCLP METALS:			
1	D3	Mercury	<0.0005	mg/L	09/18/90
2	D3D	Mercury	<0.0005	mg/L	09/19/90
3	DG1	Mercury	<0.0005	mg/L	09/18/90
1	D3	Silver	<0.50	mg/L	09/11/90
2	D3D	Silver	<0.50	mg/L	09/11/90
3	DG1	Silver	<0.50	mg/L	09/11/90
1	D3	Arsenic	<0.50	mg/L	09/10/90
2	D3D	Arsenic	<0.50	mg/L	09/10/90
3	DG1	Arsenic	<0.50	mg/L	09/10/90
1	D3	Barium	<10	mg/L	09/11/90
2	D3D	Barium	<10	mg/L	09/11/90
3	DG1	Barium	<10	mg/L	09/11/90
1	D3	Cadmium	<0.10	mg/L	09/11/90
2	D3D	Cadmium	<0.10	mg/L	09/11/90
3	DG1	Cadmium	<0.10	mg/L	09/11/90
1	D3	Chromium	<0.50	mg/L	09/11/90
2	D3D	Chromium	<0.50	mg/L	09/11/90
3	DG1	Chromium	<0.50	mg/L	09/11/90
1	D3	Lead	<0.50	mg/L	09/08/90
2	D3D	Lead	<0.50	mg/L	09/08/90
3	DG1	Lead	<0.50	mg/L	09/08/90
1	D3	Selenium	<0.10	mg/L	09/18/90
2	D3D	Selenium	<0.10	mg/L	09/18/90
3	DG1	Selenium	<0.10	mg/L	09/18/90
1	D3	Cyanide	<0.01	mg/L	09/18/90
2	D3D	Cyanide	<0.01	mg/L	09/18/90
3	DG1	Cyanide	<0.01	mg/L	09/18/90
1	D3	Corrosivity	<6.35	mmpy	09/10/90
2	D3D	Corrosivity	<6.35	mmpy	09/10/90
3	DG1	Corrosivity	<6.35	mmpy	09/10/90
1	D3	Sulfide	<1.0	mg/L	09/11/90
2	D3D	Sulfide	<1.0	mg/L	09/11/90
3	DG1	Sulfide	<1.0	mg/L	09/11/90

iea

REACTIVITY

IEA Sample Number: 646-017-1
Sample Identification: D3
Date Analyzed: 9/6 - 09/11/90 By: Campbell

Number	Compound	Results
1	pH	7.1
2	Reactivity toward water	N/R
3	Sulfide Reactivity	BQL
4	Cyanide Reactivity	BQL
5	Explosive Nature	N/R
6	Overall Reactivity	N/R

Comments:
BQL = Below Quantitation Limit
N/R = Not Reactive

FORM REAC Rev. 053189

REACTIVITY

IEA Sample Number: 646-017-2
Sample Identification: D3D
Date Analyzed: 9/6 - 09/11/90 By: Campbell

Number	Compound	Results
1	pH	7.2
2	Reactivity toward water	N/R
3	Sulfide Reactivity	BQL
4	Cyanide Reactivity	BQL
5	Explosive Nature	N/R
6	Overall Reactivity	N/R

Comments:
BQL = Below Quantitation Limit
N/R = Not Reactive

FORM REAC Rev. 053189

REACTIVITY

IEA Sample Number: 646-017-3
Sample Identification: DG1
Date Analyzed: 9/6 - 09/11/90 By: Campbell

Number	Compound	Results
1	pH	7.3
2	Reactivity toward water	N/R
3	Sulfide Reactivity	BQL
4	Cyanide Reactivity	BQL
5	Explosive Nature	N/R
6	Overall Reactivity	N/R

Comments:
BQL = Below Quantitation Limit
N/R = Not Reactive

FORM REAC Rev. 053189

iea

GC/MS PURGEABLES
SW-846 METHOD 8240

IEA Sample Number: 646-017-1
Sample Identification: D3
Date Analyzed: 09/19/90 By: Casto

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
1	Acetone	100	BQL
2	Benzene	5	BQL
3	Bromodichloromethane	5	BQL
4	Bromoform	5	BQL
5	Bromomethane	10	BQL
6	2-Butanone	100	BQL
7	Carbon disulfide	5	BQL
8	Carbon tetrachloride	5	BQL
9	Chlorobenzene	5	BQL
10	Dibromochloromethane	5	BQL
11	Chloroethane	10	BQL
12	2-Chloroethylvinyl ether	10	BQL
13	Chloroform	5	BQL
14	Chloromethane	10	BQL
15	1,1-Dichloroethane	5	BQL
16	1,2-Dichloroethane	5	BQL
17	1,1-Dichloroethene	5	BQL
18	1,2-Dichloroethene (total)	5	BQL
19	1,2-Dichloropropane	5	BQL
20	cis-1,3-Dichloropropene	5	BQL
21	trans-1,3-Dichloropropene	5	BQL
22	Ethylbenzene	5	BQL
23	2-Hexanone	50	BQL
24	Methylene chloride	5	BQL
25	4-Methyl-2-pentanone	50	BQL
26	Styrene	5	BQL
27	1,1,2,2-Tetrachloroethane	5	BQL
28	Tetrachloroethene	5	BQL
29	Toluene	5	BQL
30	1,1,1-Trichloroethane	5	BQL
31	1,1,2-Trichloroethane	5	BQL
32	Trichloroethene	5	BQL
33	Vinyl acetate	50	BQL
34	Vinyl chloride	10	BQL
35	Xylenes (total)	5	BQL

Comments:

BQL = Below Quantitation Limit

iea

GC/MS PURGEABLES
SW-846 METHOD 8240

IEA Sample Number: 646-017-2
Sample Identification: D3D
Date Analyzed: 09/19/90 By: Casto

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
1	Acetone	100	BQL
2	Benzene	5	BQL
3	Bromodichloromethane	5	BQL
4	Bromoform	5	BQL
5	Bromomethane	10	BQL
6	2-Butanone	100	BQL
7	Carbon disulfide	5	BQL
8	Carbon tetrachloride	5	BQL
9	Chlorobenzene	5	BQL
10	Dibromochloromethane	5	BQL
11	Chloroethane	10	BQL
12	2-Chloroethylvinyl ether	10	BQL
13	Chloroform	5	BQL
14	Chloromethane	10	BQL
15	1,1-Dichloroethane	5	BQL
16	1,2-Dichloroethane	5	BQL
17	1,1-Dichloroethene	5	BQL
18	1,2-Dichloroethene (total)	5	BQL
19	1,2-Dichloropropane	5	BQL
20	cis-1,3-Dichloropropene	5	BQL
21	trans-1,3-Dichloropropene	5	BQL
22	Ethylbenzene	5	BQL
23	2-Hexanone	50	BQL
24	Methylene chloride	5	BQL
25	4-Methyl-2-pentanone	50	BQL
26	Styrene	5	BQL
27	1,1,2,2-Tetrachloroethane	5	BQL
28	Tetrachloroethene	5	BQL
29	Toluene	5	BQL
30	1,1,1-Trichloroethane	5	BQL
31	1,1,2-Trichloroethane	5	BQL
32	Trichloroethene	5	BQL
33	Vinyl acetate	50	BQL
34	Vinyl chloride	10	BQL
35	Xylenes (total)	5	BQL

Comments:

BQL = Below Quantitation Limit

GC/MS PURGEABLES
SW-846 METHOD 8240

IEA Sample Number: 646-017-3
Sample Identification: DG1
Date Analyzed: 09/20/90 By: Harris

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
1	Acetone	100	BQL
2	Benzene	5	BQL
3	Bromodichloromethane	5	BQL
4	Bromoform	5	BQL
5	Bromomethane	10	BQL
6	2-Butanone	100	BQL
7	Carbon disulfide	5	BQL
8	Carbon tetrachloride	5	BQL
9	Chlorobenzene	5	BQL
10	Dibromochloromethane	5	BQL
11	Chloroethane	10	BQL
12	2-Chloroethylvinyl ether	10	BQL
13	Chloroform	5	BQL
14	Chloromethane	10	BQL
15	1,1-Dichloroethane	5	BQL
16	1,2-Dichloroethane	5	BQL
17	1,1-Dichloroethene	5	BQL
18	1,2-Dichloroethene (total)	5	BQL
19	1,2-Dichloropropane	5	BQL
20	cis-1,3-Dichloropropene	5	BQL
21	trans-1,3-Dichloropropene	5	BQL
22	Ethylbenzene	5	BQL
23	2-Hexanone	50	BQL
24	Methylene chloride	5	BQL
25	4-Methyl-2-pentanone	50	BQL
26	Styrene	5	BQL
27	1,1,2,2-Tetrachloroethane	5	BQL
28	Tetrachloroethene	5	BQL
29	Toluene	5	BQL
30	1,1,1-Trichloroethane	5	BQL
31	1,1,2-Trichloroethane	5	BQL
32	Trichloroethene	5	BQL
33	Vinyl acetate	50	BQL
34	Vinyl chloride	10	BQL
35	Xylenes (total)	5	BQL

Comments:

BQL = Below Quantitation Limit

iea

BASE/NEUTRAL/ACID EXTRACTABLES
SW-846 METHOD 8270

IEA Sample Number: 646-017-1
Sample Identification: D3
Date Extracted: 09/10/90
Date Analyzed: 09/21/90 By: Mace

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
1	Acenaphthene	10	BQL
2	Acenaphthylene	10	BQL
3	Anthracene	10	BQL
4	Benzoic acid	50	BQL
5	Benzo(a)anthracene	10	BQL
6	Benzo(b)fluoranthene	10	BQL
7	Benzo(k)fluoranthene	10	BQL
8	Benzo(g,h,i)perylene	10	BQL
9	Benzo(a)pyrene	10	BQL
10	Benzyl alcohol	20	BQL
11	bis(2-Chloroethoxy)methane	10	BQL
12	bis(2-Chloroethyl)ether	10	BQL
13	bis(2-Chloroisopropyl)ether	10	BQL
14	bis(2-Ethylhexyl)phthalate	10	BQL
15	4-Bromophenyl phenyl ether	10	BQL
16	Benzyl butyl phthalate	10	BQL
17	4-Chloroaniline	20	BQL
18	2-Chloronaphthalene	10	BQL
19	4-Chloro-3-methylphenol	20	BQL
20	2-Chlorophenol	10	BQL
21	4-Chlorophenyl phenyl ether	10	BQL
22	Chrysene	10	BQL
23	Dibenzo(a,h)anthracene	10	BQL
24	Dibenzofuran	10	BQL
25	Di-n-butylphthalate	10	28
26	1,3-Dichlorobenzene	10	BQL
27	1,4-Dichlorobenzene	10	BQL
28	1,2-Dichlorobenzene	10	BQL
29	3,3'-Dichlorobenzidine	20	BQL
30	2,4-Dichlorophenol	10	BQL
31	Diethyl phthalate	10	BQL
32	2,4-Dimethylphenol	10	BQL
33	Dimethyl phthalate	10	BQL
34	4,6-Dinitro-2-methylphenol	50	BQL
35	2,4-Dinitrophenol	50	BQL
36	2,4-Dinitrotoluene	10	BQL
37	2,6-Dinitrotoluene	10	BQL
38	Di-n-octylphthalate	10	BQL
39	Fluoranthene	10	BQL

FORM 8270 (1) Rev. 050589

BASE/NEUTRAL/ACID EXTRACTABLES
SW-846 METHOD 8270

IEA Sample Number: 646-017-1
Sample Identification: D3
Date Extracted: 09/10/90
Date Analyzed: 09/21/90 By: Mace

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
40	Fluorene	10	BQL
41	Hexachlorobenzene	10	BQL
42	Hexachlorobutadiene	10	BQL
43	Hexachlorocyclopentadiene	10	BQL
44	Hexachloroethane	10	BQL
45	Indeno(1,2,3-cd)pyrene	10	BQL
46	Isophorone	10	BQL
47	2-Methylnaphthalene	10	BQL
48	2-Methylphenol (o-cresol)	10	BQL
49	4-Methylphenol (p-cresol)	10	BQL
50	Naphthalene	10	BQL
51	2-Nitroaniline	50	BQL
52	3-Nitroaniline	50	BQL
53	4-Nitroaniline	50	BQL
54	Nitrobenzene	10	BQL
55	2-Nitrophenol	10	BQL
56	4-Nitrophenol	50	BQL
57	N-Nitroso-di-n-propylamine	10	BQL
58	N-Nitrosodiphenylamine	10	BQL
59	Pentachlorophenol	50	BQL
60	Phenanthrene	10	BQL
61	Phenol	10	BQL
62	Pyrene	10	BQL
63	1,2,4-Trichlorobenzene	10	BQL
64	2,4,5-Trichlorophenol	10	BQL
65	2,4,6-Trichlorophenol	10	BQL

Comments:

BQL = Below Quantitation Limit

FORM 8270 (2) Rev. 050589

BASE/NEUTRAL/ACID EXTRACTABLES
SW-846 METHOD 8270

IEA Sample Number: 646-017-2
Sample Identification: D3D
Date Extracted: 09/10/90
Date Analyzed: 09/21/90 By: Mace

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
1	Acenaphthene	10	BQL
2	Acenaphthylene	10	BQL
3	Anthracene	10	BQL
4	Benzoic acid	50	BQL
5	Benzo(a)anthracene	10	BQL
6	Benzo(b)fluoranthene	10	BQL
7	Benzo(k)fluoranthene	10	BQL
8	Benzo(g,h,i)perylene	10	BQL
9	Benzo(a)pyrene	10	BQL
10	Benzyl alcohol	20	BQL
11	bis(2-Chloroethoxy)methane	10	BQL
12	bis(2-Chloroethyl)ether	10	BQL
13	bis(2-Chloroisopropyl)ether	10	BQL
14	bis(2-Ethylhexyl)phthalate	10	BQL
15	4-Bromophenyl phenyl ether	10	BQL
16	Benzyl butyl phthalate	10	BQL
17	4-Chloroaniline	20	BQL
18	2-Chloronaphthalene	10	BQL
19	4-Chloro-3-methylphenol	20	BQL
20	2-Chlorophenol	10	BQL
21	4-Chlorophenyl phenyl ether	10	BQL
22	Chrysene	10	BQL
23	Dibenzo(a,h)anthracene	10	BQL
24	Dibenzofuran	10	BQL
25	Di-n-butylphthalate	10	BQL
26	1,3-Dichlorobenzene	10	BQL
27	1,4-Dichlorobenzene	10	BQL
28	1,2-Dichlorobenzene	10	BQL
29	3,3'-Dichlorobenzidine	20	BQL
30	2,4-Dichlorophenol	10	BQL
31	Diethyl phthalate	10	BQL
32	2,4-Dimethylphenol	10	BQL
33	Dimethyl phthalate	10	BQL
34	4,6-Dinitro-2-methylphenol	50	BQL
35	2,4-Dinitrophenol	50	BQL
36	2,4-Dinitrotoluene	10	BQL
37	2,6-Dinitrotoluene	10	BQL
38	Di-n-octylphthalate	10	BQL
39	Fluoranthene	10	BQL

FORM 8270 (1) Rev. 050589

BASE/NEUTRAL/ACID EXTRACTABLES
SW-846 METHOD 8270

IEA Sample Number: 646-017-2
Sample Identification: D3D
Date Extracted: 09/10/90
Date Analyzed: 09/21/90 By: Mace

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
40	Fluorene	10	BQL
41	Hexachlorobenzene	10	BQL
42	Hexachlorobutadiene	10	BQL
43	Hexachlorocyclopentadiene	10	BQL
44	Hexachloroethane	10	BQL
45	Indeno(1,2,3-cd)pyrene	10	BQL
46	Isophorone	10	BQL
47	2-Methylnaphthalene	10	BQL
48	2-Methylphenol (o-cresol)	10	BQL
49	4-Methylphenol (p-cresol)	10	BQL
50	Naphthalene	10	BQL
51	2-Nitroaniline	50	BQL
52	3-Nitroaniline	50	BQL
53	4-Nitroaniline	50	BQL
54	Nitrobenzene	10	BQL
55	2-Nitrophenol	10	BQL
56	4-Nitrophenol	50	BQL
57	N-Nitroso-di-n-propylamine	10	BQL
58	N-Nitrosodiphenylamine	10	BQL
59	Pentachlorophenol	50	BQL
60	Phenanthrene	10	BQL
61	Phenol	10	BQL
62	Pyrene	10	BQL
63	1,2,4-Trichlorobenzene	10	BQL
64	2,4,5-Trichlorophenol	10	BQL
65	2,4,6-Trichlorophenol	10	BQL

Comments:

BQL = Below Quantitation Limit

FORM 8270 (2) Rev. 050589

iea

BASE/NEUTRAL/ACID EXTRACTABLES
SW-846 METHOD 8270

IEA Sample Number: 646-017-3
Sample Identification: DG1
Date Extracted: 09/10/90
Date Analyzed: 09/21/90 By: Mace

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
1	Acenaphthene	10	BQL
2	Acenaphthylene	10	BQL
3	Anthracene	10	BQL
4	Benzoic acid	50	BQL
5	Benzo(a)anthracene	10	BQL
6	Benzo(b)fluoranthene	10	BQL
7	Benzo(k)fluoranthene	10	BQL
8	Benzo(g,h,i)perylene	10	BQL
9	Benzo(a)pyrene	10	BQL
10	Benzyl alcohol	20	BQL
11	bis(2-Chloroethoxy)methane	10	BQL
12	bis(2-Chloroethyl)ether	10	BQL
13	bis(2-Chloroisopropyl)ether	10	BQL
14	bis(2-Ethylhexyl)phthalate	10	BQL
15	4-Bromophenyl phenyl ether	10	BQL
16	Benzyl butyl phthalate	10	BQL
17	4-Chloroaniline	20	BQL
18	2-Chloronaphthalene	10	BQL
19	4-Chloro-3-methylphenol	20	BQL
20	2-Chlorophenol	10	BQL
21	4-Chlorophenyl phenyl ether	10	BQL
22	Chrysene	10	BQL
23	Dibenzo(a,h)anthracene	10	BQL
24	Dibenzofuran	10	BQL
25	Di-n-butylphthalate	10	BQL
26	1,3-Dichlorobenzene	10	BQL
27	1,4-Dichlorobenzene	10	BQL
28	1,2-Dichlorobenzene	10	BQL
29	3,3'-Dichlorobenzidine	20	BQL
30	2,4-Dichlorophenol	10	BQL
31	Diethyl phthalate	10	BQL
32	2,4-Dimethylphenol	10	BQL
33	Dimethyl phthalate	10	BQL
34	4,6-Dinitro-2-methylphenol	50	BQL
35	2,4-Dinitrophenol	50	BQL
36	2,4-Dinitrotoluene	10	BQL
37	2,6-Dinitrotoluene	10	BQL
38	Di-n-octylphthalate	10	BQL
39	Fluoranthene	10	BQL

FORM 8270 (1) Rev. 050589

BASE/NEUTRAL/ACID EXTRACTABLES
SW-846 METHOD 8270

IEA Sample Number: 646-017-3
Sample Identification: DG1
Date Extracted: 09/10/90
Date Analyzed: 09/21/90 By: Mace

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
40	Fluorene	10	BQL
41	Hexachlorobenzene	10	BQL
42	Hexachlorobutadiene	10	BQL
43	Hexachlorocyclopentadiene	10	BQL
44	Hexachloroethane	10	BQL
45	Indeno(1,2,3-cd)pyrene	10	BQL
46	Isophorone	10	BQL
47	2-Methylnaphthalene	10	BQL
48	2-Methylphenol (o-cresol)	10	BQL
49	4-Methylphenol (p-cresol)	10	BQL
50	Naphthalene	10	BQL
51	2-Nitroaniline	50	BQL
52	3-Nitroaniline	50	BQL
53	4-Nitroaniline	50	BQL
54	Nitrobenzene	10	BQL
55	2-Nitrophenol	10	BQL
56	4-Nitrophenol	50	BQL
57	N-Nitroso-di-n-propylamine	10	BQL
58	N-Nitrosodiphenylamine	10	BQL
59	Pentachlorophenol	50	BQL
60	Phenanthrene	10	BQL
61	Phenol	10	BQL
62	Pyrene	10	BQL
63	1,2,4-Trichlorobenzene	10	BQL
64	2,4,5-Trichlorophenol	10	BQL
65	2,4,6-Trichlorophenol	10	BQL

Comments:

BQL = Below Quantitation Limit

FORM 8270 (2) Rev. 050589

BASE/NEUTRAL/ACID EXTRACTABLES
SW-846 METHOD 8270

IEA Sample Number: 646-017-4
Sample Identification: DDH2
Date Extracted: 09/10/90
Date Analyzed: 09/21/90 By: Mace

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
1	Acenaphthene	10	BQL
2	Acenaphthylene	10	BQL
3	Anthracene	10	BQL
4	Benzoic acid	50	BQL
5	Benzo(a)anthracene	10	BQL
6	Benzo(b)fluoranthene	10	BQL
7	Benzo(k)fluoranthene	10	BQL
8	Benzo(g,h,i)perylene	10	BQL
9	Benzo(a)pyrene	10	BQL
10	Benzyl alcohol	20	BQL
11	bis(2-Chloroethoxy)methane	10	BQL
12	bis(2-Chloroethyl)ether	10	BQL
13	bis(2-Chloroisopropyl)ether	10	BQL
14	bis(2-Ethylhexyl)phthalate	10	BQL
15	4-Bromophenyl phenyl ether	10	BQL
16	Benzyl butyl phthalate	10	BQL
17	4-Chloroaniline	20	BQL
18	2-Chloronaphthalene	10	BQL
19	4-Chloro-3-methylphenol	20	BQL
20	2-Chlorophenol	10	BQL
21	4-Chlorophenyl phenyl ether	10	BQL
22	Chrysene	10	BQL
23	Dibenzo(a,h)anthracene	10	BQL
24	Dibenzofuran	10	BQL
25	Di-n-butylphthalate	10	BQL
26	1,3-Dichlorobenzene	10	BQL
27	1,4-Dichlorobenzene	10	BQL
28	1,2-Dichlorobenzene	10	BQL
29	3,3'-Dichlorobenzidine	20	BQL
30	2,4-Dichlorophenol	10	BQL
31	Diethyl phthalate	10	BQL
32	2,4-Dimethylphenol	10	BQL
33	Dimethyl phthalate	10	BQL
34	4,6-Dinitro-2-methylphenol	50	BQL
35	2,4-Dinitrophenol	50	BQL
36	2,4-Dinitrotoluene	10	BQL
37	2,6-Dinitrotoluene	10	BQL
38	Di-n-octylphthalate	10	BQL
39	Fluoranthene	10	BQL

FORM 8270 (1) Rev. 050589

iea

BASE/NEUTRAL/ACID EXTRACTABLES
SW-846 METHOD 8270

IEA Sample Number: 646-017-4
Sample Identification: DDH2
Date Extracted: 09/10/90
Date Analyzed: 09/21/90 By: Mace

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
40	Fluorene	10	BQL
41	Hexachlorobenzene	10	BQL
42	Hexachlorobutadiene	10	BQL
43	Hexachlorocyclopentadiene	10	BQL
44	Hexachloroethane	10	BQL
45	Indeno(1,2,3-cd)pyrene	10	BQL
46	Isophorone	10	BQL
47	2-Methylnaphthalene	10	BQL
48	2-Methylphenol (o-cresol)	10	BQL
49	4-Methylphenol (p-cresol)	10	BQL
50	Naphthalene	10	BQL
51	2-Nitroaniline	50	BQL
52	3-Nitroaniline	50	BQL
53	4-Nitroaniline	50	BQL
54	Nitrobenzene	10	BQL
55	2-Nitrophenol	10	BQL
56	4-Nitrophenol	50	BQL
57	N-Nitroso-di-n-propylamine	10	BQL
58	N-Nitrosodiphenylamine	10	BQL
59	Pentachlorophenol	50	BQL
60	Phenanthrene	10	BQL
61	Phenol	10	BQL
62	Pyrene	10	BQL
63	1,2,4-Trichlorobenzene	10	BQL
64	2,4,5-Trichlorophenol	10	BQL
65	2,4,6-Trichlorophenol	10	BQL

Comments:

BQL = Below Quantitation Limit

FORM 8270 (2) Rev. 050589

BASE/NEUTRAL/ACID EXTRACTABLES
SW-846 METHOD 8270

IEA Sample Number: 646-017-5
Sample Identification: DDH4
Date Extracted: 09/10/90
Date Analyzed: 09/22/90 By: Mace

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
1	Acenaphthene	10	BQL
2	Acenaphthylene	10	BQL
3	Anthracene	10	BQL
4	Benzoic acid	50	BQL
5	Benzo(a)anthracene	10	BQL
6	Benzo(b)fluoranthene	10	BQL
7	Benzo(k)fluoranthene	10	BQL
8	Benzo(g,h,i)perylene	10	BQL
9	Benzo(a)pyrene	10	BQL
10	Benzyl alcohol	20	BQL
11	bis(2-Chloroethoxy)methane	10	BQL
12	bis(2-Chloroethyl)ether	10	BQL
13	bis(2-Chloroisopropyl)ether	10	BQL
14	bis(2-Ethylhexyl)phthalate	10	BQL
15	4-Bromophenyl phenyl ether	10	BQL
16	Benzyl butyl phthalate	10	BQL
17	4-Chloroaniline	20	BQL
18	2-Chloronaphthalene	10	BQL
19	4-Chloro-3-methylphenol	20	BQL
20	2-Chlorophenol	10	BQL
21	4-Chlorophenyl phenyl ether	10	BQL
22	Chrysene	10	BQL
23	Dibenzo(a,h)anthracene	10	BQL
24	Dibenzofuran	10	BQL
25	Di-n-butylphthalate	10	BQL
26	1,3-Dichlorobenzene	10	BQL
27	1,4-Dichlorobenzene	10	BQL
28	1,2-Dichlorobenzene	10	BQL
29	3,3'-Dichlorobenzidine	20	BQL
30	2,4-Dichlorophenol	10	BQL
31	Diethyl phthalate	10	BQL
32	2,4-Dimethylphenol	10	BQL
33	Dimethyl phthalate	10	BQL
34	4,6-Dinitro-2-methylphenol	50	BQL
35	2,4-Dinitrophenol	50	BQL
36	2,4-Dinitrotoluene	10	BQL
37	2,6-Dinitrotoluene	10	BQL
38	Di-n-octylphthalate	10	BQL
39	Fluoranthene	10	BQL

FORM 8270 (1) Rev. 050589

BASE/NEUTRAL/ACID EXTRACTABLES
SW-846 METHOD 8270

IEA Sample Number: 646-017-5
Sample Identification: DDH4
Date Extracted: 09/10/90
Date Analyzed: 09/22/90 By: Mace

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
40	Fluorène	10	BQL
41	Hexachlorobenzene	10	BQL
42	Hexachlorobutadiene	10	BQL
43	Hexachlorocyclopentadiene	10	BQL
44	Hexachloroethane	10	BQL
45	Indeno(1,2,3-cd)pyrene	10	BQL
46	Isophorone	10	BQL
47	2-Methylnaphthalene	10	BQL
48	2-Methylphenol (o-cresol)	10	BQL
49	4-Methylphenol (p-cresol)	10	BQL
50	Naphthalene	10	BQL
51	2-Nitroaniline	50	BQL
52	3-Nitroaniline	50	BQL
53	4-Nitroaniline	50	BQL
54	Nitrobenzene	10	BQL
55	2-Nitrophenol	10	BQL
56	4-Nitrophenol	50	BQL
57	N-Nitroso-di-n-propylamine	10	BQL
58	N-Nitrosodiphenylamine	10	BQL
59	Pentachlorophenol	50	BQL
60	Phenanthrene	10	BQL
61	Phenol	10	BQL
62	Pyrene	10	BQL
63	1,2,4-Trichlorobenzene	10	BQL
64	2,4,5-Trichlorophenol	10	BQL
65	2,4,6-Trichlorophenol	10	BQL

Comments:

BQL = Below Quantitation Limit

FORM 8270 (2) Rev. 050589

BASE/NEUTRAL/ACID EXTRACTABLES
SW-846 METHOD 8270

IEA Sample Number: 646-017-6
Sample Identification: D4
Date Extracted: 09/10/90
Date Analyzed: 09/22/90 By: Mace

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
1	Acenaphthene	10	BQL
2	Acenaphthylene	10	BQL
3	Anthracene	10	BQL
4	Benzoic acid	50	BQL
5	Benzo(a)anthracene	10	BQL
6	Benzo(b)fluoranthene	10	BQL
7	Benzo(k)fluoranthene	10	BQL
8	Benzo(g,h,i)perylene	10	BQL
9	Benzo(a)pyrene	10	BQL
10	Benzyl alcohol	20	BQL
11	bis(2-Chloroethoxy)methane	10	BQL
12	bis(2-Chloroethyl)ether	10	BQL
13	bis(2-Chloroisopropyl)ether	10	BQL
14	bis(2-Ethylhexyl)phthalate	10	BQL
15	4-Bromophenyl phenyl ether	10	BQL
16	Benzyl butyl phthalate	10	BQL
17	4-Chloroaniline	20	BQL
18	2-Chloronaphthalene	10	BQL
19	4-Chloro-3-methylphenol	20	BQL
20	2-Chlorophenol	10	BQL
21	4-Chlorophenyl phenyl ether	10	BQL
22	Chrysene	10	BQL
23	Dibenzo(a,h)anthracene	10	BQL
24	Dibenzofuran	10	BQL
25	Di-n-butylphthalate	10	BQL
26	1,3-Dichlorobenzene	10	BQL
27	1,4-Dichlorobenzene	10	BQL
28	1,2-Dichlorobenzene	10	BQL
29	3,3'-Dichlorobenzidine	20	BQL
30	2,4-Dichlorophenol	10	BQL
31	Diethyl phthalate	10	BQL
32	2,4-Dimethylphenol	10	BQL
33	Dimethyl phthalate	10	BQL
34	4,6-Dinitro-2-methylphenol	50	BQL
35	2,4-Dinitrophenol	50	BQL
36	2,4-Dinitrotoluene	10	BQL
37	2,6-Dinitrotoluene	10	BQL
38	Di-n-octylphthalate	10	BQL
39	Fluoranthene	10	BQL

FORM 8270 (1) Rev. 050589

BASE/NEUTRAL/ACID EXTRACTABLES
SW-846 METHOD 8270

IEA Sample Number: 646-017-6
Sample Identification: D4
Date Extracted: 09/10/90
Date Analyzed: 09/22/90 By: Mace

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
40	Fluorene	10	BQL
41	Hexachlorobenzene	10	BQL
42	Hexachlorobutadiene	10	BQL
43	Hexachlorocyclopentadiene	10	BQL
44	Hexachloroethane	10	BQL
45	Indeno(1,2,3-cd)pyrene	10	BQL
46	Isophorone	10	BQL
47	2-Methylnaphthalene	10	BQL
48	2-Methylphenol (o-cresol)	10	BQL
49	4-Methylphenol (p-cresol)	10	BQL
50	Naphthalene	10	BQL
51	2-Nitroaniline	50	BQL
52	3-Nitroaniline	50	BQL
53	4-Nitroaniline	50	BQL
54	Nitrobenzene	10	BQL
55	2-Nitrophenol	10	BQL
56	4-Nitrophenol	50	BQL
57	N-Nitroso-di-n-propylamine	10	BQL
58	N-Nitrosodiphenylamine	10	BQL
59	Pentachlorophenol	50	BQL
60	Phenanthrene	10	BQL
61	Phenol	10	BQL
62	Pyrene	10	BQL
63	1,2,4-Trichlorobenzene	10	BQL
64	2,4,5-Trichlorophenol	10	BQL
65	2,4,6-Trichlorophenol	10	BQL

Comments:

BQL = Below Quantitation Limit

FORM 8270 (2) Rev. 050589

BASE/NEUTRAL/ACID EXTRACTABLES
SW-846 METHOD 8270

IEA Sample Number: 646-017-7
Sample Identification: D6
Date Extracted: 09/10/90
Date Analyzed: 09/22/90 By: Mace

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
1	Acenaphthene	10	BQL
2	Acenaphthylene	10	BQL
3	Anthracene	10	BQL
4	Benzoic acid	50	BQL
5	Benzo(a)anthracene	10	BQL
6	Benzo(b)fluoranthene	10	BQL
7	Benzo(k)fluoranthene	10	BQL
8	Benzo(g,h,i)perylene	10	BQL
9	Benzo(a)pyrene	10	BQL
10	Benzyl alcohol	20	BQL
11	bis(2-Chloroethoxy)methane	10	BQL
12	bis(2-Chloroethyl)ether	10	BQL
13	bis(2-Chloroisopropyl)ether	10	BQL
14	bis(2-Ethylhexyl)phthalate	10	BQL
15	4-Bromophenyl phenyl ether	10	BQL
16	Benzyl butyl phthalate	10	BQL
17	4-Chloroaniline	20	BQL
18	2-Chloronaphthalene	10	BQL
19	4-Chloro-3-methylphenol	20	BQL
20	2-Chlorophenol	10	BQL
21	4-Chlorophenyl phenyl ether	10	BQL
22	Chrysene	10	BQL
23	Dibenzo(a,h)anthracene	10	BQL
24	Dibenzofuran	10	BQL
25	Di-n-butylphthalate	10	BQL
26	1,3-Dichlorobenzene	10	BQL
27	1,4-Dichlorobenzene	10	BQL
28	1,2-Dichlorobenzene	10	BQL
29	3,3'-Dichlorobenzidine	20	BQL
30	2,4-Dichlorophenol	10	BQL
31	Diethyl phthalate	10	BQL
32	2,4-Dimethylphenol	10	BQL
33	Dimethyl phthalate	10	BQL
34	4,6-Dinitro-2-methylphenol	50	BQL
35	2,4-Dinitrophenol	50	BQL
36	2,4-Dinitrotoluene	10	BQL
37	2,6-Dinitrotoluene	10	BQL
38	Di-n-octylphthalate	10	BQL
39	Fluoranthene	10	BQL

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SW-846 METHOD 8270

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Sample Identification: D6
Date Extracted: 09/10/90
Date Analyzed: 09/22/90 By: Mace

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
40	Fluorene	10	BQL
41	Hexachlorobenzene	10	BQL
42	Hexachlorobutadiene	10	BQL
43	Hexachlorocyclopentadiene	10	BQL
44	Hexachloroethane	10	BQL
45	Indeno(1,2,3-cd)pyrene	10	BQL
46	Isophorone	10	BQL
47	2-Methylnaphthalene	10	BQL
48	2-Methylphenol (o-cresol)	10	BQL
49	4-Methylphenol (p-cresol)	10	BQL
50	Naphthalene	10	BQL
51	2-Nitroaniline	50	BQL
52	3-Nitroaniline	50	BQL
53	4-Nitroaniline	50	BQL
54	Nitrobenzene	10	BQL
55	2-Nitrophenol	10	BQL
56	4-Nitrophenol	50	BQL
57	N-Nitroso-di-n-propylamine	10	BQL
58	N-Nitrosodiphenylamine	10	BQL
59	Pentachlorophenol	50	BQL
60	Phenanthrene	10	BQL
61	Phenol	10	BQL
62	Pyrene	10	BQL
63	1,2,4-Trichlorobenzene	10	BQL
64	2,4,5-Trichlorophenol	10	BQL
65	2,4,6-Trichlorophenol	10	BQL

Comments:

BQL = Below Quantitation Limit

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