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July 2, 1996

Mr. Randy Sturgeon
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COLUMBIA AQUIFER ASSESSMENT
AND SITEWIDE HYDROGEOLOGIC CONCEPTUAL MODEL
Newport Superfund Site
Newport, Delaware

Dear Mr. Sturgeon:

On behalf of DuPont, DuPont Environmental Remediation Services (DERS) is pleased to submit this *Columbia Aquifer Assessment and Sitewide Hydrogeolgic Conceptual Model* for the Newport Superfund site. This report supplements the September 1995 *North Landfill Value Engineering Report* and updates DERS' understanding of the site conceptual model.

DERS believes that this assessment supports our proposal for a short vertical barrier (keyed to marsh deposit) at the landfill and plant area. The report also confirms our position that Columbia aquifer pumping is unnecessary to protect the river or off-site groundwater and is counter-productive. We request a change in the performance standards to reflect this new understanding.

DERS looks forward to your favorable review of this report. Please call me at (302) 992-5978 if you or your staff have any questions regarding this report or our programs.

Sincerely,

P. Brandt Butler

P. Brandt Butler, PhD
Newport Project Coordinator

PBB:pem
Enclosure

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NORTH LANDFILL
VALUE ENGINEERING REPORT ADDENDUM

COLUMBIA AQUIFER ASSESSMENT AND SITEWIDE HYDROGEOLOGIC CONCEPTUAL MODEL

Newport Superfund Site
Newport, Delaware

July 2, 1996 **DERS Project No. 2124**

Prepared by

DuPont Environmental Remediation Services
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EXECUTIVE SUMMARY

Based on the analysis provided in this report, there is no threat to human health and the environment in the river posed by the discharge to the river from the Columbia Formation groundwater found beneath the North Landfill and Plant Area. For this reason, neither a deep slurry wall nor pumping of Columbia Formation groundwater beneath the North Landfill and Plant Area is needed to protect the river.

Numerous subsurface investigations have been completed at the Newport Superfund site since the Environmental Protection Agency's (EPA's) November 16, 1994, approval of the *Remedial Design/Remedial Action Work Plan* (RD/RA work plan). The original sitewide hydrogeologic conceptual model—specifically the relationship of the Christina River and Columbia aquifer in the area of the North Landfill—has been refined based on the geologic and hydrogeologic data from these investigations and a reassessment of historical data. This report supplements the September 1995 *North Landfill Value Engineering Report* and responds to the EPA's comment (No. 6) in their December 1995 letter.

The original conceptual model from the remedial investigation (RI) depicted the Columbia aquifer in direct hydraulic connection with the Christina River. Consequently, the Record of Decision (ROD) mandated the construction of a vertical barrier down to the base of the Columbia aquifer, along the north side of the river, to prevent contaminated Columbia aquifer groundwater from discharging to the river. DuPont has now established the existence of an ancient floodplain deposit of the Christina River—a very low-permeability, green-gray, clayey silt (herein referred to as the marsh deposit). The low-permeable laterally continuous marsh deposit acts as an aquitard between the Columbia aquifer and the river. Based on the new conceptual understanding, a shorter wall keyed into the marsh deposit will effectively protect the river. Therefore, pumping in the Columbia aquifer is unnecessary.

Extending the vertical barrier to the base of the Columbia Formation would not provide additional protectiveness for human health or the environment. In addition, a deeper vertical barrier would require pumping in the Columbia Formation, which could mobilize

metals from the fill zone, pull them through the marsh deposit, and down into the Columbia.

New wells have been installed, and groundwater samples have been collected from the Columbia aquifer in the area of the North Landfill and Plant Area which show little or no groundwater constituent migration. Contaminants of concern do not appear to have undergone significant migration from the Holly Run area to the North Landfill area, clearly suggesting the effectiveness of natural attenuation mechanisms. Therefore, capture and extraction of the Columbia aquifer groundwater beneath the North Landfill and Plant Area is not needed. DuPont proposes that the existing long-term monitoring be modified to reflect this new understanding of groundwater flow and migration at the site. Specific changes are recommended.

In summary, DuPont requests that the ROD performance standards be modified to permit construction of a shallow vertical barrier in the area of the North Landfill and Plant Area and that extraction of groundwater in the Columbia aquifer be eliminated. The proposed revisions to the ROD performance standards will result in a final remedy for the North Landfill that meets the remedial objective of protecting the river and controls off-site migration. In addition, it will be more protective of the Columbia aquifer by precluding induced transport of contaminants potentially caused by pumping.

1.0 INTRODUCTION

Numerous subsurface investigations have been completed at the Newport Superfund site since the Environmental Protection Agency's (EPA's) November 16, 1994, approval of the *Remedial Design/Remedial Action Work Plan* (RD/RA work plan). This report presents an update to the sitewide conceptual hydrogeologic model, placing emphasis on the Columbia aquifer and hydrogeologic conditions in the area of the North Landfill and its relationship to the Christina River. The newly acquired remedial design and remedial action (RD/RA) data is used to illustrate areas where site-specific information has improved the understanding of the site's hydrogeology. This new information effects the basis on which the remedial actions mandated in the Record of Decision (ROD) were originally proposed.

This report supplements the September 29, 1995, *North Landfill and Plant Area Value Engineering Report*, and responds to the Environmental Protection Agency's (EPA's) request for an updated sitewide understanding of site groundwater flow patterns and subsurface conditions (conceptual model).

2.0 PREDESIGN INVESTIGATIONS

The field investigations conducted at the Newport Superfund site since approval of the RD/RA work plan in November 1994 have produced a significant amount of new information. In December 1994, nine borings (i.e., borings WB-1 through WB-1; see Figure 3) confirmed marsh deposit continuity beneath the South Landfill area as part of the South Landfill treatment proposal field investigation. Laboratory permeability tests showed the marsh deposit to have an average permeability of 10^{-7} centimeters per second (cm/sec). This confirmed the confining properties of the marsh deposit. This data was previously presented to the EPA in the April 5, 1995, *Proposal—South Landfill Treatment*.

The next investigation, conducted in July 1995, was part of the North Landfill value engineering (VE) study. Three deep soil borings (i.e., borings NVE-1, NVE-2 and NVE-3) were completed through the North Landfill to the top of the Potomac Formation. These borings confirmed the continuity and confining nature of the marsh deposit beneath the North Landfill area. This data was previously presented to the EPA in the September 29, 1995, *Value Engineering Report for the North Landfill and Plant Area*.

During the Phase II investigation of the Christina River sediment in September 1995, seven 20-foot-long core barrels were advanced through the bottom of the Christina River. These cores confirmed the continuity and confining nature of the marsh deposit beneath the river. This data is presented in Section 3.2 of this report.

The investigation for the South Landfill VE study was conducted in September 1995. Test trenches were excavated at thirteen locations around the South Landfill perimeter. All trenches encountered the marsh deposit, further confirming its continuity. This data was presented to the EPA in the October 27, 1995, *South Landfill Value Engineering Report*.

Predesign investigations for the Plant Area, North Landfill, and South Landfill area groundwater extraction systems began in February 1995. As part of this fieldwork, two new wells were installed on the North Landfill and nine new wells on the South Landfill.

These wells all encountered the marsh deposit. In May 1996, single borehole hydraulic conductivity tests were conducted on these and other on-site wells to assess flow characteristics.

3.0 REMEDIAL CONTAINMENT STRATEGY

3.1 ROD Containment Strategy for North Landfill Area

Performance standard, Section 2.5, requires the following:

- "...A physical barrier wall (an actual wall that limits migration of ground water to the maximum extent practicable) shall be constructed to extend from the ground surface to the base of the Columbia aquifer, keying into the aquitard which separates the Columbia aquifer and the Potomac aquifer.....This wall shall connect to the physical barrier wall to be installed along the riverbank at the Ciba-Geigy plant as discussed under the "Ciba-Geigy and DuPont Holly Run Plants" section below (see Section 6.4). Because the wall may cause mounding of the ground water to occur in the landfill, ground-water extraction wells shall be installed to control any mounding effect. The recovered ground water shall be treated."

Performance standard 2.5.1 further states the following:

- "2.5.1. A physical barrier shall be constructed to extend from the surface to the base of the Columbia aquifer. The design shall be such as to minimize to the maximum extent practicable the flow of Columbia groundwater underneath the barrier wall into the Christina River..."

The ROD required a physical barrier to the base of the Columbia aquifer because the RI/FS characterized the relationship of the Columbia aquifer and the river in the manner which is most common of groundwater-river systems in the Atlantic Coastal Plain. That is, groundwater discharges to the river contributing a significant amount of its base flow. This was a reasonable characterization at the time of the RI/FS because no other site-specific data were available concerning the existence of a confining unit immediately beneath the river. On a regional scale the Columbia aquifer does provide a major part of the Christina River's basal groundwater flow in other area of the river. However, the new RD/RA data, discussed in Section 4.0 of this report, changes the premise of this section of the ROD.

3.2 Updated Containment Strategy for the North Landfill Area

DuPont proposes an updated containment strategy for the North Landfill area groundwater based on our currently revised conceptual understanding of site hydrogeology. This new strategy was first discussed in the North Landfill VE report. Based on the findings of the VE field investigations, a vertical barrier extended into the shallow marsh deposit (with fill zone groundwater extraction) will effectively prevent migration of the fill zone groundwater into the Christina River. The VE field investigations also determined that the first Potomac Formation material directly under the Columbia aquifer would be a poor unit into which to key the vertical barrier because of its relatively higher permeability.

Installing the vertical barrier to control the fill zone groundwater eliminates the need for hydraulic control in the Columbia aquifer. Eliminating pumping in the Columbia aquifer would remove any possibility of "pulling" down contaminated fill zone groundwater or accelerating the migration of already contaminated Columbia aquifer groundwater in the Holly Run Area (e.g., area around MW-1 and MW-2 well clusters) towards the river area. The conceptual flow model, presented in Section 4.0, discusses Columbia aquifer flow in more detail.

4.0 CONCEPTUAL FLOW MODEL

4.1 Geologic Setting

New Castle County, Delaware, lies within two regional geologic provinces, the Appalachian Piedmont and the Atlantic Coastal Plain (Sundstrom et al. 1976). The northernmost part of the county is characterized by gently rolling hills and outcrops of bedrock of the Piedmont Province. The surface of this complex of very old metamorphic and igneous rocks slopes seaward, forming the basement on which lies the wedge-shaped mass of Coastal Plain sediment. This wedge consists largely of unconsolidated and semiconsolidated clay, silt, sand and gravel that reach a thickness of more than 2,300 feet in southeastern New Castle County (Sundstrom and Pickett 1971).

The site is in the transition zone (fall zone) between the Coastal Plain sediment and the hard rock of the Piedmont Province. Because the site is in the fall zone, the Coastal Plain sediment immediately beneath the North Landfill ranges from approximately 75 feet thick (well MW-32) to 135 feet thick (well MW-1) before weathered bedrock is encountered (see Appendix C). The thickness and attitude of the individual stratigraphic units that comprise the Coastal Plain sediment can also vary greatly in the fall zone. As one moves north and east across the site, the Coastal Plain sediment thins, and bedrock is encountered closer to the surface. TB-20 and TB-34, in the northeastern corner of the site, encountered bedrock at 53 and 64 feet below ground surface (BGS), respectively.

The Coastal Plain sediment beneath the site is comprised of three geologic formations. These stratigraphic units (formations) are shown on Figures 4 through 9 (geologic cross-sections A-A' to F-F', respectively). The geologic logs used to construct each cross section are provided in Appendix C, and the plan view of these cross-section locations is shown in Figure 3. As shown on the cross section, the first stratigraphic unit beneath the cover soil and any waste/fill material is Holocene or recent age (less than 10,000 years ago) clayey silt marsh deposit. The second stratigraphic unit is the Pleistocene age (10,000 to 2,000,000 years ago) Columbia Formation. The third stratigraphic unit is part of the Cretaceous age (65 to 135 million years ago) Potomac Formation.

4.2 Continuity and Thickness of the Marsh Deposit

The uppermost confining unit is termed the marsh deposit. The marsh deposit is classified as a clayey silt based on the particle-size analysis and Atterberg limits (see Appendix B2). The clayey silt marsh deposit is believed to have formed in association with the ancient floodplain of the Christina River. These deposits are typically continuous over their area of occurrence.

The continuity and thickness of the marsh deposit has been previously documented by over 80 geologic borings across the site and most recently by the six river cores (PB-2, NVERB-1, 2, 4, 5, and 6; see Appendix C). In addition, all 9 borings for the recent installation of the South Landfill RD/RA predesign investigation groundwater extraction wells (wells RDW-1 through RDW-9) encountered the top of the marsh deposit. Figure 10, the Isopach Thickness Map, shows the locations of all 87 borings and marsh deposit thickness for each boring. These thicknesses were used to construct contour lines that represent lines of equal thickness of the marsh deposit.

As seen on geologic cross-sections A-A', B-B', C-C', D-D', E-E', and F-F' (Figures 4 through 9, respectively), all borings encounter the marsh deposit. Beneath the waste/fill material of the North Landfill, the clayey silt is a minimum of 7 feet thick (boring B-111) to a maximum of 12.5 feet thick (boring NVE-1). The unit has an approximate average thickness of 10 feet in this area. The base elevation of the clayey silt layer is fairly consistent. A numerical average for all 87 borings across the site for the marsh deposit is approximately 9 feet.

The marsh deposit is horizontally continuous under the waste and fill material of the North Landfill, the Plant Area, and the South Landfill and has a sufficiently low permeability (see Table 1) and thickness to serve as a confining unit key for the two vertical barriers called for in the ROD. The continuity and thickness of the marsh deposit beneath the Christina River is discussed in Section 3.2.1.

4.2.1 Deep River Coring Data

On November 23 and 27, 1995, DuPont collected deep cores through the bottom of the Christina River using the same vibracore protocols and sampling equipment that had been used for the Phase II Christina River sampling. The only difference was that 20-foot-long aluminum core barrels were used to determine the stratigraphy beneath the river. Deep cores were attempted at seven locations (see Figure 3). Photographs of the cores are provided in Appendix A.

At six of the seven locations, cores of the marsh deposit greater than 7.5 feet thick were obtained. At location NVERB-3, riprap and gravel on the river bottom repeatedly crumpled the lip of the core barrel, and it was not possible to drive a core more than 3 feet in that location. With the exception of NVERB-3, all 20 foot core barrels were driven deep enough to penetrate the Columbia Formation. The photograph of core NVERB-5 in Appendix A shows the marsh deposit-Columbia Formation contact particularly well.

4.2.2 River Core Permeability and Grain Size

The river cores were handled in the same manner as the Phase II river cores. However, before the cores were opened, a 2-foot-long section was cut out for permeability and grain-size testing. These sections can be seen in the photographs, and the exact intervals are indicated on the boring logs presented in Appendix B. The sections were handled in accordance with American Society for Testing and Materials (ASTM) procedures and tested for permeability (ASTM D5084) and grain size.

Geotechnical testing results are provided in Appendix B. Permeability of all marsh deposit samples was in the range of 10^{-7} cm/sec. Average permeability for the marsh deposit under the river is 6×10^{-7} cm/sec.

Thirteen marsh deposit samples were submitted for grain-size analysis, the results of which classified the marsh deposit as either a clay or silt (OH, MH or ML). Three samples of the Columbia Formation (bottom of cores NVERB-2, -5 and -6) were all classified as silty sands or sand-clay mixtures (SM).

4.3 Columbia Formation Occurrence and Characteristics

The silts, sands, and gravels of the Columbia Formation lie beneath the marsh deposit. Beneath the North Landfill, this formation can be divided into two zones based on lithologic and hydraulic characteristics. Both zones are considered one aquifer. The upper zone of the Columbia Formation is a lower-permeability mixture of orange, predominately fine to medium sand with some lens of silts and clays (see particle-size distribution curve for samples SS-17 and SS-27 found in Appendix D of the *North Landfill VE Report*).

The North Landfill VE test borings show that the upper Columbia extends from the bottom of the marsh deposit at around 22 feet BGS to approximately 60 feet BGS. The lower zone of the Columbia Formation has a higher permeability than the upper zone and extends from approximately 60 feet BGS to the top of the first Potomac unit (at around 80 feet BGS). This lower zone is a very homogenous medium-to-fine quartz sand (see particle-size distribution curve for sample SS-23 found in Appendix D of the *North Landfill VE Report*), which is under some hydrostatic pressure. That is, "running sands" were observed during drilling. This running sand zone in the Columbia Formation is characteristic of the contact between the Columbia and Potomac Formations throughout New Castle County.

The Columbia Formation is less extensive (thick) in the Plant Area than in the North Landfill Area and is considered one zone based on its lithologic and hydraulic characteristics. As seen on the southwestern end of cross-section A-A' (see Figure 4) and the northwestern end of cross-section D-D' (see Figure 7), the Columbia Formation is thickest beneath the North Landfill/Holly Run Plant Area. The Columbia Formation is thinner (but still fairly uniform in thickness) in the area immediately below the Ciba-Geigy Plant as seen on the eastern end of cross-section A-A' (see Figure 4) and on cross-section F-F' (see Figure 9). Under the South Landfill and South Wetlands, cross-sections C-C" (see Figure 6) and E-E' (see Figure 8) show the thinness of the Columbia Formation. These cross sections also illustrate how the Columbia Formation is confined under the Christina River by the marsh deposit on its top and by the Potomac Formation on its bottom.

4.4 Potomac Formation Occurrence and Characteristics

The Potomac Formation unit below the North Landfill area is a mixture of variegated red, gray, purple, yellow, and white frequently lignitic silts and clays containing interbedded white, gray, and rust-brown fine to course quartz sands and gravels (see particle size distribution curve for samples ST-2, ST-4, ST-6, and SS-20 found in Appendix D of the *North Landfill VE Report*). Because of this interbedding with sands, the permeability of the Potomac "clay" unit found at the base of the Columbia Formation is about one order of magnitude higher than the permeability of the marsh deposit (see Table 1 of *North Value Engineering Report*). In addition, the clay in this first Potomac Formation unit does not appear to be continuous (i.e., it is mixed with sand and silt) along the length of the proposed vertical barrier. Where the clay is present, it may not be thick enough to provide an effective vertical barrier key.

Boring logs also indicate that the first Potomac unit is often a true stiff clay or silty clay; indicative of very low permeability and the ability of the first Potomac unit functioning as a complete confining layer (see southern end of cross-section D-D' in Figure 7). The permeability of the Potomac unit in contact with the overlaying Columbia Formation in the area beneath the river is lower than that of the Columbia Formation. Groundwater in the Columbia flows easier in the Columbia than in the Potomac. In this sense, the Potomac functions as a semiconfining unit for the Columbia beneath the North Landfill and river.

4.5 Groundwater Flow System

To supplement the existing RI data base on the groundwater flow system, several field investigations were conducted. New wells were installed and sampled to update the groundwater quality characterization in the North Landfill and South Landfill areas of the site. Sitewide water level measurements in all wells were taken to determine groundwater flow directions in each stratigraphic unit. Single borehole hydraulic conductivity tests (i.e., slug test) were completed in select wells to provide data for the calculation of groundwater flow velocities.

To help characterize the groundwater quality in the area beneath the North Landfill, two new monitoring wells, SM-3(F) and SM-3(C), were installed. Well SM-3(F) was screened in the fill zone above the marsh deposit, from 22 feet BGS (base of the marsh deposit) up to 12 BGS. The 10-foot long screen covers the complete saturated zone interval that was found to be about 4.5 feet thick in the North Landfill. The second well, SM-3(C), was screened at the base of the Columbia Formation. The screen covered the interval from 70 feet BGS to 55 feet BGS. Nine new wells were installed in the South Landfill waste zone (RDW-1 through RDW-9).

To calculate hydraulic gradients and determine groundwater flow directions in each of the three stratigraphic units, two rounds of water levels were measured in 85 wells on site. The water-level measurements were taken at low tide on May 9, 1996, and at high tide on May 10, 1996. The raw water-level data and the interval screened by each well are summarized in Table 2. The cross-sections (Figures 4 through 9) also illustrate the screened interval of each well. Based on this data, water level contour maps were developed and groundwater flow directions determined for each stratigraphic unit. Figure 11 and 12 are the low and high tide groundwater contour maps for the fill zone. Figure 13 and 14 are the low and high tide groundwater contour maps for the Columbia aquifer. Figures 15 and 16 are the maps for the Potomac Aquifer for low and high tide, respectively. The maps are in general agreement with those maps generated for the RI.

To calculate groundwater flow velocities accurately, slug tests were conducted in 25 wells to measure the hydraulic conductivity of the Columbia Formation and fill zone. The results of the slug test for the Columbia aquifer in the area of the North Landfill are summarized in Table 3. The calculations and graphs for each well are found in Appendix D.

4.5.1 Groundwater Flow and Travel Times in the Columbia Formation

On a sitewide scale, groundwater in the Columbia Formation flows from north/northwest to south/southeast (see equal-potential lines on Figures 13 and 14). Groundwater flows from high hydraulic head to lower hydraulic head (that is, perpendicular to the lines of equal-potential).

Travel time calculations provide a basis for assessing migration and monitoring well placement. Travel time is calculated from velocity.

$$v = ki/n$$

where,

v = velocity in feet per day

k = hydraulic conductivity

i = hydraulic gradient (dh/dl)

n = effective porosity of the saturated material.

The average hydraulic conductivity (k) for the Columbia aquifer is found on Table 3. The hydraulic gradient (i) value is calculated from Figure 13, the water-level map: using a head value of 12.92 feet MSL at well MW-2B, subtracting a head value down gradient of 2.08 feet MSL at well MW-5A, and dividing by the distance between the points (i.e., 1,500 feet) yields a hydraulic gradient of 0.007. The effective porosity (n) represents the effective pore (or void) space actually present for the water molecules to move through. For this calculation, a conservative effective porosity value for a sand and gravel aquifer like the Columbia is 35 percent. Therefore, the rate at which groundwater travels in the Columbia Formation across the site is calculated as follows:

$$\begin{aligned} v &= (6.48 \times 10^{-5} \text{ feet/sec})(0.007)/0.35 \\ &= 1.3 \times 10^{-6} \text{ ft/sec} \\ &= 41 \text{ ft/yr} \end{aligned}$$

Hence, groundwater travels from the Holly Run plant area to the South Wetland/Old Airport Road area in 60 years.

Water-level maps are inconclusive regarding the fate of the Columbia Formation groundwater once it reaches the area underneath the south wetlands (closest to Old Airport Road). It may either discharge there (as was indicated by the data found in the original RI) or it may continue to flow south, beyond Old Airport Road.

4.5.2 Groundwater Quality Data From Existing Wells

Recent data indicate that groundwater quality has improved since the RI sampling was completed in 1990. Table 4 presents the data for comparison.

4.5.3 Groundwater Quality Data From New Wells

A significant finding of the recent groundwater sampling is the high quality of Columbia groundwater immediately below the North Landfill (SM-3C). Table 4 shows a comparison of the groundwater quality to Maximum Contaminant Limits (MCL).

The Columbia Formation wells (MW-1B and MW-2B) located upgradient from SM-3C (and the North Landfill) have higher levels of constituents of concern, including volatile organic compounds (VOCs), than found in the SM-3C. This suggests that natural attenuation mechanisms are preventing contaminant migration. Many natural mechanisms most likely contribute to this phenomenon, including biological action and sorption.

5.0 PROTECTIVENESS ASSESSMENT

The marsh deposit underlying the site, including the Christina River, has a very low permeability; nevertheless, some discharge will occur. Transport of constituents through the marsh deposit has been assessed assuming Darcy's law and no attenuation of metals by the very fine-grained material. Similar to an alternate concentration limit calculation, this assessment shows that the native marsh deposit protects the river from any measurable impact.

5.1 Transport Factors

The minimum marsh deposit thickness is 7.5 feet in the river bottom, based on the river cores collected.

The hydraulic gradient across the marsh deposit is assumed to be upward (i.e., from the Columbia to the river). The water levels in the two closest piezometers SM-3F (screened above the marsh deposit) and SM-3C (screened below the marsh deposit) show an upward gradient across the marsh deposit.

The discharge area is the length of the river along the vertical barrier in the North Landfill Area (1,200 feet) multiplied by the width of the river at its widest point (300 feet).

Any attenuation of metals by the clayey silt marsh deposit due to sorptive or other natural geochemical retardation mechanisms is ignored. In addition, the maximum concentration detected for each metal was used in the loading calculations. Total metals values were also used (see Table 3). Because of the assumptions, the transport calculation will most likely over-estimate the river impact.

5.2 Discharge through the Marsh Deposit

Darcy's law describes flow through porous media.

$$Q = kia$$

where,

Q = volume discharged in gallons per day

k = average permeability for the marsh deposit under the river

Data in Appendix B suggests a typical marsh deposit permeability of 1.8×10^{-3} ft/day (6.26×10^{-7} cm/sec).

The hydraulic gradient is calculated based on well cluster SM-3. Water levels in SM-3F and SM-3C were 7.55 feet MSL and 10.36 feet MSL, respectively, at high tide. The midpoints of each well screen are 63 and 17 feet, respectively. Therefore, the gradient (i) is

$$i = (10.36 \text{ feet MSL} - 7.55 \text{ feet MSL}) / 63' - 17' = 0.06$$

The cross section area, a, is

$$a = 1{,}200 \text{ feet} \times 300 \text{ feet} = 360{,}000 \text{ square feet}$$

Therefore,

$$\begin{aligned} Q &= (1.8 \times 10^{-3} \text{ ft/day})(0.06)(360{,}000 \text{ ft}^2) \\ &= 38 \text{ ft}^3 \text{ per day} \\ &= 290 \text{ gallons per day} \end{aligned}$$

5.3 Columbia Aquifer Groundwater Quality

Data collected for the groundwater discharge assessment in March 1996 included Columbia aquifer samples. Dissolved metals results from that sampling event are tabulated as follows.

COLUMBIA GROUNDWATER QUALITY DISSOLVED METALS LEVELS (µG/l)			
Well	Zinc	Cadmium	Lead
MW-1B	0.026	< 0.003	< 0.002
MW-2B	6.0	0.06	< 0.002
MW-30A	0.69	0.007	< 0.002
MW-33B(R)	26	0.42	< 0.002
WM-33C	15	0.24	< 0.002
MW-35A	0.75	0.004	< 0.002
MW-38F	6.3	0.008	< 0.002
SM-3C	30	0.16	< 0.002
Average	**11**	**0.11**	**< 0.002**
AWQC	**120**	**4**	**15**

The average values represent groundwater that is migrating through the marsh deposit to the Christina River. Although the actual levels are well below ambient water-quality criteria, their actual impact is even less when combined with river flow.

5.4 River Protection Factor

A low-flow condition of 1,000,000 gpd is estimated for the Christina River base flow. DERS has not been able to validate the river flow value. However, DERS believes that ongoing discussions with the Department of Natural Resources and Environmental Control (DNREC) will confirm the conservative nature of the number. The river protection factor (PF) is calculated by dividing riverwater flow by the flow from the Columbia Formation.

$$PF = 1{,}000{,}000 \text{ gpd}/290 \text{ gpd} \approx 345$$

Using the average concentration for total zinc, cadmium, and lead, the contribution of metals to this river can be calculated and compared to the protective concentration.

CONTRIBUTION OF COLUMBIA AQUIFER TO RIVER METALS LEVELS			
Metal	Average Dissolved Concentration (µg/l)	Incremental Contribution (µg/l)	AWQC (µg/l)
Zn	11	0.003	120
Cd	0.11	0.00003	4
Pb	< 0.002	0.0000006	15

This assessment shows that the maximum possible incremental loading to the river is four to seven orders of magnitude less than the respective water-quality standard. Contamination in the Columbia does not impact river quality, and a short vertical barrier with no Columbia pumping is protective of the river.

6.0 PROPOSED LONG-TERM GROUNDWATER MONITORING PLAN MODIFICATION

To monitor the continued effectiveness of natural attenuation mechanisms, changes to the long-term groundwater monitoring (LTGM) program are proposed.

Section 7.3 of the ROD mandates a LTGM program to ensure the validity of the groundwater remediation waiver. Since DuPont has demonstrated that the Columbia Formation groundwater beneath the North Landfill area is flowing under the river toward Old Airport Road and not discharging in significant quantity to the river, this new groundwater pathway in the area of the South Landfill should be monitored. While well MW-6A is well positioned to monitor the Columbia groundwater (see Figure 2), it is relatively far downgradient. DuPont proposes adding a new well in the South Wetlands area, fully screened in the Columbia. The position of the screen is shown conceptually on Figure 2. The exact location will be determined in the field, based on access considerations. If the levels of constituents of concern rise significantly at some time in the future, a more detailed assessment of migration mechanisms might be warranted.

In addition, one of the primary purposes of the LTGM program is to monitor groundwater quality on the southern boundary of the site in both the Columbia and Potomac Formations. MW-21A is screened in the marsh deposit and not the Columbia, as originally stated in the RI (see cross-section B-B', Figure 5, and the boring log in Appendix C). It should be dropped from the program and a new well installed in the small strip of land between the James Street bridge and the Route 141 bridge, on the south side of the river bank. This new well would be screened in the Columbia and, in fact, be directly downgradient from the plant area.

MW-21B, which was assumed to be in the Potomac, is actually screened in the Columbia. Given the access problem to this location (as previously discussed with EPA), DuPont proposes dropping MW-21B and relying on well MW-18B as the Potomac monitoring point. It is also more directly downgradient from the plant area than MW-21B.

Well MW-23A is not screened in the Columbia Formation. Because it is so shallow, it does not reach the marsh deposit and only screens the select fill material that Department of Transportation (DOT) imported for construction of the Route 141 highway bridge approach. It should be removed from the LTGM program. The new Columbia well (i.e., MW-21A replacement) will provide sufficient monitoring of the Columbia in this area of the site.

SM-1 was destroyed by Ciba-Geigy construction activities. DuPont does not think it is necessary to install a replacement for this well at the present time. The new Columbia wells proposed for the south side will monitor groundwater migrating under the river from the north side.

The other wells currently in the LTGM program are screened in the correct formations to meet the intent of the LTGM program.

The table that follows summarizes the proposed changes to the long-term groundwater monitoring program.

LONG-TERM MONITORING PROPOSAL		
Well	**Status**	**Comment**
North Side		
MW-33A	Keep	—
SM-1	Drop	Damaged
SM-3	Keep	—
SM-4	Keep	—
South Side—Columbia		
MW-21A	Drop	Marsh deposit
MW-23A	Drop	Fill zone
MW-24A	Keep	—
MW-25A	Keep	—
MW-26A	Keep	—
New	Add	SWL area
New	Add	James Street Bridge, replace 21A
South Side—Potomac		
MW-6B	Keep	—
MW-18B	Keep	—
MW-21B	Drop	inaccessible, Columbia
MW-26BS	Keep	—

7.0 CONCLUSIONS AND RECOMMENDATIONS

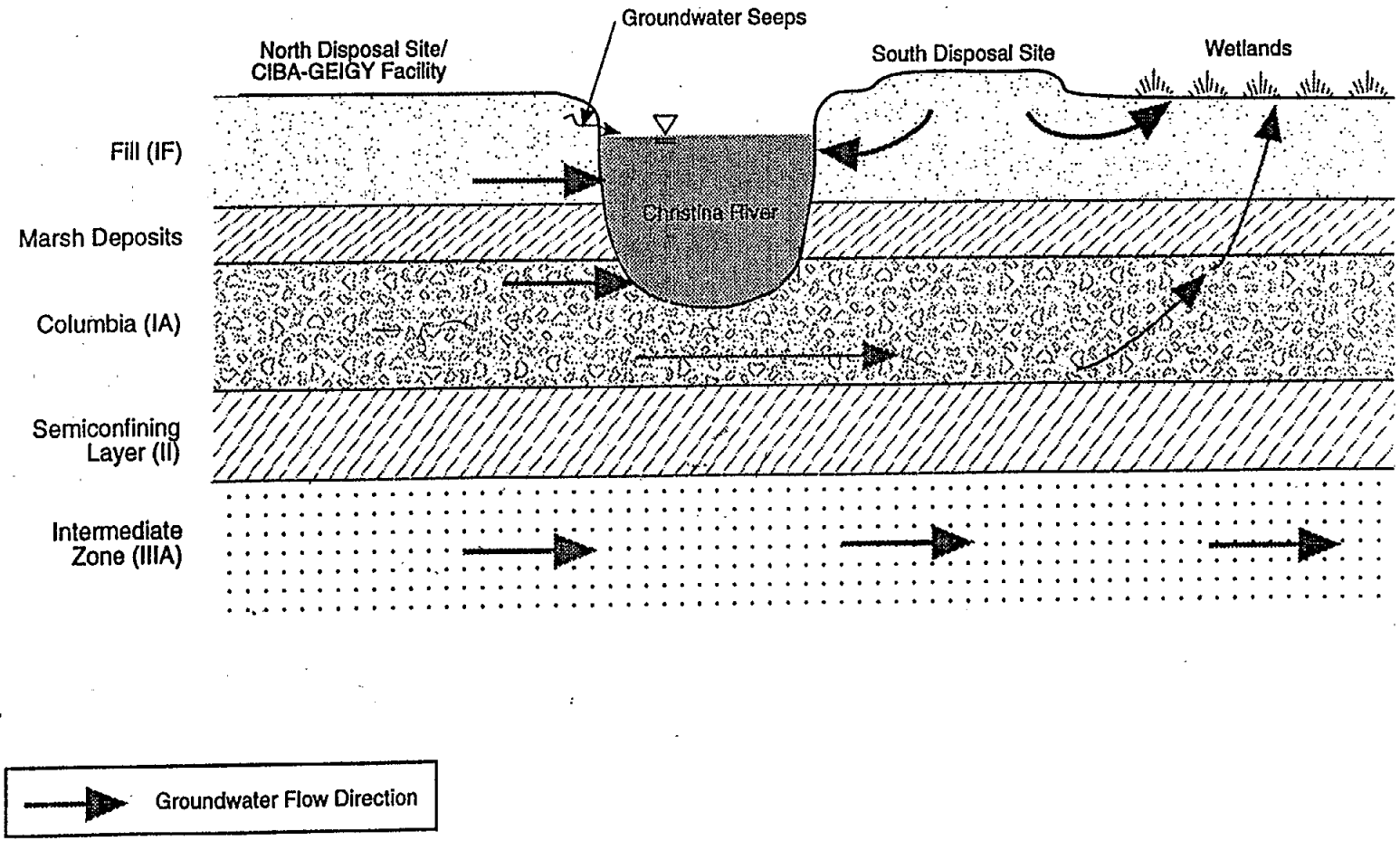
Based on the analysis provided in this report, there is no threat to human health and the environment in the river posed by the discharge to the river from the Columbia Formation groundwater found beneath the North Landfill. For this reason, neither a deep slurry wall nor pumping of Columbia Formation groundwater beneath the North Landfill is needed to protect the river.

Water-level maps are inconclusive regarding the fate of the Columbia Formation groundwater once it reaches the area underneath the south wetlands (closest to Old Airport Road). It may either discharge there (as was indicated by the data found in the original RI) or it may continue to flow south, beyond Old Airport Road. In either case, the rationale behind the groundwater remediation waiver found in the ROD is still valid because Columbia pumping would pull contaminated fill zone water downward and spread contamination.

Several specific conclusions regarding the flow of groundwater in the Columbia aquifer are as follows:

- Groundwater travels from the Holly Run-North Landfill area to the south-southeast toward the South Wetlands-Old Airport Road area.
- The travel time for groundwater from the Holly Run-North Landfill area to the South Wetlands-Old Airport Road area is approximately 60 years.
- Since the waste disposal operation started over 80 years ago, groundwater has had more than enough time to migrate under the river; however, natural attenuation mechanisms preclude constituent migration.
- Since the constituents of concern have not been detected in significant levels downgradient, retardation mechanisms must be occurring in the Columbia Formation. For the inorganic constituents these are most probably the well documented precipitation-dissolution, sorption-desorption and complexation phenomenon. For the organic constituents, the attenuation mechanism is likely sorption and intrinsic biodegradation.

FIGURES



DuPont Newport	Conceptual Flow Model Groundwater Discharge to Christina River and Wetlands	*FIGURE I–1*
Woodward-Clyde Consultants		88C2076/4X

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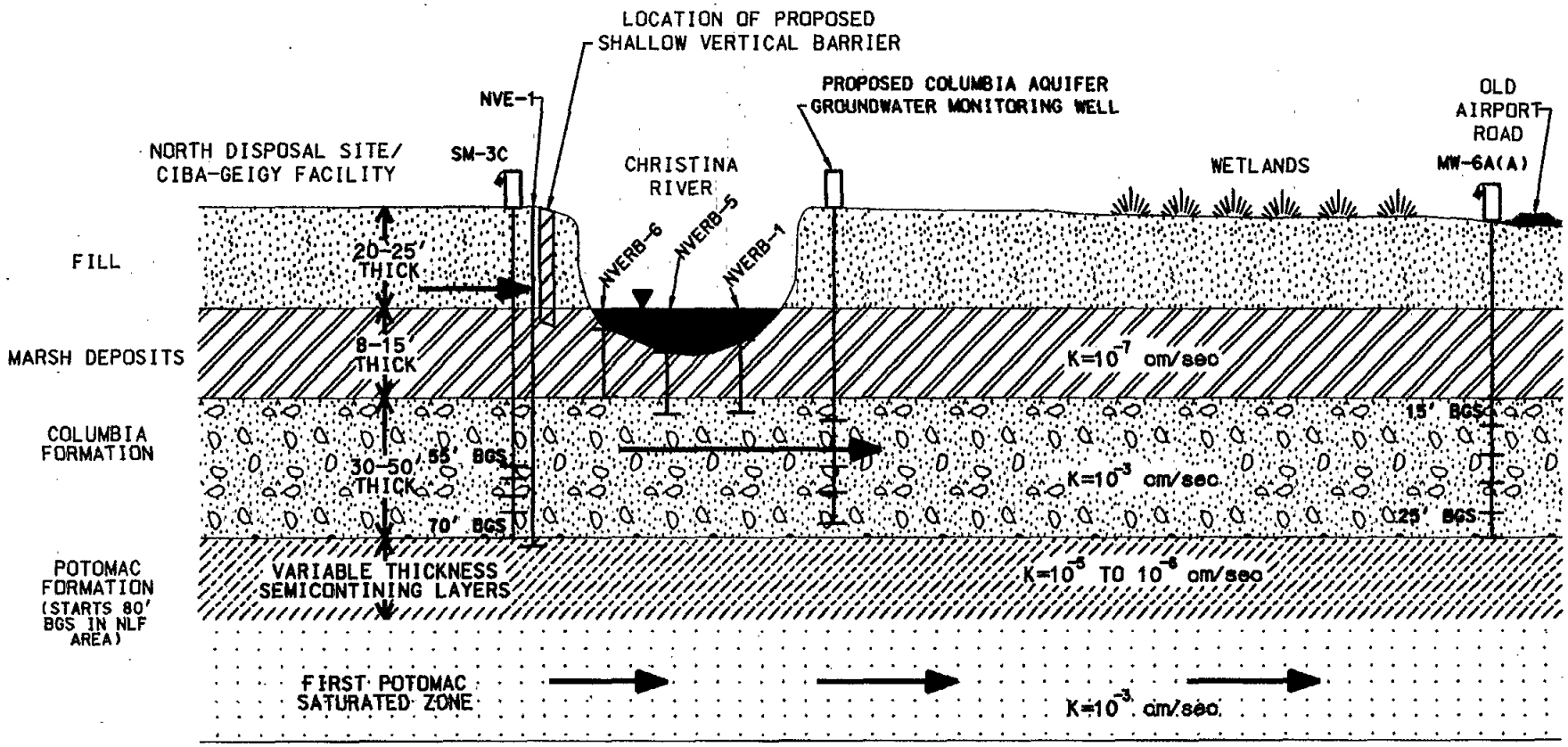

GROUNDWATER FLOW DIRECTION

NOT TO SCALE

FIGURE 2	RD/RA CONCEPTUAL GROUNDWATER FLOW MODEL			
	SCALE NTS	DESIGNED BY	DRAWN BY DHB	CAD DRAWING NO 2124A9
	DATE 6/17/96	CHECKED	APPROVED	PROJECT NO 2124
DUPONT	NEWPORT PLANT SITE NEWPORT, DELAWARE			
	DuPont Environmental Remediation Services			

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DESCRIPTION OF IMAGERY Figure 9 Geologic Cross Section F-F' Sheet 1 of 1

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DESCRIPTION OF IMAGERY Figure 10 - Isopach Thickness Map of the Marsh Deposit

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DESCRIPTION OF IMAGERY Figure 11 Groundwater Contour and Flow Direction Fill Zone, Low Tide 5/9/96

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DESCRIPTION OF IMAGERY Figure 12 - Groundwater Contour & Flow Direction Fill Zone, High Tide 5/10/96

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DESCRIPTION OF IMAGERY Figure 13 Columbia Formation Potentimetric Surface & Ground Flow Tide 5/9/96

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DESCRIPTION OF IMAGERY Figure 14 Columbia Formation Potentimetric Surface & Groundwater Flow High Tide 5/16/96

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DESCRIPTION OF IMAGERY Figure 15 - Potomac Formation Potentiometric Surface & Groundwater Flow Low Tide 5/9/96

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DESCRIPTION OF IMAGERY Figure 16 - Potomac Formation Potentimetric Surface & Groundwater Flow High Tide 5/10/96

NUMBER AND TYPE OF IMAGERY ITEM(S) 1 oversized map

TABLES

Table 1

SUMMARY OF PERMEABILITY DATA FOR THE MARSH DEPOSIT
Newport Superfund Site
Newport, Delaware

Borings	Date	Location	Sample Depth (MSL)	Permeability (cm/sec)	Comments
D-1	6/18/80	South Landfill	15.7' to 15.9'	1×10^{-7}	In South Development Study, South Disposal Site, Newport, Delaware (Woodward-Clyde Consultants, April 1988)
D-2	6/18/80	South Landfill	11.4' to 11.5'	5×10^{-8}	" " " " "
D-4	6/18/80	South Landfill	16.1' to 16.3'	1×10^{-7}	" " " " "
D-5	6/18/80	South Landfill	21.8' to 21.9'	5×10^{-8}	" " " " "
D-7	6/18/80	South Landfill	11.6' to 11.8'	1×10^{-7}	" " " " "
D-8	6/18/80	South Landfill	21.8' to 22.0'	1×10^{-7}	" " " " "
WB-1	1/3/94	South Landfill	24' to 26'	2×10^{-7}	In Proposal South Landfill Treatment, Newport Superfund Site, Newport, Delaware (DERS, April 5, 1995)
WB-7	1/3/94	South Landfill	18' to 20'	2×10^{-7}	" " " " "
NVE-1	7/20/95	North Landfill	26' to 28'	4.29×10^{-7}	In Value Engineering Report For The North Landfill and Plant Area, Newport Superfund Site, Newport, Delaware (DERS, September 29, 1995)
NVE-2	7/20/95	North Landfill	24' to 26'	2.75×10^{-7}	" " " " "
NVE-3	7/20/95	North Landfill	26' to 28'	2.36×10^{-7}	" " " " "
PB-2	12/12/95	Christina River	6' to 8'	3.47×10^{-7}	New data presented in this report
NVERB-2	12/12/95	Christina River	9' to 11'	1.61×10^{-7}	" " " " "
NVERB-4	12/12/95	Christina River	5' to 7'	4.80×10^{-7}	" " " " "
NVERB-5	12/12/95	Christina River	6' to 8'	2.01×10^{-6}	" " " " "
NVERB-6	12/12/95	Christina River	4' to 6'	1.35×10^{-7}	" " " " "

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Table 2
WATER-LEVEL DATA
Newport Superfund Site
Newport, Delaware

		North Side Wells							Measured Low Tide 5/9/96 13:09			Measured High Tide 5/10/96 06:47		
Well ID	Ciba or Holly Run	Formation Screened In	Ground Elevation (MSL)	Top of Screen (BGS)	Bottom of Screen (BGS)	Top of Screen (MSL)	Bottom of Screen (MSL)	Elevation of Top of PVC Casing (MSL)	Water Level Below TOC	Water Elevation (MSL)	Time	Water Level Below TOC	Water Elevation (MSL)	Time
MW-29C	C	Bedrock	22.10	130.00	140.00	-107.90	-117.90	23.90	11.59	12.31	14:57	11.5	12.40	8:23
MW-1A(F)	HR	Fill-Marsh	20.62	5.00	15.00	15.62	5.62	22.86	7.7	15.16	14:15	7.55	15.31	7:35
MW-2A(F)	HR	Fill-Marsh	16.64	5.00	15.10	11.64	1.54	18.91	5.76	13.15	14:21	5.79	13.12	6:20
MW-3A	HR	Fill-Marsh	11.45	6.75	16.75	4.70	-5.30	13.84	8.26	5.58	14:44	7.78	6.06	8:03
MW-17A	C	Fill-Marsh	18.27	11.00	20.70	7.27	-2.43	20.37	14.7	5.67	13:32	14.7	5.67	7:25
MW-29A(F)	C	Fill-Marsh	24.00	10.30	19.80	13.70	4.20	23.70	8.65	15.05	14:59	8.52	15.18	8:25
MW-30F	C	Fill-Marsh	12.10	9.30	13.00	2.80	-0.90	12.10	3.42	8.68	12:51	3.47	8.63	6:55
MW-31F	C	Fill-Marsh	24.00	19.90	24.80	4.10	-0.80	23.00	12.93	10.07	13:30	12.92	10.08	7:19
SM-3F	HR	Fill-Marsh	26.10	12.00	22.00	14.1	4.1	28.33	20.8	7.53	14:31	20.78	7.55	7:51
MW-1B	HR	Lower Columbia	20.43	54.70	72.20	-34.27	-51.77	22.80	8.36	14.44	14:17	8.26	14.54	7:37
MW-2B	HR	Lower Columbia	16.45	62.00	77.50	-45.55	-61.05	18.85	5.93	12.92	14.24	5.63	13.22	7:45
MW-17B	C	Lower Columbia	18.62	47.30	58.30	-28.68	-39.68	21.31	19.04	2.27	13:33	17.12	4.19	7:24
MW-20B	C	Lower Columbia	7.50	32.30	42.00	-24.80	-34.50	9.10	3.33	5.77	17:00	2.19	6.91	6:50
MW-28B	C	Lower Columbia	24.41	70.10	79.90	-45.69	-55.49	25.66	6.29	19.37	14:06	6.27	19.39	8:37
MW-29B	C	Lower Columbia	22.80	57.30	66.90	-34.50	-44.10	24.70	9.3	15.40	14:56	9.23	15.47	8:21
MW-31B	C	Lower Columbia	23.50	60.20	70.00	-36.70	-46.50	23.20	13.96	9.24	13:29	13.51	9.69	7:21
MW-33C	C	Lower Columbia	21.50	70.30	80.00	-48.80	-58.50	23.40	16.21	7.19	13:39	14.62	8.78	7:28
MW-34B	C	Lower Columbia	13.00	50.20	60.00	-37.20	-47.00	12.60	1.23	11.37	13:22	1.15	11.45	7:01
MW-35C	C	Lower Columbia	9.60	52.30	62.00	-42.70	-52.40	11.90	7.7	4.20	13:11	5.61	6.29	7:11
MW-36A	C	Lower Columbia	15.40	15.10	24.50	0.30	-9.10	17.40	Not Located			Not Located		
MW-37A	C	Lower Columbia	15.40	15.90	24.40	-0.50	-9.00	17.60	6.49	11.11	15:11	6.46	11.14	8:30
MW-38F	C	Lower Columbia	20.80	13.90	24.40	6.90	-3.60	20.50	14.93	5.57	13:25	14.72	5.78	7:17
SM-3C	HR	Lower Columbia	26.03	55.00	70.00	-28.97	-43.97	28.26	19.06	9.20	14:33	17.9	10.36	7:50
MW-1C	HR	Potomac	20.48	118.00	128.10	-97.52	-107.62	22.13	8.07	14.06	14:19	7.9	14.23	7:39
MW-2C	HR	Potomac	17.05	92.00	102.00	-74.95	-84.95	19.13	5.81	13.32	14:26	5.55	13.58	7:46
MW-3B	HR	Potomac	10.98	80.00	90.00	-69.02	-79.02	13.64	2.81	10.83	14:42	2.19	11.45	8:01
MW-3C	HR	Potomac	10.27	117.00	137.00	-106.73	-126.73	12.78	1.5	11.28	14:40	0.84	11.94	8:00
MW-28C	C	Potomac	24.25	120.10	129.90	-95.85	-105.65	25.78	6.67	19.11	14:06	6.61	19.17	8:40
MW-30B	C	Potomac	12.00	40.20	49.90	-28.20	-37.90	11.70	5.62	6.08	13:46	4.42	7.28	6:56
WW-11	C	Potomac	22.00	50.00	60.00	-28.00	-38.00		Not Located			Not Located		
WW-13	HR	Potomac	23.20	88.00	99.00	-64.80	-75.80		Cap Rusted On			Cap Rusted On		
MW-1A(A)	HR	Upper Columbia	20.73	23.60	33.10	-2.87	-12.37	22.84	9.28	13.56	14:15	9.19	13.65	7:36
MW-2A(A)	HR	Upper Columbia	16.67	23.10	29.90	-6.43	-13.23	18.36	5.06	13.30	14:24	4.98	13.38	7:42
MW-20A	C	Upper Columbia	7.50	17.30	21.80	-9.80	-14.30	9.10	4.43	4.67	16:55	4.04	5.06	6:50
MW-27A	C	Upper Columbia	6.20	16.00	21.20	-9.80	-15.00	8.10	Not Located					
MW-28A	C	Upper Columbia	24.46	26.30	34.00	-1.84	-9.54	26.01	8.23	17.78	14:07	8.15	17.86	8:35
MW-29A(A)	C	Upper Columbia	22.30	25.30	33.20	-3.00	-10.90	24.10	8.47	15.63	14:55	8.29	15.81	8:19
MW-30A	C	Upper Columbia	11.90	16.90	24.40	-5.00	-12.50	11.90	3.61	8.29	12:53	3.42	8.48	6:54
MW-31A	C	Upper Columbia	23.50	31.90	37.00	-8.40	-13.50	23.10	12.82	10.28	13:31	12.57	10.53	7:20
MW-33A	C	Upper Columbia	21.50	25.30	29.80	-3.80	-8.30	23.80	20.29	3.51	13:36	12.9	10.90	7:26
MW-33B(R)	C	Upper Columbia	21.80	40.10	49.90	-18.30	-28.10	23.10	17.22	5.88	13:37	15.32	7.78	7:30
MW-34A	C	Upper Columbia	13.40	7.20	16.80	6.20	-3.40	13.00	8.33	4.67	13:19	8.32	4.68	7:00
MW-35A	C	Upper Columbia	9.20	14.30	22.00	-5.10	-12.80	11.20	4.45	6.75	13:12	3.92	7.28	7:05
MW-35B	C	Upper Columbia	8.60	35.20	39.90	-26.60	-31.30	9.90	6.26	3.64	13:13	3.91	5.99	7:07
SM-2	HR	Upper Columbia	14.62	21.00	25.00	-6.38	-10.38	18.65	Not Located			Not Located		
SM-3	HR	Upper Columbia	26.24	31.00	35.00	-4.76	-8.76	27.91	21.32	6.59	14:30	19.63	8.28	7:54
SM-4	HR	Upper Columbia	3.80	20.00	25.00	-16.20	-21.20	6.80	2.71	4.09	14:51	0.42	6.38	8:09
[illegible]	C	Upper Columbia	18.60	15.00	20.00	3.60	-1.40		6.99	-6.99	13:53	6.87	-6.87	7:33
[illegible]	HR	Upper Columbia	16.00	27.00	31.00	-11.00	-15.00	[illegible]	Not Located		Abandoned	Not Located		
[illegible]	C	Upper Columbia	18.00	45.00	55.00	-27.00	-37.00	[illegible]	7.89	-7.89	13:50	7.53	-7.53	[illegible]:32

AR323545

Table 2
WATER-LEVEL DATA
Newport Superfund Site
Newport, Delaware

		South Side Wells								Measured Low Tide 5/9/96 13:09			Measured High Tide 5/10/96 06:47	
Well ID		Formation Screened In	Ground Elevation (msl)	Top of Screen (bgs)	Bottom of Screen (bgs)	Top of Screen (msl)	Bottom of Screen (msl)	Elevation of Top of PVC Casing (MSL)	Water Level TOC	Water Elevation (MSL)	Time	Water Level TOC	Water Elevation (MSL)	Time
MW-6C		Bedrock	4.70	110.50	152.00	-105.80	-147.30	7.38	5.83	1.55	14:14	5.7	1.68	7:48
MW-24A		Columbia	3.90	13.70	19.10	-9.80	-15.20	6.00	3.12	2.88	14:21	2.99	3.01	7:33
MW-25A		Columbia	6.40	6.10	16.00	0.30	-9.60	8.30	5.13	3.17	14:09	5.2	3.10	7:30
MW-26A		Columbia	12.40	26.20	33.80	-13.80	-21.40	14.60	12.45	2.15	13:39	10.11	4.49	8.11
MW-6A(A)		Columbia	4.00	15.20	25.00	-11.20	-21.00	6.20	4.23	1.97	14:15	4.23	1.97	7:43
MW-15		Fill	10.62	5.00	15.10	5.62	-4.48	12.74	5.55	7.19	13:54	5.48	7.26	7:40
MW-18A		Fill-Marsh	13.37	8.25	18.00	5.12	-4.63	14.97	10.71	4.26	14:10	10.86	4.11	7:59
MW-21A		Fill-Marsh	4.50	19.90	25.00	-15.40	-20.50	6.80	4.06	2.74	15:06	2.8	4.00	7:19
MW-23A		Fill-Marsh	7.80	10.00	19.90	-2.20	-12.10	10.10	6.53	3.57	16.13	6.32	3.78	8:21
MW-4A		Fill-Marsh	13.28	5.00	15.10	8.28	-1.82	15.58	9.88	5.70	13:06	9.74	5.84	6:45
MW-8		Fill-Marsh	4.80	2.00	26.50	2.80	-21.70	7.10	4.09	3.01	13.16	2.94	4.16	6:57
MW-9		Fill-Marsh	9.21	5.00	24.70	4.21	-15.49	11.78	6.86	4.92	13:25	6.77	5.01	7:05
RDW-1		Fill	10.69	6.30	11.30	4.39	-0.61	12.68	5.61	7.07	13:13	5.61	7.07	7:09
RDW-2		Fill	17.55	15.50	20.50	2.05	-2.95	19.25	12.66	6.59	13.1	12.6	6.65	7:03
RDW-3		Fill	16.42	12.50	17.50	3.92	-1.08	18.78	12.05	6.73	13:41	11.91	6.87	7:31
RDW-4		Fill	11.02	6.50	11.50	4.52	-0.48	13.10	7.36	5.74	13:09	7.27	5.83	6:54
RDW-5		Fill	11.94	8.00	13.00	3.94	-1.06	13.67	6.96	6.71	13:45	6.8	6.87	7:36
RDW-6		Fill	13.56	10.50	15.50	3.06	-1.94	15.46	8.45	7.01	13.48	8.33	7.13	7:34
RDW-7		Fill	11.17	8.00	13.00	3.17	-1.83	13.28	6.52	6.76	14:02	6.51	6.77	7:52
RDW-8		Fill	9.84	6.00	11.00	3.84	-1.16	12.04	6.05	5.99	14:17	6.01	6.03	8:03
RDW-9		Fill	15.91	12.10	17.10	3.81	-1.19	17.95	10.95	7.00	13:50:00	10.88	7.07	7:44
DML-7		Lower Potomac	9.85	135.00	145.00	-125.15	-135.15	11.44	8.54	2.90	13:21	8.36	3.08	7:07
MW-18B		Lower Potomac	10.64	70.10	81.00	-59.46	-70.36	12.45	11.52	0.93	14.07	11.21	1.24	7:57
MW-19B		Potomac	9.96	87.00	98.00	-77.04	-88.04	11.79	9.05	2.74	13.47	7.54	4.25	8:04
MW-21B		Potomac	4.90	36.80	46.60	-31.90	-41.70	9.10	4.9	4.20	15:02	2.11	6.99	7:21
MW-26BD		Potomac	12.20	90.40	100.10	-78.20	-87.90	13.40	10	3.40	13.37	8.59	4.81	8:12
MW-26BS		Potomac	12.30	50.3	60.00	-38.00	-47.70	13.40	11.06	2.34	13:41	9.71	3.69	8:14
MW-4B		Potomac	12.65	53.30	76.60	-40.65	-63.95	14.83	10.9	3.93	13:04	9.27	5.56	6:48
MW-4C		Potomac	12.26	110.00	120.00	-97.74	-107.74	14.67	11.12	3.55	13:03	10.77	3.90	6:05
MW-5B		Potomac	2.17	76.00	90.60	-73.83	-88.43	4.98	2.39	2.59	14:37	2.28	2.70	7:21
MW-5C		Potomac	2.38	113.50	124.90	-111.12	-122.52	5.13	2.49	2.64	14:40	2.43	2.70	7:23
MW-6B		Potomac	5.11	65.00	77.00	-59.89	-71.89	7.48	5.87	1.61	14:11	5.76	1.72	7:47
MW-7B		Potomac	5.35	63.00	78.50	-57.65	-73.15	7.96	5.24	2.72	14:22	5.07	2.89	8:10
MW-7C		Potomac	4.29	94.00	109.00	-89.71	-104.71	6.84	3.72	3.12	14.23	3.56	3.28	8:11
MW-11		Upper Columbia	6.34	4.00	24.80	2.34	-18.46	8.75	damaged					
MW-13		Upper Columbia	4.10	5.30	25.30	-1.20	-21.20	6.49	3.53	2.96	14:24	3.45	3.04	7:36
MW-19A		Upper Columbia	10.32	5.75	30.00	4.57	-19.68	12.86	8.04	4.82	15:59	7.72	5.14	8:06
MW-5A		Upper Columbia	2.75	2.70	12.70	0.05	-9.95	5.58	3.5	2.08	14:35	3.12	2.46	7:20
MW-6A		Upper Columbia	4.39	5.00	24.00	-0.61	-19.61	7.33	3.26	4.07	14:18	3.25	4.08	7:42
MW-7A		Upper Columbia	5.44	5.00	15.10	0.44	-9.66	8.16	5.15	3.01	14:20	5.06	3.10	8:09
DMU-7		Upper Potmac	9.89	40.00	50.00	-30.11	-40.11	11.26	8.63	2.63	13.27	7.59	3.67	7:00

River—Sheet Pile Wall (Benchmark fixed at 10.0 feet MSL)

Water Level Below Benchmark	Water Level of River (MSL)	Time	Water Level Below Benchmark	Water Level of River (MSL)	Time
10.4	0.4	13:09	5.38	4.62	6:47

AR323546

Table 3

COLUMBIA FORMATION
HYDRAULIC CONDUCTIVITY TEST RESULTS
Newport Superfund Site

Well	K	
	ft/sec	cm/sec
SM-3	2.06×10^{-5}	6.2×10^{-4}
SM-3(C)	1.05×10^{-5}	3.2×10^{-4}
MW-1B	3.78×10^{-5}	1.2×10^{-3}
MW-2B	9.90×10^{-5}	3.0×10^{-3}
MW-33B	5.80×10^{-6}	1.8×10^{-4}
MW-33C	2.15×10^{-4}	6.6×10^{-3}
Average	**6.48×10^{-5}**	**2.0×10^{-3}**

*Rising head, Hvorslev method used
ft/sec = feet per second
cm/sec = centimeters per second

Table 4

COLUMBIA AQUIFER ASSESSMENT AND SITEWIDE HYDROLOGICAL CONCEPTUAL MODEL
GROUNDWATER QUALITY DATA
Newport Superfund Site
Newport, Delaware

Parameter	Maximum Contaminant Levels (MCL's) or *Secondary Drinking Water Standards MCL's	Columbia Aquifer Wells									
		SM-3C		MW-33B		MW-33C		MW-1B		MW-2B	
		RD/RA 3/96	PHASE III RI 11/90	RD/RA 3/96	PHASE III RI 11/90	RD/RA 3/96	PHASE III RI 11/90	RD/RA 3/96	PHASE III RI 11/90	RD/RA 3/96	PHASE III RI 11/90
General Chemistry Field Parameters [1]											
Temperature (degrees F)	N/A	54.00	NA	59.00	NA	51.00	NA	51.00	NA	53.00	NA
pH	N/A	5.64	NA	5.30	NA	6.06	NA	5.81	NA	5.17	NA
Specific Conductivity (micro mhos)	N/A	336.00	NA	239.00	NA	195.00	NA	95.00	NA	136.00	NA
Dissolved O2 (µg/l)	N/A	3.60	NA	10.10	NA	7.30	NA	7.20	NA	4.60	NA
Redox (mv)	N/A	189.40	NA	231.90	NA	221.20	NA	202.80	NA	250.10	NA
CO2 (mg/l)	N/A	66.00	NA	58.00	NA	51.00	NA	8.00	NA	20.00	NA
Organic Compounds											
Tetrachloroethene (µg/l)	5	6.00	NA	38.00	56.00	14.00	32.00	420.00	3.00	2.00	1.00
Trichloroethene (µg/l)	5	2.00	NA	8.00	12.00	4.00	10.00	15.00	ND	ND	ND
Vinyl Chloride (µg/l)	5	ND	NA	ND	NA	ND	NA	ND	NA	ND	
Inorganic Compounds											
Arsenic (µg/l)	50,000	ND	NA	ND	3.90	ND	**	ND	ND	ND	ND
Cadmium (µg/l)	5,000	166.00	NA	441.00	378.00	272.00	358.00	ND	ND	59.00	78.69
Chromium (µg/l)	100,000	ND	NA	58.00	ND	ND	ND	ND	ND	ND	ND
Copper (µg/l)	NA	16.00	NA	5.90	7.20	8.20	15.40	5.90	10.80	34.00	44.79
Lead (µg/l)	15,000	2.80	NA	ND	ND	2.10	ND	ND	ND	ND	ND
Mercury (µg/l)	2,000	ND	NA	ND	NA	ND	NA	ND	NA	ND	
Nickel (µg/l)	100,000	136.00	NA	146.00	83.00	67.00	62.20	ND	ND	41.00	51.20
Zinc (µg/l)	5,000,000*	30400.00	NA	26300.00	26100.00	15400.00	22000.00	28.00	42.40	6100.00	8290.00
Barium (µg/l)	2,000,000	430.00	NA	140.00	153.00	93.00	45.09	100.00	64.80	57.00	46.40
Cobalt (µg/l)	NA	117.00	NA	30.50	33.40	27.60	33.70	ND	ND	38.90	72.00
Magnesium (µg/l)	NA	9410.00	NA	4660.00	6130.00	4360.00	4740.00	1940.00	2360.00	3470.00	4660.00
Vanadium (µg/l)	NA	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND

33A DM-6

1.1/3.9
11 (CC)
12/13
3.2
.012/2.4
/CC/HOC
.10/.20

464 321

[1] No parameter data available for Phase III RI samples
[2] All values are MCLs except zinc (secondary MCL)
** No Arsenic analysis for MW-33C in Phase III RI data
Total Metals data shown. Dissolved metals data found in Appendix E.
NA = Not analyzed

Average Cd = ≃ 317 ppb
increase in river ≃ .0317
or ND

AR323548

APPENDIXES

Appendix A

PHOTOGRAPHS OF CHRISTINA RIVER CORES

Appendix B

GEOTECHNICAL TESTING DATA FOR CHRISTINA RIVER CORES

PERMEABILITY DATA FOR DEEP RIVER CORES

GEOTEC ASSOCIATES

302 Beverly Rd
Newark, DE 19711
Phone-Fax: 302/368-0427

DUPONT ENVIRONMENTAL REMEDIATION SERVICES

Newport

Flex wall permeability (ASTM) D5084)

(Top = 3 psi, bottom = 6 psi, cell = 10 psi)

Tube Sample	As received Moisture	Dry den.	Permeability cm/sec
PB2, 6-8'	78.0%	52.0pcf	3.47×10^{-7}
NVERB2, 9-11'	103.5	43.6	1.61×10^{-7}
NVERB4, 5-7'	96.8	48.6	4.80×10^{-7}
NVERB5, 6-8'	46.3	79.8	20.1×10^{-7}
NVERB6, 4-6'	131.9	38.3	1.35×10^{-7}

Avg. 6.26×10^{-7}

RN
12-12-95

MH = Inorganic Silts ; L.L. >50%

SM = Silty Sands or Sand-clay mixtures

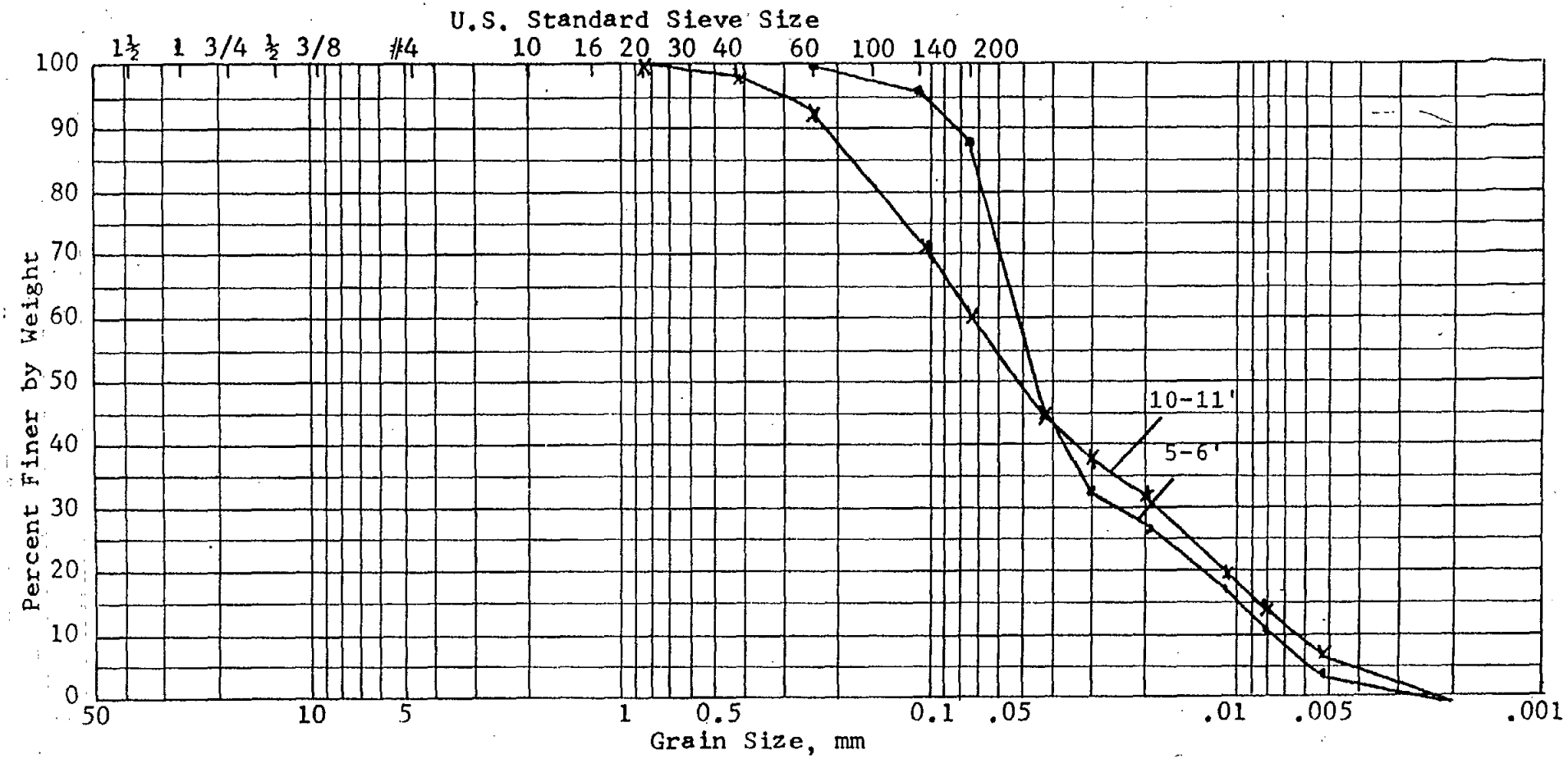
OH = Organic Clays

ML = Inorganic Silts ; L.L. <50%

PARTICLE SIZE DISTRIBUTION AND ATTERBERG LIMITS FOR DEEP RIVER CORE SAMPLES

GEOTEC ASSOCIATES

302 Beverly Road
Newark, Delaware



Gravel		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

Location	Sample	Depth	Nat W %	LL	PL	PI	Unified Class.
Newport	NVERB1	5-6'	78.7	72.5	44.2	28	MH
		10-11'	30.0	30.3	28.6	2	ML

Technician rn

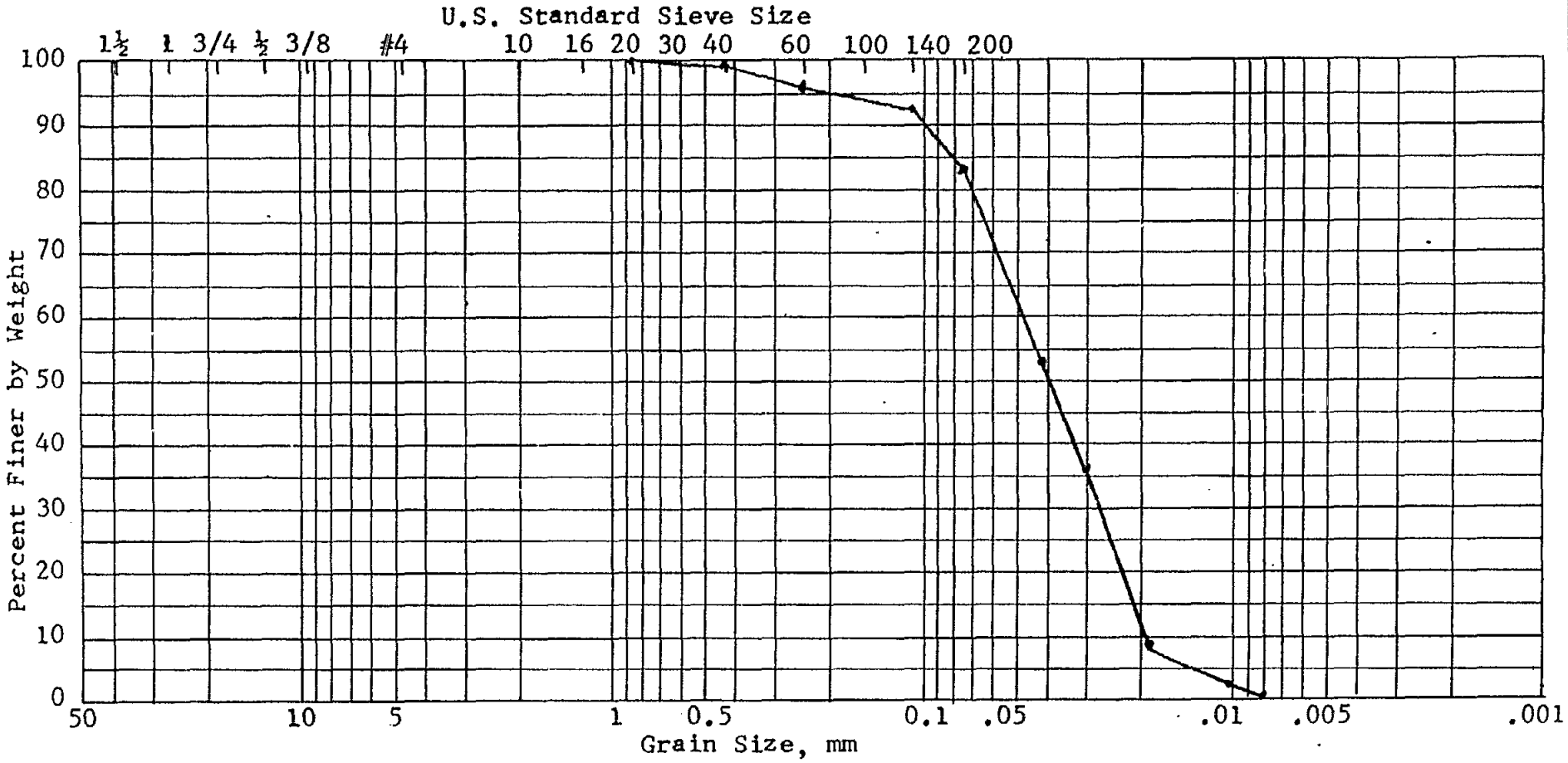
Date 12-12-95

SOIL CLASSIFICATION TESTS

AR323555

GEOTEC AS CIATES

302 Beverly Road
Newark, Delaware



Gravel		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

Location	Sample	Depth	Nat W %	LL	PL	PI	Unified Class.
Newport	PB2 Tube	6-8'	78,0	83.5	53.7	30	MH

Technician rn

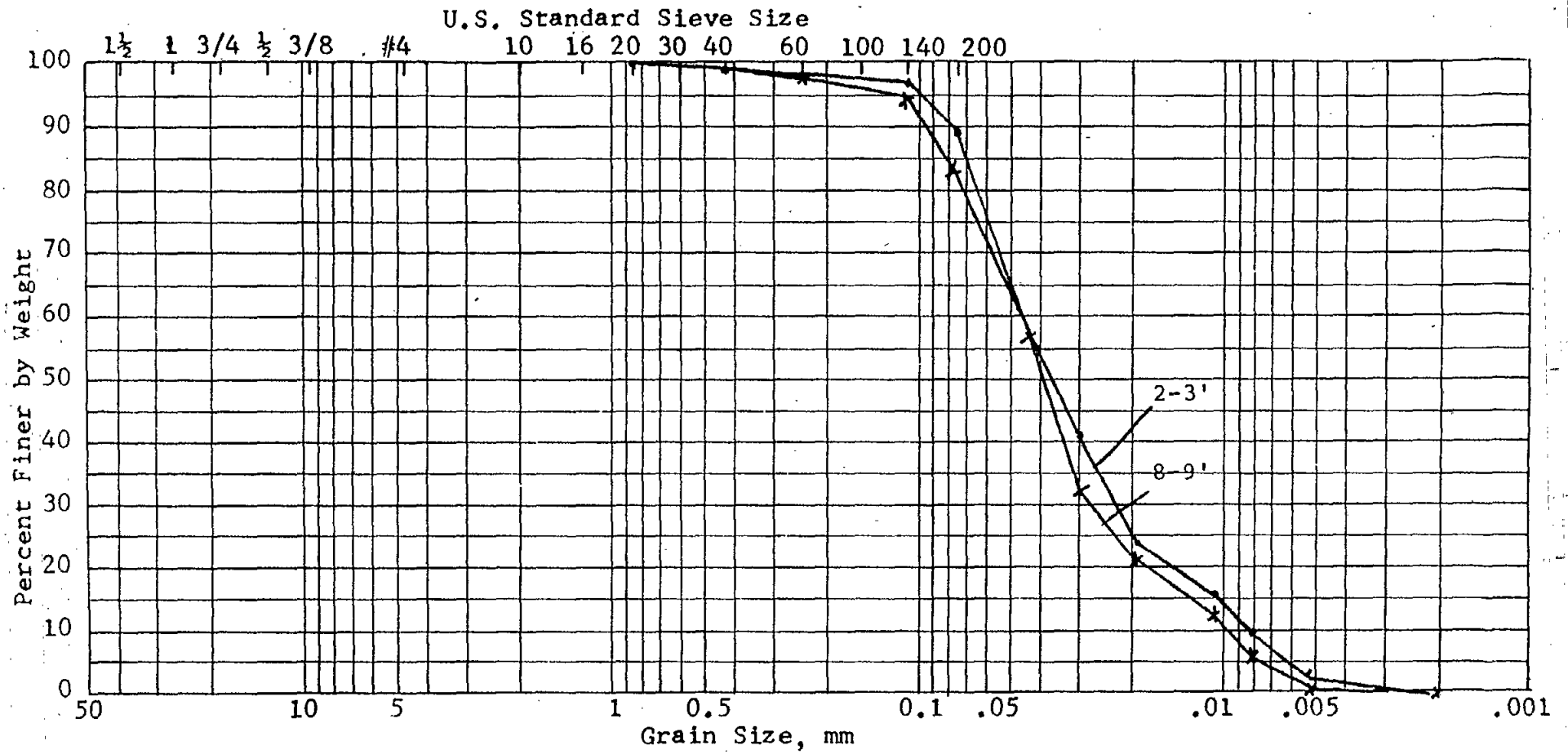
Date 12-12-95

SOIL CLASSIFICA[illegible] TESTS

AR323556

GEOTEC AS[illegible]TES

302 Beverly Road
Newark, Delaware



Gravel		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

Location	Sample	Depth	Nat W %	LL	PL	PI	Unified Class.
Newport	PB2	2-3'	61.8	57.0	41.7	15	MH
		8-9'	62.3	70.0	44.3	26	MH

Technician rn

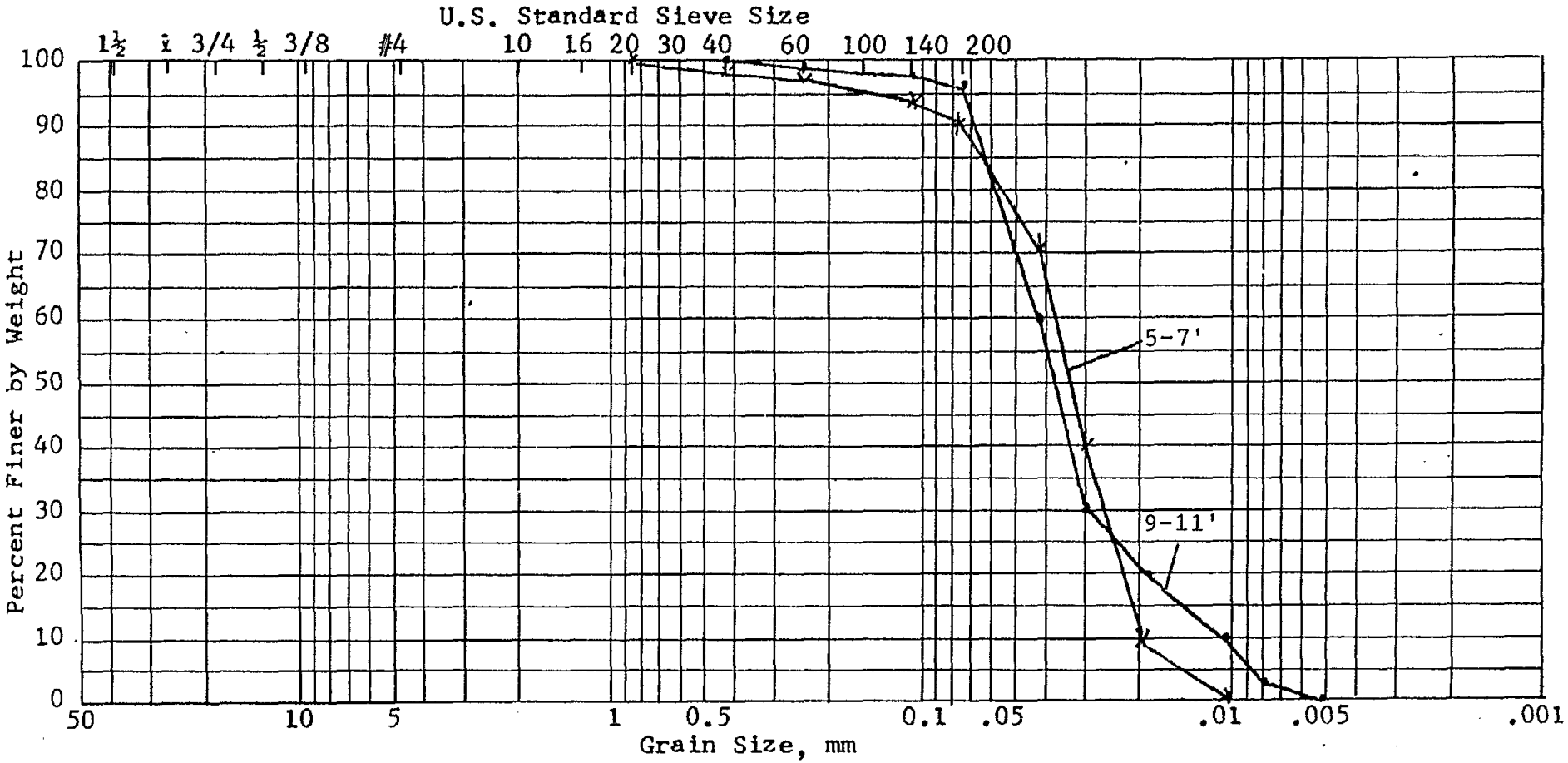
Date 12-12-95

SOIL CLASSIFICATION TESTS

AR323557

GEOTEC AS CIATES

302 Beverly Road
Newark, Delaware



Gravel		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

Location	Sample	Depth	Nat W %	LL	PL	PI	Unified Class.
Newport	NVERB2 TUBE	9-11'	103.3	96.3	44.0	52	MH
	NVERB4 TUBE	5-7'	96.8	113.0	57.7	55	OH

Technician rn

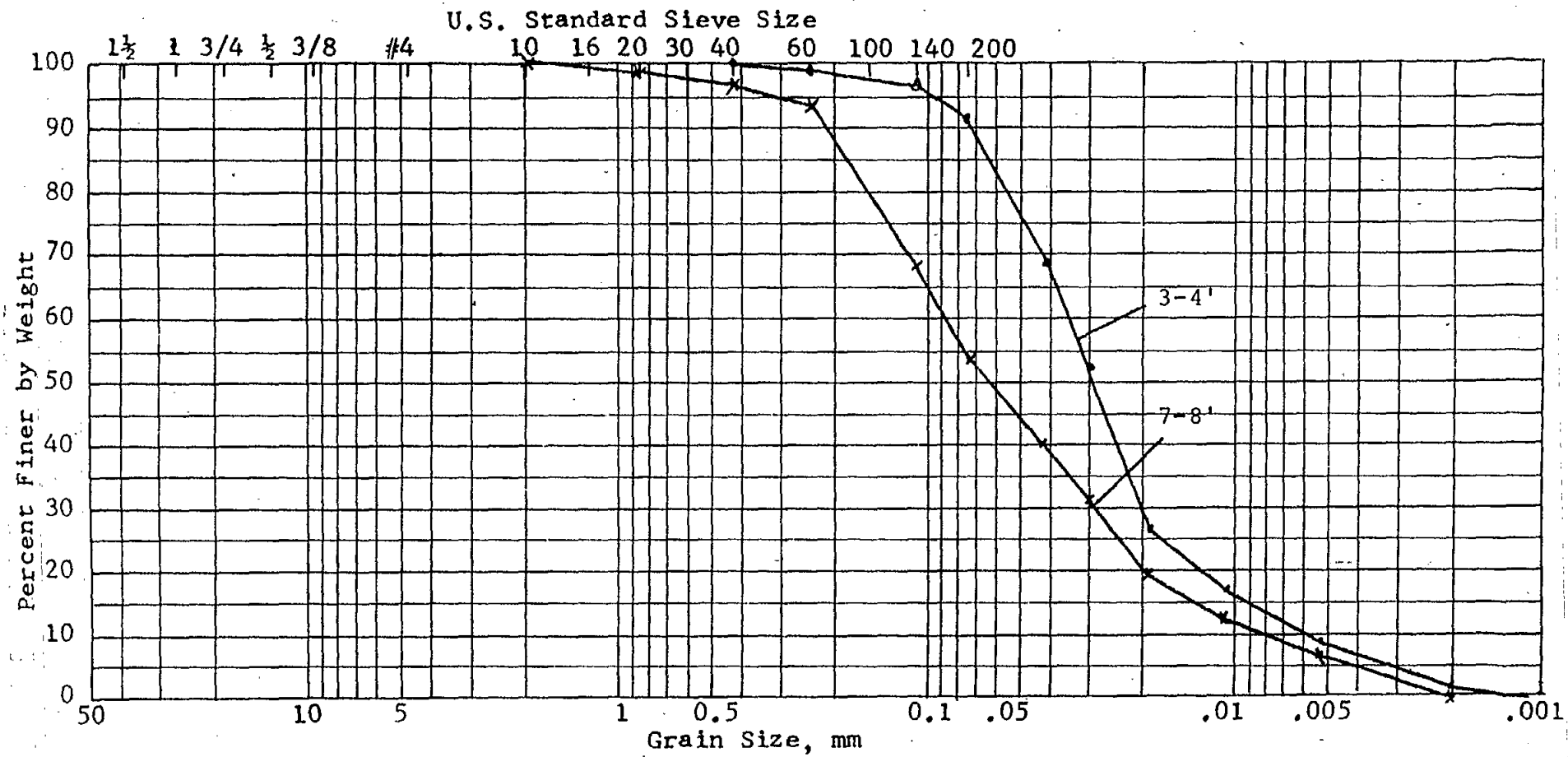
Date 12-12-95

SOIL CLASSIFICAT[illegible] TESTS

AR323558

GEOTEC ASSOCIATES

302 Beverly Road
Newark, Delaware



Gravel		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

Location	Sample	Depth	Nat W %	LL	PL	PI	Unified Class.
Newport	NVERB4	3-4'	71.6	84.6	39.9	45	MH
		7-8'	30.5	36.6	30.9	6	ML

Technician rn

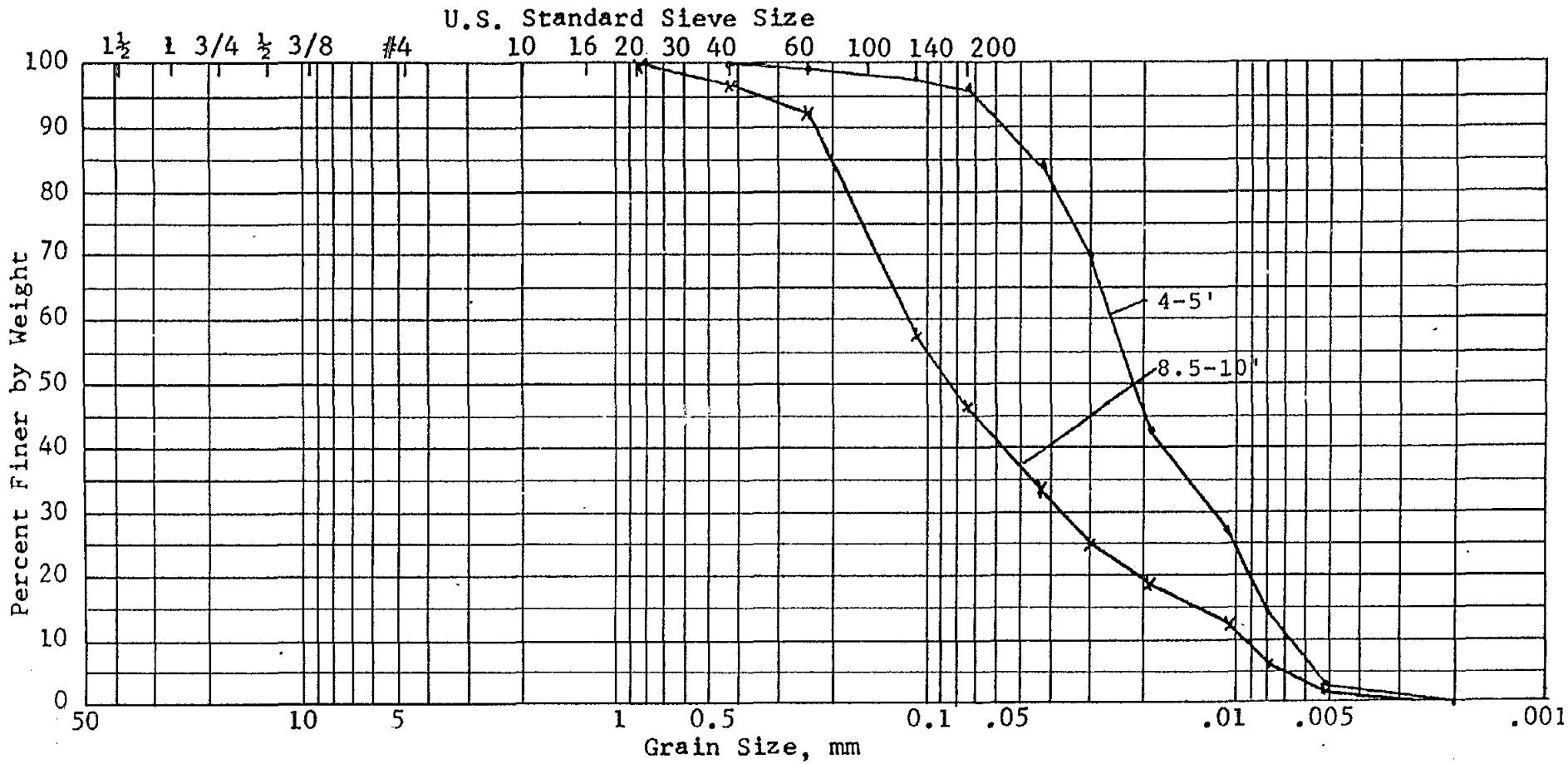
Date 12-12-95

SOIL CLASSIFICATION TESTS

AR323559

GEOTEC AS CIATES

302 Beverly Road
Newark, Delaware



Gravel		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

Location	Sample	Depth	Nat W %	LL	PL	PI	Unified Class
Newport	NVERB5	4-5'	180.1	357	55.9	297	Pt (organic)
		8.5-10	27.8	NP	NP	NP	SM

Technician rn

Date 12-12-95

Columbia

SOIL CLASSIFICA TESTS

AR323560

GEOTEC ASSOCIATES

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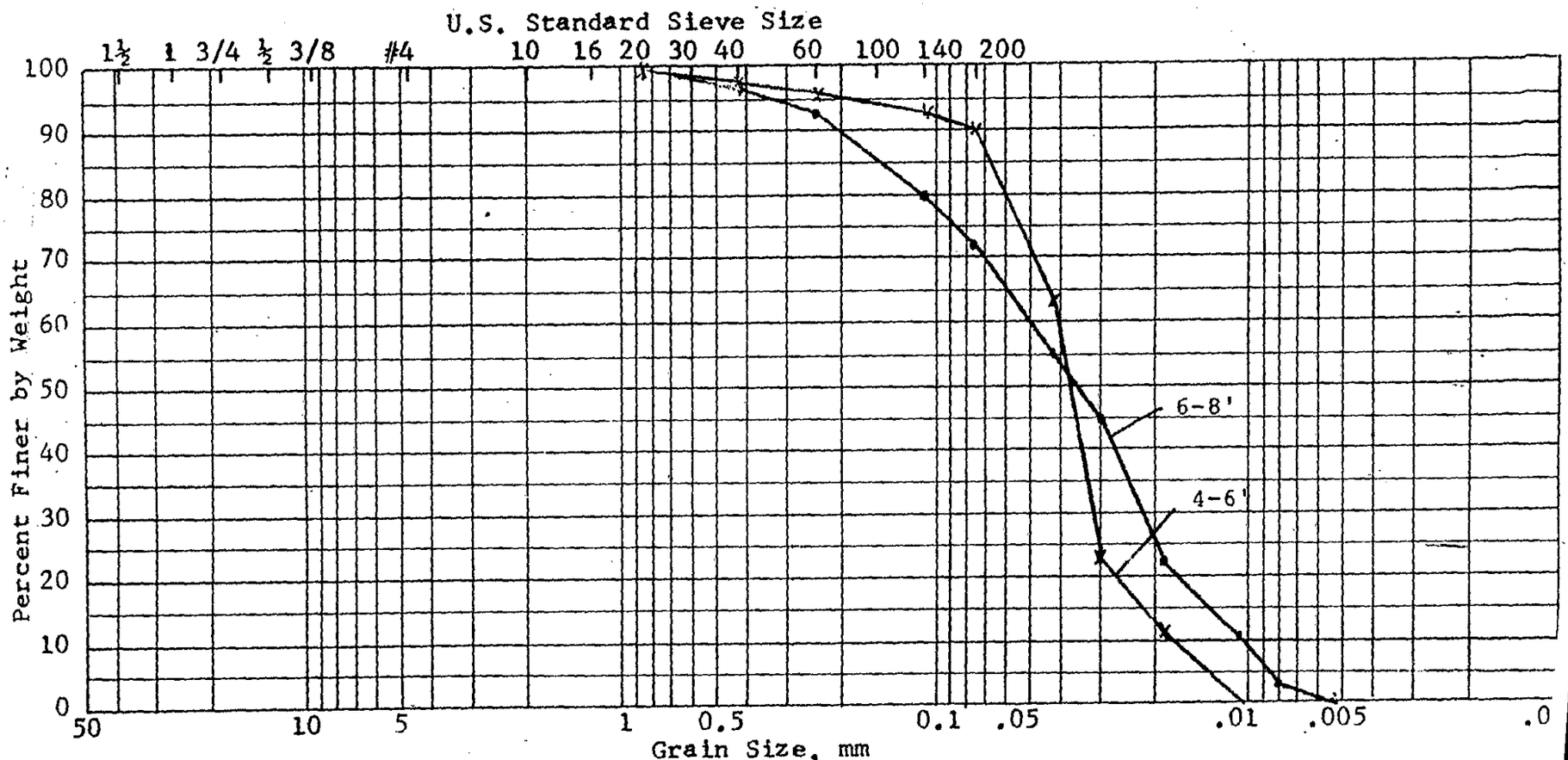
Newark, Delaware



Gravel		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

Location	Sample	Depth	Nat W %	LL	PL	PI	Unified Class.
Newport	NVERB5 TUBE	6-8'	46.3	47.1	32.2	15	ML
	NVERB6 TUBE	4-6'	131.9	133.2	67.3	66	OH

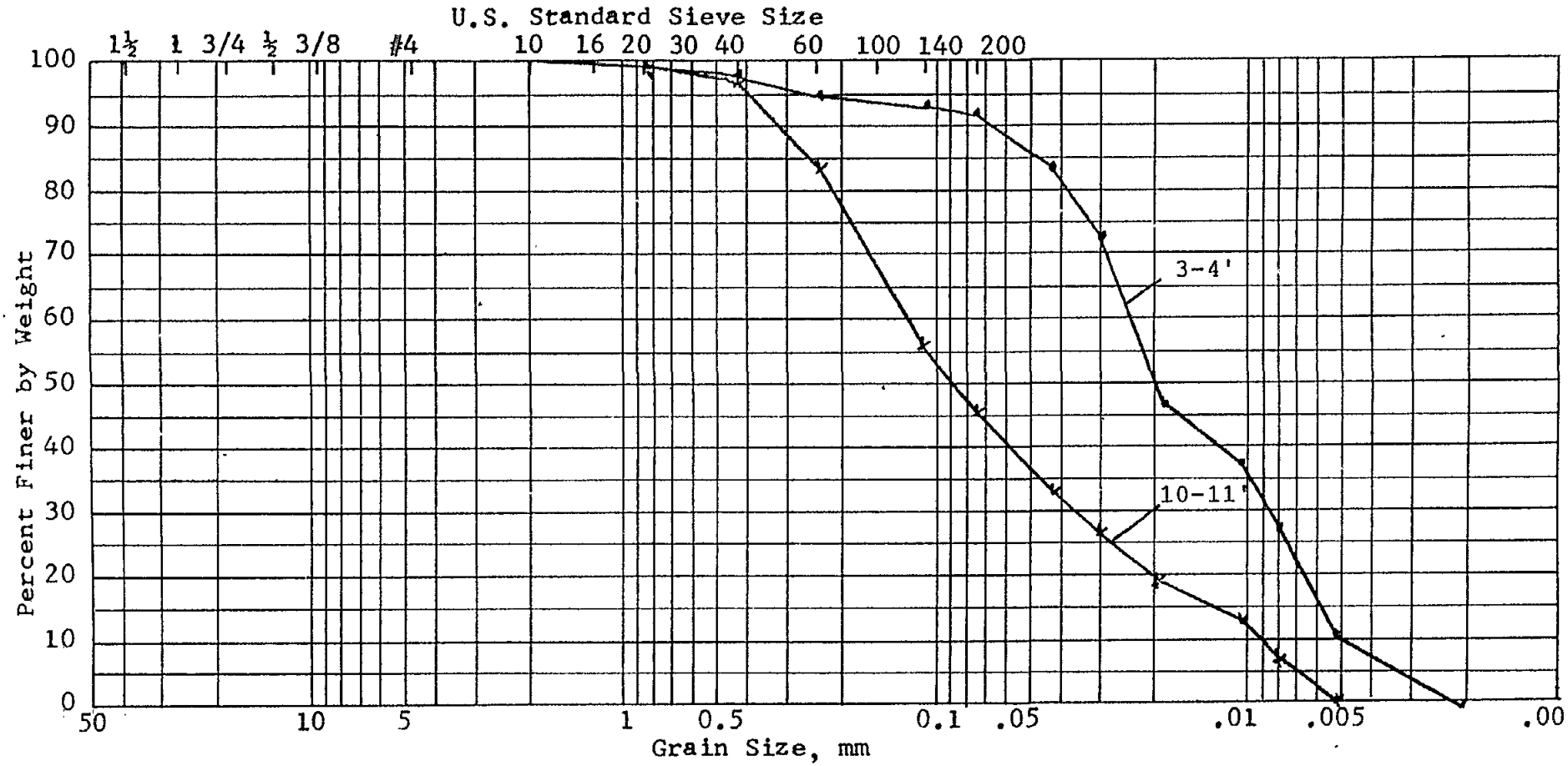
Technician rn

Date 12-12-95

AR323561

GEOTEC A CIATES

302 Beverly Road
Newark, Delaware



Gravel		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

Location	Sample	Depth	Nat W %	LL	PL	PI	Unified Class.
Newport	NVERB6	3-4'	86.9	97.4	45.8	52	MH
		10-11'	32,3	NP	NP	NP	SM

Technician rn

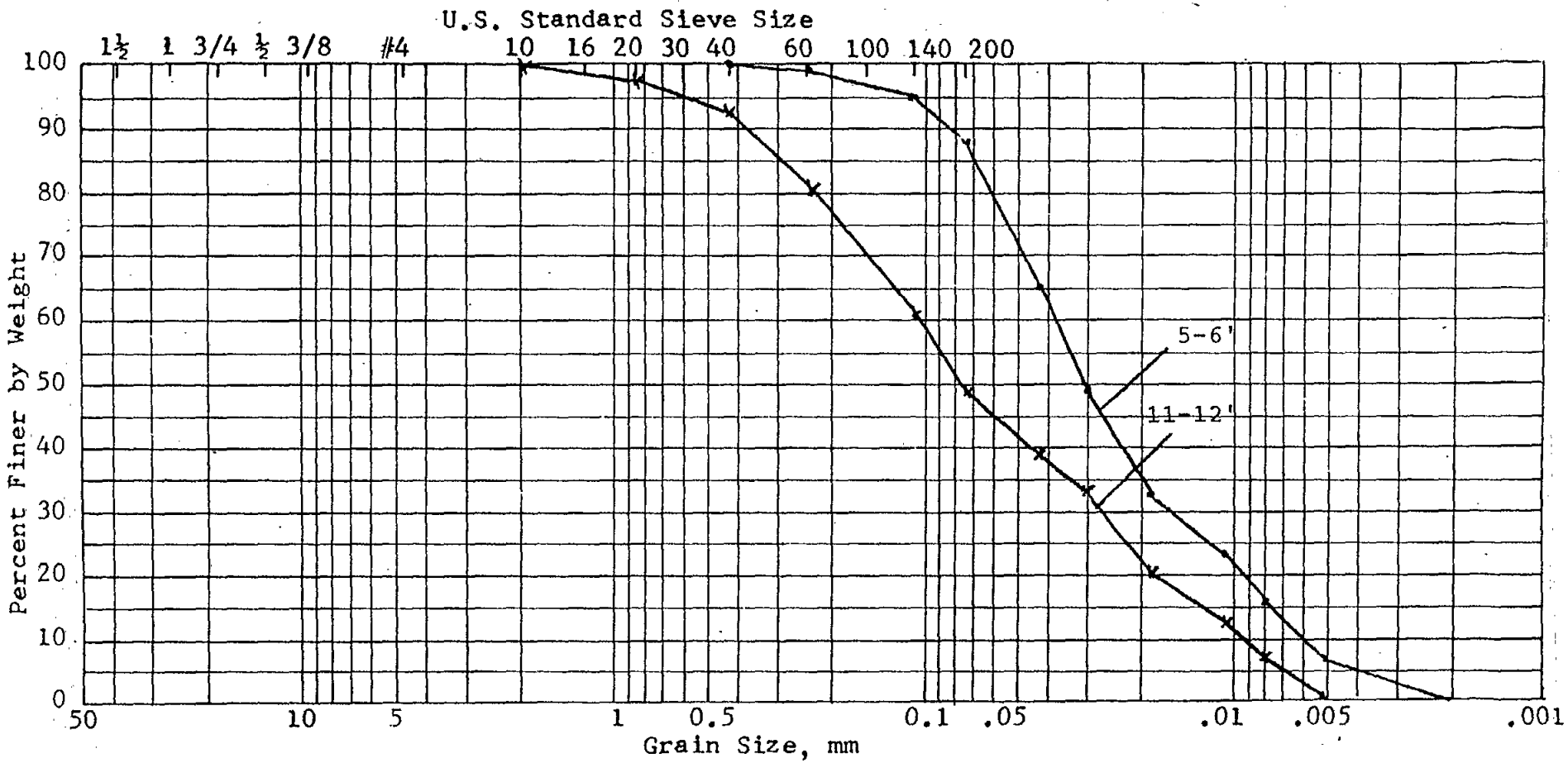
Date 12-12-95

SOIL CLASSIFICA N TESTS

AR323562

GEOTEC ASSOCIATES

302 Beverly Road
Newark, Delaware



Gravel		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

Location	Sample	Depth	Nat W %	LL	PL	PI	Unified Class.
Newport	NVERB2	5-6'	62.9	71.4	39.7	32	MH
		11-12'	30.6	31.4	29.7	2	SM

Technician rn

Date 12-12-95

Columbia Formation from bottom of Tube

SOIL CLASSIFICATION TESTS

AR323563

LOGS OF DEEP RIVER CORES

DuPont

DuPont Environmental Remediation Services

Final Log

LOG OF BORING NO. PB-2

ELEV. (FEET M.S.L.)	DEPTH (FEET) River Bottom	SAMPLE NO. AND TYPE	BLOWS PER 6-INCH INCREMENTS	SAMPLE RECOVERY (IN.)	PROFILE	DESCRIPTION	USCS SYMBOL	REMARKS
			N/A			COORDINATES N 62,2550 E 60,1490; SURFACE EL: @ -6 below River Surface.		
						0-9" Brown, medium to fine Sand, wet	SM	Core opened on 11-22-95.
		Jar				Green-gray clayey silt, moist	MH	
	5'							
	6'							
		Tube		24"			MH	$K = 3.4 \times 10^{-7}$ cm/sec
	8'							
	9'	Jar					MH	
	10'					[9.5'-10.5' Green Gray Silt and Sand]		
						Bottom of Core = 10.5'		Marsh Deposit 9 ft thick.

PROJECT NO.: 2124 Newport
DATE BEGAN: 11-17-95
DATE COMPLETED: 11-17-95
FIELD GEOLOGIST: MPB
CHECKED BY:

GWL:DEPTH N/A DATE/TIME
GWL:DEPTH N/A DATE/TIME
DRILLING METHOD: Vibra-Core using 2 7/8" I.D. Aluminum Core barrel.

NOTES:
CONTRACTOR: OSI
DRILLER: Bob Wallace
HELPER: Mike
RIG: OSI Skiff

BORING NO. PB-2
SHEET 1 OF 1

AR323565

DuPont

DuPont Environmental Remediation Services

Final Log

LOG OF BORING NO. NVERB-1

ELEV. (FEET M.S.L.)	DEPTH (FEET)	SAMPLE NO. AND TYPE	BLOWS PER 6-INCH INCREMENTS	SAMPLE RECOVERY (IN.)	PROFILE	DESCRIPTION	USCS SYMBOL	REMARKS
	River Bottom		N/A			COORDINATES N 62,2316 E 60,1236 SURFACE EL: @ -6 below River Surface.		
						Gray to brown, medium to fine sand, some to trace mica, wet. 3.0'	SP	Core opened on 11-22-95.
	5'					Green-gray clayey silt, moist		
	6'	Jar					MH	
	8'							
		Tube						Not run.
	10'					11.2'	SM	
						Orange brown medium to fine sand, TR mica		Columbia Formation
						Bottom of Core = 11.8'		Marsh Deposit 8 ft. thick

PROJECT NO.: 2124 Newport
DATE BEGAN: 11-17-95
DATE COMPLETED: 11-17-95
FIELD GEOLOGIST: MPB
CHECKED BY:

GWL:DEPTH N/A DATE/TIME
GWL:DEPTH N/A DATE/TIME
DRILLING METHOD: Vibra-Core using 2 7/8" I.D. Aluminum Core barrel.

NOTES:
CONTRACTOR: OSI
DRILLER: Bob Wallace
HELPER: Mike
RIG: OSI Skiff

BORING NO. NVERB-1
SHEET 1 OF 1

AR323566

DuPont

DuPont Environmental Remediation Services

Final Log

LOG OF BORING NO. NVERB-2

COORDINATES: N 62,2371 E 60,1202

SURFACE EL: @ ~8 below River Surface

ELEV. (FEET M.S.L.)	DEPTH (FEET) River Bottom	SAMPLE NO. AND TYPE	BLOWS PER 6-INCH INCREMENTS	SAMPLE RECOVERY (IN.)	PROFILE	DESCRIPTION	USCS SYMBOL	REMARKS
			N/A			Brown to gray, medium to fine sand, trace to some mica, wet 1.5'	SP	Core opened on 11-22-95
						Same as above but gray-green 4.0'	SP	
	5'	Jar				Green-gray, Clayey Silt, moist	MH	
	10'	Tube					MH	K = 1.61 × 10⁻⁷ cm/sec
		Jar				[11.5' some fine sand] [Start of Columbia]	SM	
						Bottom of Core = 12.1'		Marsh Deposit 8ft thick.

PROJECT NO.: 2124 Newport
DATE BEGAN: 11-20-95
DATE COMPLETED: 11-20-95
FIELD GEOLOGIST: MPB
CHECKED BY:

GWL:DEPTH N/A DATE/TIME
GWL:DEPTH N/A DATE/TIME
DRILLING METHOD: Vibra-Core using 2 7/8" I.D. Aluminum Core barrel.

NOTES:
CONTRACTOR: OSI
DRILLER: Bob Wallace
HELPER: Mike
RIG: OSI Skiff

BORING NO. NVERB-2
SHEET 1 OF 1

AR323567

DuPont Environmental Remediation Services

Final Log

LOG OF BORING NO. NVERB-3

ELEV. (FEET M.S.L.)	DEPTH (FEET) River Bottom	SAMPLE NO. AND TYPE	BLOWS PER 6-INCH INCREMENTS N/A	SAMPLE RECOVERY (IN.)	PROFILE	DESCRIPTION (COORDINATES: N 62,2465 E 60,1147; SURFACE EL: @ -6 below River Surface)	USCS SYMBOL	REMARKS
						Course gravel and rip-rap, wet		Core in storage.
	5'					Core Refusal at 3.0'		Core barrel could not penetrate rip-rap. Lead edge of core barrel bent after 3 attempts.

PROJECT NO.: 2124 Newport
DATE BEGAN: 11-20-95
DATE COMPLETED: 11-20-95
FIELD GEOLOGIST: MPB
CHECKED BY:

GWL:DEPTH N/A DATE/TIME
GWL:DEPTH DATE/TIME
DRILLING METHOD: Vibra-Core using 2 7/8" I.D. Aluminum Core Barrel

NOTES:
CONTRACTOR: OSI
DRILLER: Bob Wallace
HELPER: Mike
RIG: OSI Skiff

BORING NO. NVERB-
SHEET 1 OF 1

AR323568

DuPont

DuPont Environmental Remediation Services

Final Log

LOG OF BORING NO. NYERB-4

COORDINATES: N 62,1815 E 60,0873

SURFACE EL: @ -5 below River Surface

ELEV. (FEET M.S.L.)	DEPTH (FEET)	SAMPLE NO. AND TYPE	BLOWS PER 6-INCH INCREMENTS	SAMPLE RECOVERY (IN.)	PROFILE	DESCRIPTION	USCS SYMBOL	REMARKS
	River Bottom		N/A			Brown to gray brown, med. to fine, sand, wet	sp	Core opened on 11-22-95.
	5'	Jar				Green-gray, Clayey Silt, moist	MH	
		Tube				[at 3.0' organic matter, root like]	OH	K = 4.80 x 10^-7 cm/sec
		Jar					ML	
	10'					Bottom of Core = 8.8'		Marsh Deposit 7.5 ft. thick

PROJECT NO.: 2124 Newport
DATE BEGAN: 11-20-95
DATE COMPLETED: 11-20-95
FIELD GEOLOGIST: MPB
CHECKED BY:

GWL:DEPTH N/A DATE/TIME
GWL:DEPTH N/A DATE/TIME
DRILLING METHOD: Vibra-Core using 2 7/8" I.D. Aluminum Core Barrel

NOTES:
CONTRACTOR: OSI
DRILLER: Bob Wallace
HELPER: Mike
RIG: OSI Skiff

BORING NO. NYERB-4
SHEET 1 OF 1

AR323569

DuPont Environmental Remediation Services

Final Log

LOG OF BORING NO. NVERB-5

ELEV. (FEET M.S.L.)	DEPTH (FEET)	SAMPLE NO. AND TYPE	BLOWS PER 6-INCH INCREMENTS	SAMPLE RECOVERY (IN.)	PROFILE	DESCRIPTION	USCS SYMBOL	REMARKS
	River Bottom		N/A			COORDINATES N 62,1843 E 60,0807 SURFACE EL: @ -5 below River Surface		
						0-5" Grey-brown med. to fine sand, wet		Core opened 11-22-95
	4'					Green-gray Clayey Silt, TR organic stalks		
	5'	Jar				[4' to 5' silt becomes very peaty]	Pt	
	6'							
	8'	Tube					ML	K = 20.1 x 10^{-7} cm/sec
	8.5'					8.5'		
	10'	Jar				Orange brown laminated silt, TR fine sand, wet.	SM	Columbia Formation
						Bottom of Core = 11.1'		Marsh Deposit 8.0 ft thick.

PROJECT NO.: 2124 Newport
DATE BEGAN: 11-20-95
DATE COMPLETED: 11-20-95
FIELD GEOLOGIST: MPB
CHECKED BY:

GWL:DEPTH N/A DATE/TIME
GWL:DEPTH N/A DATE/TIME
DRILLING METHOD: Vibra-Core using 2 7/8" I.D. Aluminum Core Barrel

NOTES:
CONTRACTOR: OSI
DRILLER: Bob Wallace
HELPER: Mike
RIG: OSI Skiff

BORING NO. NVERB-5
SHEET 1 OF 1

AR323570

DuPont

DuPont Environmental Remediation Services

Final Log

LOG OF BORING NO. NVERB-6

ELEV. (FEET M.S.L.)	DEPTH (FEET)	SAMPLE NO. AND TYPE	BLOWS PER 6-INCH INCREMENTS	SAMPLE RECOVERY (IN.)	PROFILE	DESCRIPTION	USCS SYMBOL	REMARKS
	River Bottom		N/A			COORDINATES N 62,1886 E 60,0724 SURFACE EL: @ -5 below River Surface		
						0-9" Gray-brown, med. sand, wet		Core open 11-22-95.
	3'	Jar				Green-gray clayey silt, moist	MH	
	5'	Tube					OH	K=1.35×10^-7
	10'	Jar				[Grading to fine sand and silt below 10.0'] E Start of Columbia]	SM	
						Bottom of Core =12.0'		Marsh Deposit 11.0ft thick

PROJECT NO.: 2124 Newport
DATE BEGAN: 11-20-95
DATE COMPLETED: 11-20-95
FIELD GEOLOGIST: MCB
CHECKED BY:

GWL:DEPTH N/A DATE/TIME
GWL:DEPTH N/A DATE/TIME
DRILLING METHOD: Vibra-Core using 2 7/8" I.D. Aluminum Core barrel.

NOTES:
CONTRACTOR: OSI
DRILLER: Bob Wallace
HELPER: Mike
RIG: OSI Stiff

BORING NO. NVERB-6
SHEET 1 OF 1

AR323571

Appendix C

BORING LOGS USED TO CONSTRUCT GEOLOGICAL CROSS-SECTIONS AND MARSH DEPOSIT ISOPACH THICKNESS MAP

LOGS USED FOR A-A

WALTON CORPORATION
Drilling Contractor

P. O. BOX 1097, NEWARK, DELAWARE 19711

*DM-6

BORING LOG
DM-6

DuPont Company ..... PROJECT NO. .....

Newport Plant ..... SUPERVISOR .....

NG NO. (Well Pt. #1) *DM-6	DRILLER S. Bethard	DATE 5-2-77	
ATHER Sunny & Warm	SURFACE ELEVATION 4.0 (from Topo)	DATUM -	

Sample No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials	*Blows A.
			0	1.0	Top Marsh Organics	
			1.0	5.0	Gray Clayey Silt w/Organics	
			5.0	10.0	Gray Clayey Silt w/Organics	
			10.0	16.0	Gray Clayey Silt w/Organics	
			16.0	21.0	Brn. F/M Sand	
			21.0	30.0	Brn. F/C Sand & Gravel w/Clay	
			30.0	35.0	Same	
			35.0	41.0	Same	
			41.0	45.0	Brn. Clayey F/C Sand & Gravel	
			45.0	50.0	Red & Brn. Clay w/Sand	
			50.0	57.0	Same	
			57.0	60.0	Red & Brn. Sandy Clay	
			60.0	70.0	Brn. F/C Sand & Gravel w/Tr. Clay	
					BOB = 70' or -66 MSL	

16'

A. Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

B. Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in. casing 12 inches.

DNE

REMARKS: 2"x10' PVC #16 Slot Set Well Screen 60.0-70.0

Gravel Pack 20.0-55.0 54-55 Bentonite Pellets

100436

Pressure Grouted w/Cement 54.0-0.

GROUND WATER

AR323574

BLOWS ON CASING B
0- 1
1- 2
2- 3
3- 4
4- 5
5- 6
6- 7
7- 8
8- 9
9-10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
18-19
19-20
20-21
21-22
22-23
23-24
24-25
25-26
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27-28
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31-32
32-33
33-34
34-35
35-36
36-37
37-38
38-39
39-40
40-41
41-42
42-43
43-44
44-45
45-46
46-47
47-48
48-49
49-50
50-51
51-52
52-53
53-54
54-55
55-56
56-57
57-58
58-59
59-60

LOG of BORING No. B-111

DATE 2/22/85 SURFACE ELEVATION 25.0 (from Topo) LOCATION See Plate 2

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0		9	Topsoil (6")					
		9	Medium dense brown medium to fine sandy silt, trace gravel (Fill)					
5		7						
		9						
		4						
10		8						
		5	Very loose to medium dense miscellaneous fill containing flyash, bottom ash, brick fragments, wood, silt, sand, gravel and other materials					
15		6						
		8	Landfill Material					
		4						
20		2						
		14						
			25.0'					
25		4	Soft to firm greenish gray silty clay Marsh Deposit	~7' thick				
30		7						
		6	Peat 32.0'					
35		10	Interbedded gray loose silty coarse to fine sand and gravel, and firm gray fine sandy silty clay and clayey silt					
40		33						
			Medium dense to dense brown and multi-colored coarse to fine sand, becoming silty and clayey medium to fine sand with depth					
45		18						
			Continued on Sheet 2					

Completion Depth 100.5 Feet Water Depth See Note Feet Date

Project Name DuPont-Newport, Delaware Project Number 85C2374

Woodward-Clyde Consultants

LOG of BORING No. B-111

DATE 2/22/85 SURFACE ELEVATION _____ LOCATION See Plate 2

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45								
50		12						
55		22	Same as above					
60		12	62'					
			Potomac					
65		16	Stiff to very stiff red silty clay, trace fine sand, with thin seams of silty medium to fine sand					
70		20						
			-becoming tan					
75		33						
80		34	Medium dense to dense interbedded tan, light gray and red silty medium to fine sand with thin seams of very stiff silty clay					
85		26						
90		28	-2" seam of gravel					
			Continued on Sheet 3					

Completion Depth 100.5 Feet Water Depth See Note Feet Date _____

Project Name DuPont-Newport, Delaware Project Number 85C2374

Woodward-Clyde Consultants

AR323576

LOG of BORING No. B-111

DATE 2/22/85 SURFACE ELEVATION _____ LOCATION See Plate 2

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
90			Same as above					
			Very stiff red silty clay					
95		22						
			Very stiff brown silty clay becoming clayey silt, trace fine sand					
100		19						
			Groundwater Depth: 18.3 feet encountered 2/22/85 18.0 feet at completion 2/25/85					
105								

Completion Depth 100.5 Feet Water Depth See Note Feet Date _____

Project Name DuPont-Newport, Delaware Project Number 85C2374

Woodward-Clyde Consultants

AR323577

DuPont Environmental Remediation Services
300 Bellevue Parkway, Suite 390
Wilmington, DE 19809-3722

Final Log

LOG OF BORING NO. NVE-1

COORDINATES
N _____ E _____
SURFACE EL: 25 MSL (from Topo)

ELEV. (FEET M.S.L.)	DEPTH (FEET)	PROFILE	DESCRIPTION	USCS SYMBOL	REMARKS
			0-14" Brown organic soil, dry.	–	Radiation Counter registers no Thorium signature on surface or at any point in borehole.
	5		Mixture of Black to gray Ash and Slag material with layers of Cream yellow slag like material (possible Corian) and red granular Slag like material, dry to moist.	–	OVA readings zero throughout hole.
	10		[lens of crushed red brick 2.1' to 2.2']	–	
			[lens of lithopone from 14.1' to 14.2']	–	
	15			SM	
	20		22.4'	–	▽ Water taped in augers at 21.0'
	25		Green-gray to olive-green, clayey Silt, moist to wet.	ml	
				ml	
				SM	
	30			ml	
				ml	31' Shelby Tube "ST-3"
				ml	33' K = 4.29 x 10^-7 cm/sec
	35		34.9'	ml	

PROJECT NO.: 2124
DATE BEGAN: 7-7-95
DATE COMPLETED: 7-10-95
FIELD GEOLOGIST: MPB
CHECKED BY: _____

GWL: DEPTH 21' DATE/TIME 7-10-95
GWL: DEPTH _____ DATE/TIME _____
DRILLING METHOD: HSA 4¼ inch I.D. 2 inch Split-spoon sampler.

NOTES:
Driller: Walton Corp.
Rig: CME-55
Location taped off of Well SM-3.

DuPont Environmental Remediation Services
300 Bellevue Parkway, Suite 390
Wilmington, DE 19809-3722

Final Log

LOG OF BORING NO. NVE-1

COORDINATES
N _____ E _____
SURFACE EL: 25 MSL

ELEV. (FEET M.S.L.)	DEPTH (FEET)	PROFILE	DESCRIPTION	USCS SYMBOL	REMARKS
	35		Brown to Oranage to Gray, Course to fine sand, trace gravel, mixed with layers of silty sand, wet.	gm/gw	
	40				
	45			sm	At 47' drill feed pressure increases.
	50				
	55		[lens of red-gray mottled clay - 55.2' to 56.5']	oh	
				oh/sm	
	60				
			64.0		
	65		Brown to white, medium quartz sand, wet.	sp.	Heaving sands in augers
	70				

PROJECT NO.: (See page 1)
DATE BEGAN: "
DATE COMPLETED: "
FIELD GEOLOGIST: "
CHECKED BY:

GWL: DEPTH _____ DATE/TIME _____
GWL: DEPTH _____ DATE/TIME _____
DRILLING METHOD: (See page 1)

NOTES: (See Page 1)

BORING NO. NVE-1
SHEET 2 OF 3

AR323579

DuPont Environmental Remediation Services
300 Bellevue Parkway, Suite 390
Wilmington, DE 19809-3722

Final Log

LOG OF BORING NO. NVE-1

COORDINATES
N _____ E _____
SURFACE EL: 25 MSL

ELEV. (FEET M.S.L.)	DEPTH (FEET)	PROFILE	DESCRIPTION	USCS SYMBOL	REMARKS
	70		(Same as above) 71.0'	SP	Red Sandy Clay seen on last 10 feet of auger, upon withdrawal from boring.
	75		Red-gray, stiff mottled clay, grading to red-brown mottled clay, some fine sand, moist. [Clayey sand seen on head of tube at 78']	oh	76' Shelby Tube "ST-4"
				sm/oh	78' $k = 9.32 \times 10^{-5}$ cm/sec
	80		80.0'		
			Bottom of Boring at 80.0'		Boring grouted thru augers from bottom up.

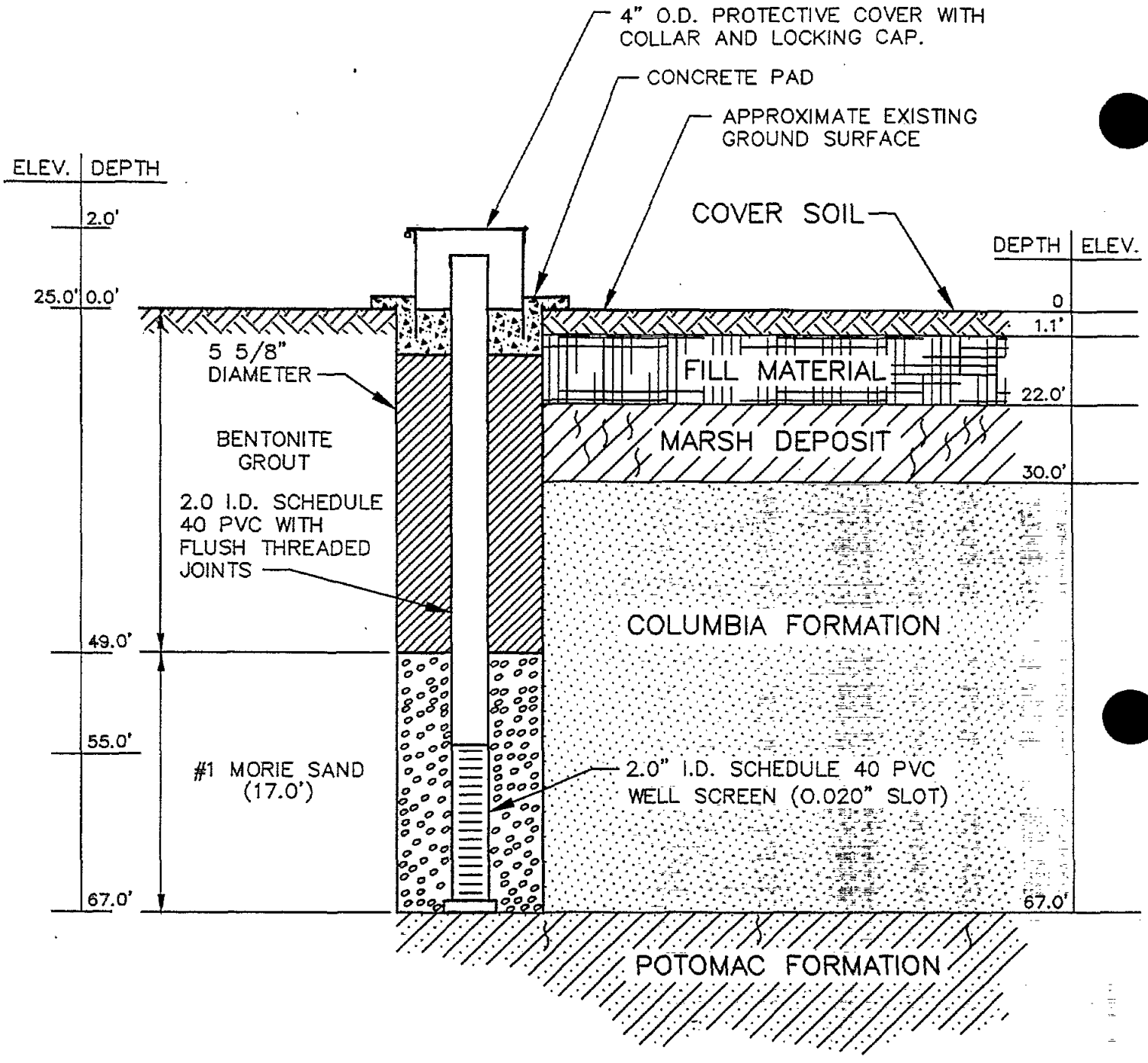
PROJECT NO.: (See page 1)
DATE BEGAN: _____
DATE COMPLETED: _____
FIELD GEOLOGIST: _____
CHECKED BY: _____

GWL: DEPTH _____ DATE/TIME _____
GWL: DEPTH _____ DATE/TIME _____
DRILLING METHOD: (See page 1)

NOTES:
(See Page 1)

BORING NO. NVE-1
SHEET 3 OF 3

AR323580



(N.T.S.)

NOTE:

1. SEE FIGURE FOR PLAN LOCATION OF PIEZOMETER
2. ELEVATION DATUM IS MEAN SEA LEVEL (M.S.L.)
3. DEPTH DATUM IS GROUND SURFACE
4. DNREC PERMIT NO. 107113

MONITORING WELL SM-3C

WELL INSTALLATION DETAILS STRATAGRAPHIC LOG			
SCALE N.T.S.	DESIGNED BY	DRAWN BY TIQ	CAD DRAWING NO 2124AQ32
DATE 6-17-96	CHECKED	APPROVED	PROJECT NO 2124
NEWPORT SUPERFUND SITE NEWPORT, DELAWARE			
DuPont Environmental Remediation Services			

AR323581

Useless Drillers Logs

ORIGINAL (Red)

WALTON CORPORATION

Drilling Contractor
PAPER MILL ROAD — P.O. BOX 1097
NEWARK, DELAWARE 19715

Phone: (302) 737-6480
Fax: (302) 737-6309

BORING LOG

CLIENT: Dupont Environmental Remediation Services

SITE: Dupont Newport Superfund Site

ADDRESS:

PROJECT NO:

PERMIT NO:

BORING NO.	DRILLER	DATE:
SM-3C	G. Truver	2/29/96
WEATHER Cloudy, Windy	SURFACE ELEVATION	DATUM:

SAMPLE NO.	SAMPLE DEPTH-FEET FROM	SAMPLE DEPTH-FEET TO	DEPTH STRATA FEET FROM	DEPTH STRATA FEET TO	DRILLER'S DESCRIPTION of MATERIALS	* BLOWS A			
			0.0	2.0	Misc Fill (Silt, sand, Gravel)				
			2.0	2.5	Drk Gr Silty Clay				
			2.5	3.5	Blk Ash				
			3.5	6.0	Brn Silt w/Tr Sand				
			6.0	25.0	Blk Ash				
			25.0	35.0	Brn & Gr Silty Clay				
			35.0	50.0	Or Brn Sand & Gravel w/Some Silt				
			50.0	66.0	Or Brn (F-C) Sand w/Tr Gravel				
			66.0	70.0	R Clay w/Tr Sand				

* A Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

REMARKS: Point Set @ 70.0

GROUNDWATER

AR323582

LOG of BORING No. SBND#3

DATE 10/11/88 SURFACE ELEVATION 24.0 (from Topo) LOCATION FIGURE 3

ORIGINAL (Red)

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0			Brown organic silt					
		41	Dry black asphalt					
2			Orange partially consolidated fine sand and silt with a trace of white and black material (burnt soil)					
		37						
4								
6		12						
8			with 2 inches of loose black cinders					
		23	Hard consolidated gray silt (ash)					
10			Orange partially consolidated fine sand and silt with a trace of white and black material (burnt soil)					
		10						
12			Black silt (lithopone waste)					
			Light gray cinders interbedded with brown silt					
		12						
			Black silt (lithopone waste)					
14			Light gray medium sand-sized cinders					
			Brown to red-brown hard consolidated silt and fine sand, trace coarse sand (burnt soil)					
16		25	Black silt (lithopone waste) interbedded with red-brown hard consolidated silt and fine sand					
18			Continued on next page					

Completion Depth 24.5 Feet Water Depth ~ 17.5 Feet Date 10/11/88

Project Name DuPont Newport; Phase II RI Project Number 88C2076-4F

Woodward-Clyde Consultants

ORIGINAL (Red)

LOG of BORING No. SBND#3

DATE 10/11/88 SURFACE ELEVATION _____ LOCATION FIGURE 3

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
17			Very moist black silt (lithopone waste)					
		14						
19			with a trace of coarse sand-sized grains and root traces					
21		3						
			becomes silty clay					
23		9	Soft yellow-brown and light gray silty clay, trace coarse to fine sand and gravel (FILL)	23.5				
			Soft organic gray silty clay (MARSH DEPOSITS)	24.5'				
25			(Penatrated 1 foot into Marsh Deposit.)					

Completion Depth 24.5 Feet Water Depth ~ 17.5 Feet Date 10/11/88

Project Name DuPont Newport; Phase II RI Project Number 88C2076-4F

Woodward-Clyde Consultants

AR323584

DuPont Environmental Remediation Services
300 Bellevue Parkway, Suite 390
Wilmington, DE 19809-3722

Final Log (ORIGINAL (Red))

LOG OF BORING NO. NVE-2

COORDINATES
N _____ E _____
SURFACE EL: 24 MSL (from Topo)

ELEV. (FEET M.S.L.)	DEPTH (FEET)	PROFILE	DESCRIPTION	USCS SYMBOL	REMARKS
			0-20" Brown organic soil, grading to red clay, dry	-	Radiation Counter registers no thorium signature on surface or at any point in borehole.
			Gray to white and black silt size waste material mixed with clay, dry to moist.	sm	
	5			-	
				-	OVA readings are zero throughout hole.
	10			-	
				-	
				-	
	15		[lens of greenish gray Lithopone - 16.6' to 17.1']	-	
			[Black, roasted Baritic Ore - 18' to 20']	-	▽ Water taped in augers at 18.0'
	20		21.0'	-	
			Green-gray, clayey silt, moist	ml	
				ml	24' Shelby Tube "ST-1"
	25			ml	26' K = 2.75 x 10^{-7} cm/sec
				ml	
			29.0	ml	
	30		Yellow-brown to orange, fine silty micaceous sand, trace gravel, grading to clayey silty fine sand, wet	sp	
				sm	
				sm	
	35			sm	

PROJECT NO.: 2124
DATE BEGAN: 7-5-95
DATE COMPLETED: 7-7-95
FIELD GEOLOGIST: MEG/LKP
CHECKED BY: _____

GWL: DEPTH 18.0' DATE/TIME 7-5-95
GWL: DEPTH _____ DATE/TIME _____
DRILLING METHOD: HSA 4 1/4 inch I.D.
2 inch split-spoon sampler

NOTES:
Driller: Walton Corp.
Rig - CME-55
Location taped off of well SM-3.

BORING NO. NVE-2
SHEET 1 OF 3

AR323585

DuPont Environmental Remediation Services
300 Bellevue Parkway, Suite 390
Wilmington, DE 19809-3722

Final Log ORIGINAL

LOG OF BORING NO. NVE-2

COORDINATES
N _____ E _____
SURFACE EL: 24 MSL

ELEV. (FEET M.S.L.)	DEPTH (FEET)	PROFILE	DESCRIPTION	USCS SYMBOL	REMARKS
	35		(Same as above)	sm	
				sm	
				sm	
	40			sm	
				sm	
				sm	
	45			sm	
				sm	
				sm	
	50			sm	
				cl	
	55			sm	
				sm	
				sm	
	60			sm	
			64.0	sm	
	65		Brown to white, medium quartz sand, wet		Heaving sands in augers starting at @ 64'.
	70			sm	

PROJECT NO.: (See page 1.)
DATE BEGAN: "
DATE COMPLETED: "
FIELD GEOLOGIST: "
CHECKED BY:

GWL: DEPTH _____ DATE/TIME _____
GWL: DEPTH _____ DATE/TIME _____
DRILLING METHOD: (See page 1)

NOTES: (See page 1)

BORING NO. NVE-2
SHEET 2 OF 3

AR323586

DuPont Environmental Remediation Services
300 Bellevue Parkway, Suite 390
Wilmington, DE 19809-3722

Final Log

LOG OF BORING NO. NVE-2

COORDINATES
N _____ E _____
SURFACE EL: 24 MSL

ELEV. (FEET M.S.L.)	DEPTH (FEET)	PROFILE	DESCRIPTION	USCS SYMBOL	REMARKS
	70		(Same as above)		
			73.0'		< Potomac Contact
	75		Red-brown mottled clay with layers of silty sand, moist to wet	cl/ch	75' Shelby Tube "ST-2"
			77.0'	ch	77' K=5.39x10^{-6} cm/sec
			Bottom of Boring at 77.0'		Boring grouted thru augers from bottom up.

PROJECT NO.: (See page 1)
DATE BEGAN: "
DATE COMPLETED: "
FIELD GEOLOGIST: "
CHECKED BY:

GWL: DEPTH _____ DATE/TIME _____
GWL: DEPTH _____ DATE/TIME _____
DRILLING METHOD: (See page 1)

NOTES: (See page 1)

BORING NO. NVE-2
SHEET 3 OF 3

AR323587

DuPont Environmental Remediation Services
300 Bellevue Parkway, Suite 390
Wilmington, DE 19809-3722

Final Log

LOG OF BORING NO. NVE-3

COORDINATES
N _____ E _____
SURFACE EL: 23 MSL (from Topo)

ELEV. (FEET M.S.L.)	DEPTH (FEET)	PROFILE	DESCRIPTION	USCS SYMBOL	REMARKS
			0-2" Course gravel	-	No radiation readings for thorium on surface.
			Brownish Red to Black Silt size Waste material with layers of brown red and white Slag material, dry to moist.	-	OVA readings are Zero throughout hole.
	5			-	
				-	
	10			sm	
				-	Large chunk of Slag stuck in spoon head - 12' to 14'
				-	
	15		[Layer of Cream-yellow (Corian) - 14.1' to 18.0', wet]	-	
				-	
				-	Water on Spoon at 16.5'
	20		[Layer of Wood fragments - 20.5' to 22.1'] 22.2'	-	
			Green-gray to olive-green, clayey Silt, moist	oh	
	25			oh	26' Shelby Tube "ST-5"
				oh	28' K = 2.36×10^{-7} cm/sec
	30		30.2'	oh	
			Orange to brown to gray, course to fine, sand, trace gravel, mixed with layers of sandy silt, moist to wet	sw	
	35				

PROJECT NO.: 2124
DATE BEGAN: 7-11-95
DATE COMPLETED: 7-11-95
FIELD GEOLOGIST: MPB
CHECKED BY: _____

GWL: DEPTH — DATE/TIME —
GWL: DEPTH _____ DATE/TIME _____
DRILLING METHOD: HSA 4 1/4 inch I.D.
2 inch Split-spoon sampler

NOTES:
Driller: Walton Corp.
Rig: CME-55
Location typed off of well SM-3.

DuPont Environmental Remediation Services
300 Bellevue Parkway, Suite 390
Wilmington, DE 19809-3722

Final Log

LOG OF BORING NO. NVE-3

COORDINATES
N _____ E _____
SURFACE EL: 23 msL

ELEV. (FEET M.S.L.)	DEPTH (FEET)	PROFILE	DESCRIPTION	USCS SYMBOL	REMARKS
	35		(Same as above)		
	40			SC	
	45				
	50			SM	
	55				
	60			SM	
	65		Brown to white, medium quartz sand, wet.		Heaving Sand in Augers below 60.0'
	70				

PROJECT NO.: (See page 1)
DATE BEGAN: "
DATE COMPLETED: "
FIELD GEOLOGIST: "
CHECKED BY:

GWL: DEPTH _____ DATE/TIME _____
GWL: DEPTH _____ DATE/TIME _____
DRILLING METHOD: (See page 1)

NOTES: (See page 1)

DuPont Environmental Remediation Services
300 Bellevue Parkway, Suite 390
Wilmington, DE 19809-3722

Final Log

LOG OF BORING NO. NYE-3

COORDINATES
N _____ E _____
SURFACE EL: 23 msL

ELEV. (FEET M.S.L.)	DEPTH (FEET)	PROFILE	DESCRIPTION	USCS SYMBOL	REMARKS
	70		(same as above)	sp	Heaving Sands in augers.
	75		Orange-brown fine sand and Silt, wet	sm	< Potomac Contact
	80		Red Clay, with purple mottling, grading to clay, trace to some sand, moist 82.0'	cl cl.	80' 82' } Shelby Tube "ST-6" K = 1.15 x 10^{-6} cm/sec
			Bottom of Boring at 82.0'		Boring grouted thru augers from bottom up.

PROJECT NO.: (See page 1)
DATE BEGAN: "
DATE COMPLETED: "
FIELD GEOLOGIST: "
CHECKED BY:

GWL: DEPTH _____ DATE/TIME _____
GWL: DEPTH _____ DATE/TIME _____
DRILLING METHOD: (See page 1)

NOTES: (See page 1)

BORING NO. NYE-3
SHEET 3 OF 3

AR323590

LOG of BORING No. TB-33

DATE 7/11/90 SURFACE ELEVATION 21.6 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0		20	SS	Light brown, SILTY FINE SAND with roots .5	21.1
		25*	SS	Black, brown, and dark gray, with trace white stipples, SILTY COARSE TO FINE SAND, brick fragments and dense, gray clinker ? lithopone	
5		2	SS	Dark orange-brown, CLAYEY FINE SANDY SILT, trace coarse to medium sand and asphalt pavement fragments	17.1
		19	SS	Brown with orange mottling and white streaks, SILTY COARSE TO FINE SAND, brick fragments	15.6
		16*	SS	- with tan mottling at 8.0 feet	
10		14	SS		
		8	SS	- with lenses of tan silty sand at 12.0 feet	
		26*	SS		
15		8	SS	Blue-gray to green-gray with trace white mottling, FINE SANDY SILT 18' 18' (FILL)	5.6 / 3.8
		10	SS	Orange-brown, FINE SANDY CLAYEY SILT, trace root fragments	3.6
20		12*	SS	Blue-black FINE SANDY SILTY CLAY, trace coarse to medium sand and mica ~@8' thick MARSH DEPOSIT (OTHER QUATERNARY)	-1.4
25	MW-33A			White, orange, and black, moderately-sorted, COARSE TO MEDIUM SANDY GRAVEL, trace fine sand, coarse gravel and mica, sub-angular to round 25.9'	
		114*	SS	(COLUMBIA)	-10.4
30		36*	SS	Yellow, orange, and white with orange and red mottling, well-sorted, CLAYEY MEDIUM TO FINE SAND, trace coarse sand and fine sandy clay lenses, quartzose	
35		16	SS	high iron, typical of Columbia sediments	
40	MW-33B(R)	12	SS	- becoming orange clayey fine sand at 39.0 feet	-18.4
				Stiff, red with gray mottling, FINE SANDY CLAY	-21.9
		25	SS	Lithology description on Page 2 of 3	

Completion Depth: 101.0 ft. Water Depth: ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 5.25" Mud Rotary

Woodward-Clyde Consultants

AR323591

LOG of BORING No. TB-33

DATE 7/11/90 SURFACE ELEVATION 21.6 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
45		33B(R)		Light orange to orange-brown, CLAYEY MEDIUM TO FINE SAND with light gray and orange medium sandy clay lenses — indicates high iron, typical of Columbia.	
50		21	SS		
55		25	SS	Stiff, red with light gray and orange mottling, FINE SANDY CLAY with medium to fine sand lenses	-32.9
				Red and gray MEDIUM TO FINE SANDY CLAY	-33.9
60		35	SS	Gray, FINE SANDY CLAY	-37.9
				Orange-brown to yellow, MEDIUM TO FINE SAND, trace clay, then light gray, CLAYEY FINE SAND with red clay lenses	-38.4
65		22	SS	Orange-brown to yellow, COARSE TO FINE SAND, trace clay,	-42.4
				Red and blue-gray, CLAYEY MEDIUM TO FINE SAND	-43.4
70		25 MW-33C	SS	- becoming orange to yellow with purple-gray mottling, trace coarse sand	
75		46	SS	Orange to yellow-brown, MEDIUM TO FINE SAND with brown and gray, clayey medium to fine sand lenses, trace coarse sand- to fine gravel-size schist or gneiss fragments	-52.4
80		7	SS	Orange-brown to yellow-brown, MEDIUM TO FINE SAND AND CLAY, little coarse sand	-57.4
				- becoming mottled white and black, trace fine quartz gravel at 80.9 feet	-59.3
				Red with white mottling, MEDIUM TO FINE SAND CLAY	
85		13	SS	- becoming firm, yellow-brown, FINE SANDY CLAY (POTOMAC) 88 bgs	
		89	SS	Lithology description on Page 3 of 3	-66.9

Completion Depth: 101.0 ft. Water Depth: ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 5.25" Mud Rotary

Woodward-Clyde Consultants

AR323592

LOG of BORING No. TB-33

DATE 7/11/90 SURFACE ELEVATION 21.6 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
90				Yellow-brown with red, gray, and dark brown mottling, COARSE TO FINE SANDY CLAY, quartzose, schistose foliation, saprolite	
95					
100				101 (WEATHERED BEDROCK)	-79.4
105					
110					
115					
120				Note: 1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.	
125					
130					

Completion Depth: 101.0 ft. Water Depth: ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 5.25" Mud Rotary

Woodward-Clyde Consultants

DUPONT CIVIL ENGINEERING SYSTEMS

BORING NUMBER CG-4 PLANT Newport, DE
PLANT COORDINATES S 515, W 520 DATE DRILLED 9-29-94
SURFACE ELEVATION 22.0 Feet MSL DRILLING COMPANY EDI
PROJECT TITLE Ciba-Geigy Bridge DRILLING METHOD Mud Rotary
PROJECT NO. 3222-01-011180 INSPECTOR V. H. Ferrero

ELEV (feet)	DEPTH (feet)	SAMPLE	SOIL CLASSIF.	BLOWS/6 in.	GRAPHIC LOG	SOIL DESCRIPTION AND REMARKS	WATER CONTENT, % (PLASTIC LIMIT ○ / NATURAL ● / LIQUID LIMIT ○; 10 20 30 40)	OTHER TESTS
20.0						Asphalt & Crushed Stone		
17.0		☒	ML-SM	25-12-3-2		FILL: Light gray sandy SILT with loose sand layer at 4'. 5'		
	5	☒	ML-SM	9-8-5-4		FILL: Greenish gray to yellowish orange sandy SILT to silty SAND with trace of gravel.		
		☒	SM	2-2-2-6				
	10	☒	SM	3-1-2-1		Marsh Deposit		
		☒	SM	1-2-2-3		- loose, with occasional roots at 13'. 15		
7.0	15	☒	SM-SW	4-2-7-7		Olive gray silty SAND with trace to little clay & some gravel. 20'BGS		
	20	☒	SM	16-16-9-10		- yellowish orange to light brown at 20'.		
	25	☒	SM	5-7-8-11		- with mica & trace to little clay at 25'.		
-7.5	30	☒	SP	17-21-21-18		Light brown gravelly SAND (coarse gravel). 32'		
-11.0	35	☒	SC	13-18-22-35		Red, light gray & yellow clayey SAND. Potomac		
	40	☒	SC	17-9-10-18		43.5		
-21.5	45	☒	SC	9-19-24-21		Multicolor silty SAND with some clay, trace of cementation & fine gravel.		
	50							

AR323594

DUPONT CIVIL ENGINEERING SYSTEMS

BORING NUMBER CG-4 | PLANT Newport, DE
PLANT COORDINATES N 515, E 520 | DATE DRILLED 9-29-94
SURFACE ELEVATION 22.0 Feet MSL | DRILLING COMPANY EDI
PROJECT TITLE Ciba-Geigy Bridge | DRILLING METHOD Mud Rotary
PROJECT NO. 3222-01-011180 | INSPECTOR V. H. Ferrero

ELEV (feet)	DEPTH (feet)	SAMPLE	SOIL CLASSIF.	BLOWS/6 in.	GRAPHIC LOG	SOIL DESCRIPTION AND REMARKS	WATER CONTENT, % (PLASTIC LIMIT ○ / NATURAL ● / LIQUID LIMIT ○; 10 20 30 40)	OTHER TESTS
-31.5		X	SM-SP	8-17-18-17		53.5'		
-36.5	55	X	CL	21-38-45-41		Red & tan silty CLAY with little fine sand. 53.5		
	60	X	SC	11-13-18-23		Yellowish orange clayey SAND to sandy CLAY with trace of coarse sand & some silt.		
	65	X	SC	10-19-28-40				
-61.5	70	X	SM	10-15-23-23		- with some coarse layers of gravelly sand at 70'.		
-66.5	75	X	SM	28-37-34-33		Yellowish orange silty fine to medium SAND.		
-71.5	80	X	SC	12-20-33-42		Multicolor clayey fine to medium SAND. - becoming gravelly sand with some clay at 81.5'.		
-70.0	85	X	CL	4-25-25-45		Light gray silty CLAY to dark gray organic clayey SILT with wood pieces. Saprolite		
	90	X	CL	27-42-40-55		- light gray clayey silt at 90'.		
	95					END OF BORING AT 92'.		
	100							

AR323595

LOG of BORING No. MW-17A/17B North side of River

DATE 9/12-15/88 SURFACE ELEVATION 18.62' LOCATION FIGURE 1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0		8	Moist silty fine sand with a 1-inch seam of orange-brown medium to fine sand, trace gravel	15.12				
5		2	Moist to wet dark brown coarse to fine sand with black coal-like gravel throughout with white clay-like material					
10		5	-becomes dark brown to black and silty -with white clay-like material (FILL)	8.62				
			Moist yellow-brown medium to fine sand and silt	5.12				
15		38 17A	Moist to wet dark-brown to dark gray coarse to fine sand and well rounded gravel	3.62				
20		24	Moist to wet brown silty coarse to fine sand and well rounded gravel trace silt					
25		10	Moist dark gray to black micaceous fine sand, silt content increases with depth becoming a soft to firm dark gray micaceous silty clay	23'-4.38 6.5' Marsh Deposit				
30		14	Dark gray clayey gravelly coarse to fine sand (COLUMBIA FORMATION)	29.5' -10.88 -11.38				
35		25	Red-brown, yellow-brown, light gray mottled fine sandy silty clay becomes stiff	-19.88				
40		17	Light gray silty clayey fine sand with a 7-inch lense of red-grown and light gray					
			Yellow-brown clayey coarse to fine sand	-24.38 -24.88				
45		12	Stiff yellow-brown, light gray, red mottled silty clay	-26.38				

Continued on next page

Completion Depth 70.5 Feet Water Depth 15 Feet Date 9/12/88

Project Name DuPont Newport, Phase II RI Project Number 88C2076-4C

Woodward-Clyde Consultants

LOG of BORING No. MW-17A/17B

DATE 9/12-15/88 SURFACE ELEVATION 18.62' LOCATION FIGURE 1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45			(See previous page for soil description)	-29.88				
50	11	17B	Moist to wet yellow-brown, light gray mottled silty coarse to fine sand; the sand is a weathered quartz -becomes tan in color and loose, trace silt	-35.38				
55			Light gray and tan mottled silty medium to fine sand	-39.88				
60	23		Red-brown highly plastic silty clay, trace fine sand	-44.88				
65	29		Yellow-brown and red-brown mottled silty clay and fine sand	-49.88				
70	18		Yellow-brown and red-brown mottled clayey medium to fine sand	-51.38				
			Yellow-brown gravelly medium to fine sand (POTOMAC FORMATION)	-51.88				
75								

Completion Depth 70.5 Feet Water Depth 15 Feet Date 9/12/88

Project Name DuPont Newport; Phase II RI Project Number 88C2076-4C

Woodward-Clyde Consultants

AR323597

LOG of BORING No. MW-38F

DATE 10/9/90 SURFACE ELEVATION 20.8 LOCATION See Figure #2

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0				Concrete Pad	20.2
				Light brown, MEDIUM TO FINE SAND	19.7
		5	SS	Black, SILTY COARSE TO FINE SAND AND GRAVEL, oil sheen and odor	
		6	SS	Olive-gray with slight orange mottling, SILTY CLAY, some fine sandy seams, little mica, trace organics and coarse sand, oil odor 3.0	17.6
5		11	SS	Orange, CLAYEY SAND 2½' thick	15.7
				Olive-gray, micaceous, FINE SANDY SILTY CLAY 7.0	14.3
		41	SS	Brown to orange-brown, SILTY MEDIUM TO FINE SAND	13.6
				SILTY COARSE TO FINE SAND AND GRAVEL, quartzose, oil odor	12.2
10		9	SS		
		5	SS	Soft, orange and dark gray, GRAVELLY COARSE SANDY CLAY, oil odor (FILL)	8.2
15		8	SS	Gray to orange-brown, well-sorted, MEDIUM TO FINE SAND, little silt	6.2
		10	SS	- Becoming moderately-sorted, GRAVELLY COARSE TO FINE SAND, trace silt and clay, micaceous and quartzose, sub-round to round	
20		8	SS		
		5	SS		
	38F	6	SS	(COLUMBIA)	-3.7
25				Red, FINE SANDY CLAY (POTOMAC)	-4.2

Note:
1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.
2) Boring logged from hollow-stem auger cuttings below 24.3 feet.

30

35

40

Completion Depth: 25.0 ft. Water Depth: 14.4 ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 6.25" I.D. H.S.A.

Woodward-Clyde Consultants

AR323598

LOG of BORING No. MW-39F

DATE 10/5/90 SURFACE ELEVATION 16.2 LOCATION See Figure #2

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0				Asphalt Pavement	15.8
				Portland Cement Concrete	15.1
		2	SS	Orange-brown, SILTY MEDIUM TO FINE SAND	
		11	SS	Gray-brown, FINE SANDY SILTY CLAY, trace coarse to medium sand and fine gravel, unidentified organic-chemical odor (3.5')	12.6
5		13	SS	Firm becoming soft, brown, MEDIUM TO FINE SANDY CLAY	9.7
		9	SS	-Grading to CLAYEY MEDIUM TO FINE SAND (~8.5' thick)	
10		6	SS		
		9	SS	Brown and dark gray, moderately-sorted, CLAYEY COARSE TO FINE SAND AND FINE GRAVEL, very micaceous, trace silt (12.0')	3.7
15		9	SS	-With little clay stringers	
		10	SS	-With seams of medium to fine sandy clay (FILL)	-2.5
		10	SS	Dark brown, ORGANIC CLAYEY MEDIUM TO FINE SAND (OTHER QUATERNARY)	-3.9
20				Stiff, orange, red, MEDIUM TO FINE SANDY CLAY (POTOMAC)	
25					
30					
35					
40					

Note: 1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.

Completion Depth: 20.5 ft.

Water Depth: 10.4 ft.

Project No.: 88C2076-4S

Project Name: Du Pont Newport Site

Drilling Method: 6.25" I.D. H.S.A.

Woodward-Clyde Consultants

AR323599

LOG of BORING No. TB-35

DATE 7/4/90 SURFACE ELEVATION 9.0 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0		13	SS	Brown to orange-brown, SILTY SANDY GRAVEL, trace debris and mica	
				Orange, CLAYEY SILTY FINE SAND	8.0
		13*	SS		
				Dark brown, SILTY MEDIUM TO FINE SAND with decomposed organics	5.5
5		3	SS	Blue-black product-stained, SILTY FINE SAND TO FINE SANDY SILT, little to trace clay, micaceous	5.0
		7	SS	6.5	
				Brown, organic CLAYEY FINE SANDY SILT	2.5
				Firm to soft, gray, FINE SANDY SILTY CLAY, micaceous — 3.5' thick	1.8
				10.0 (OTHER QUATERNARY)	
10		20*	SS	Orange becoming brown, SILTY COARSE TO MEDIUM SAND, trace fine sand and fine quartz gravel, gravel content increasing with depth, micaceous	-1.0
15	3SA				
				18'	-9.0
20		25*	SS	Orange, COARSE QUARTZ SAND AND FINE GRAVEL, little to trace clay, medium sand, and coarse gravel, sub-angular to round	
25		10*	SS	- becoming clayey coarse quartz sand and fine gravel	
				26' (COLUMBIA)	-17.0
		18	SS	White becoming orange, CLAYEY MEDIUM TO FINE QUARTZ SAND, little mica, trace red and white clay seams	
30		15	SS	Red, orange, and light olive-brown, thinly interbedded MEDIUM TO FINE SANDY CLAY AND CLAYEY MEDIUM TO FINE SAND	-21.0
35		20	SS	Orange to red, well-sorted, MEDIUM TO FINE SAND, little to trace clay and mica	-26.0
	3SB				
40		22	SS		-31.8
				Orange to gray, CLAYEY MEDIUM TO FINE SAND with red clay stringers	-34.0
				Continued on Page 2 of 2	

Completion Depth: 75.0 ft. Water Depth: ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 5.25" Mud Rotary

Woodward-Clyde Consultants

AR323600

LOG of BORING No. TB-35

DATE 7/4/90 SURFACE ELEVATION 9.0 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
45		38	SS	Red, orange, and gray mottled, CLAY, trace fine sand	
				Orange and brown, well-sorted, CLAYEY FINE SAND	-37.0
50		30	SS	Yellow-brown to orange, MEDIUM TO FINE SAND, little to trace clay, trace coarse sand and fine gravel, occassional red and white fine sandy clay seam	-41.0
55		35	SS	Gray, CLAYEY MEDIUM TO FINE SAND, trace coarse sand and fine gravel, mica	-46.0
60		42	SS	Brown with dark gray to purple streaks, CLAYEY MEDIUM TO FINE SAND	-51.0
				Orange-brown with white mottling, CLAYEY COARSE TO FINE SAND AND FINE GRAVEL, quartz and schist fragments	-51.6
				(POTOMAC)	-56.0
65		25	SS	Stiff, red, green, and white mottled, SILTY CLAY TO CLAYEY SILT, little mica, schistose foliations, saprolite	
70		27	SS		
				(WEATHERED BEDROCK)	-66.0
75					
80					
85					

35c

Note:
1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.

Completion Depth: 75.0 ft. Water Depth: ft.

Project No.: 88C2076-4S —ft.

Project Name: Du Pont Newport Site

Drilling Method: 5.25" Mud Rotary

Woodward-Clyde Consultants

AR323601

LOG of BORING No. TB-20

DATE 6/28/90 SURFACE ELEVATION 7.3 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0		11	SS	Dark brown topsoil with organics and asphalt pavement fragments	6.6
		16	SS	Brown, SILTY FINE SAND AND CLAY with little brick, asphalt pavement, and gravel fragments	
5		12	SS	Light gray-brown to brown with little orange staining, SILTY CLAYEY FINE SAND grading to FINE SANDY SILTY CLAY, micaceous, trace coarse to medium sand, brick fragments, and organics -Poorly sorted gravel 6.0' (FILL)	3.4 -2.7
10		3	SS	Gray with orange mottles, FINE SANDY SILTY CLAY, trace medium to coarse sand becoming MEDIUM TO FINE SANDY CLAY, micaceous, trace coarse sand, silt and organics Marsh Deposit 2 8' thick 18.0 (OTHER QUATERNARY)	
15		2	SS		-10.7
	MW20A			Red-brown, well-sorted, CLAYEY MEDIUM TO FINE SAND, trace coarse sand	
20		19	SS	25' BGS (COLUMBIA)	-17.7
25		6	SS	Stiff to firm, light gray and red with slight orange mottling, FINE SANDY CLAY	-22.7
30		15	SS	Orange-brown with yellow and red streaks, MEDIUM TO FINE SANDY CLAY grading to CLAYEY COARSE TO FINE SAND, trace fine gravel, angular to sub-angular	-27.7
35		27	SS	Soft, orange, MEDIUM TO FINE SANDY CLAY	~~28.2~~
	MW20B			White, well-sorted, COARSE TO MEDIUM QUARTZ SAND, little clay, angular to sub-angular	-32.7
40		72	SS	Orange and white, CLAYEY COARSE TO FINE SAND, trace fine gravel, and lens of red, fine silty clay	-35.7
				Continued on Next Page 2 of 2	

Completion Depth: 64.0 ft. Water Depth: ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 3.5" Mud Rotary

Woodward-Clyde Consultants

LOG of BORING No. TB-20

DATE 6/28/90 SURFACE ELEVATION 7.3 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
45		27	SS	Dark gray, purple, orange, and white CLAYEY MEDIUM TO FINE SAND, little fine gravel, with clay stringers	
50		26	SS	Predominantly white, well-sorted, COARSE TO FINE GRAVEL	-42.7
				53'BGS (POTOMAC)	-45.7
				Green, gray, CLAYEY FINE SAND, schistose foliations, quartzose, micaceous	
55		30	SS		
60					
				(WEATHERED BEDROCK)	-56.7
65					
70					
75				Note: 1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.	
80					
85					

Completion Depth: 64.0 ft. Water Depth: ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 3.5" Mud Rotary

Woodward-Clyde Consultants

AR323603

LOGS FOR B'-B'

LOG of BORING No. TB-26

DATE 7/10/90 SURFACE ELEVATION 12.3 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0		28	SS	Brown becoming light pink-brown, GRAVELLY COARSE TO FINE SANDY SILT, some gravel-size consolidated coarse to fine sand	
		26	SS	Brown to orange brown with orange mottles, FINE SANDY CLAYEY SILT	10.3
		100/2"	SS	Dark brown with slight orange mottles, ORGANIC FINE SANDY SILT, some roots and vegetative matter	9.3
5		7	SS		
		36	SS	Light gray with orange mottles, CLAYEY FINE GRAVEL AND COARSE TO MEDIUM SAND, with gray, becoming finer with depth, increasing wood content	5.3
10		32	SS	Brown-gray to brown with orange mottles, COARSE TO FINE SANDY CLAYEY SILT, with gray, gravel-size, fiberous fragment	2.3
		102/6"	SS	Brown, COARSE SAND AND FINE GRAVEL, some inorganic debris, little medium to fine sand and clay (FILL)	0.3
15		2	SS	Soft, gray, ORGANIC MICACEOUS SILTY CLAY	-1.7
20		2	SS	(OTHER QUATERNARY)	
25		10	SS	Gray and orange, well-sorted, MEDIUM TO FINE SAND with little silt, quartzose and micaceous	-12.7
30		16 26A	SS	-Becoming olive-gray with black opaque mineral grains	
35		22	SS	Yellow-brown to light gray, COARSE TO FINE SAND AND FINE GRAVEL, dark gray clay lens, little silt, trace coarse gravel (COLUMBIA)	-22.7
40		17	SS	Red to orange-brown with little white mottles, CLAYEY MEDIUM TO FINE SAND	-27.7
				Stiff, red, gray, and yellow-brown, FINE SANDY CLAY, trace medium sand	-28.7
					-30.7

Continued on Page 2 of 3

Completion Depth: 104.0 ft. Water Depth: ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 3.5" Mud Rotary

Woodward-Clyde Consultants

LOG of BORING No. TB-26

DATE 7/10/90 SURFACE ELEVATION 12.3 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
45		18	SS	Becoming purple to dark red with gray and slight orange mottling	
50		18	SS		-38.7
				Light gray to white, MEDIUM SAND with little clay Yellow-brown and gray with trace red mottles, CLAYEY MEDIUM TO FINE SAND, occassional clay lenses.	
55		16	SS	-Becoming very stiff to hard, dark red with gray mottles	
60		24	SS	Light orange-brown with light gray mottles, MEDIUM TO FINE SAND TO CLAYEY MEDIUM TO FINE SAND	-47.7 -48.7
				Stiff, gray and olive-brown, FINE SANDY CLAY	
65		25	SS	Very stiff, dark red with gray mottles, CLAY, trace fine sand, slightly micaceous	
				Red, MEDIUM TO FINE SAND, little clay	
70		22	SS	-Becoming red and gray	-58.7
				Red, CLAYEY FINE SAND with clay stringers	
75		19	SS	Very stiff, olive-brown, yellow, and red with purple angular inclusions, SILTY CLAY, trace coarse to fine quarts sand	-62.7
80		33	SS	Olive-gray and red, CLAYEY FINE SAND, little silt, slightly micaceous	-67.7
85		23	SS	Very stiff, purple, violet, and light gray, CLAY TO SILTY CLAY, little to trace fine sand, slightly micaceous	-72.7
					-75.7
				Continued on Page 3 of 3	

Completion Depth: 104.0 ft. Water Depth: ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 3.5" Mud Rotary

Woodward-Clyde Consultants

LOG of BORING No. TB-26

DATE 7/10/90 SURFACE ELEVATION 12.3 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
90		23	SS	Interbedded, gray, red, and white mottled, FINE SANDY CLAY, CLAYEY FINE SAND, and CLAYEY MEDIUM TO FINE SAND	
		26BP			
95		40	SS	Light brown, tan, and white with trace red streaks, SILTY MEDIUM TO FINE SAND, trace coarse sand, micaceous	-82.7
100		32	SS	Stiff to very stiff, light olive-brown, red and purple mottled, SILTY CLAY TO CLAY, trace fine sand, little mica, highly plastic	-87.7
				(POTOMAC)	-91.7
105					
110					
115					
120					
125					
130					

Note:
1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.

Completion Depth: 104.0 ft.

Water Depth: — ft.

Project No.: 88C2076-4S

ft.

Project Name: Du Pont Newport Site

Drilling Method: 3.5" Mud Rotary

Woodward-Clyde Consultants

AR323607

LOG of BORING No. MW-19A/19B

DATE 9/27-28/88 SURFACE ELEVATION 9.96 LOCATION FIGURE 1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0		25	Brown fine sand and silt, trace angular gravel, with 6 inches of asphalt at a depth of 10 inches	6.46				
5			Black to brown medium to fine sand, trace coarse sand, gravel, silt, and organics, with brick and concrete fragments, and rubber; drilling soft from 5.5 to 8.5 feet	1.46				
10		7	Saturated wood with plastic sheeting, trace sand and gravel (FILL)	-3.54				
15		2	Soft dark brown organic silty clay, trace fine sand	-8.54				
20		2	Soft dark gray silty clay, trace fine sand, mica, and organics (MARSH DEPOSITS)	-13.54				
25		5	Dark gray silty micaceous medium to fine sand becomes coarse to fine quartz sand					
30		10	becomes dark gray silty medium to fine sand					
35		16	becomes brown micaceous coarse to fine quartz sand	-28.54				
40		27	Brown coarse to fine sand and well rounded gravel, trace silt (COLUMBIA FORMATION)	-33.54				
45		16	Light gray medium to fine sand, trace silt; becomes clayey with depth	-35.54				

19A

Continued on next page

Completion Depth 100.5 Feet Water Depth ~ 8 Feet Date 9/27/88

Project Name DuPont, Newport; Phase II RI Project Number 88C2076-4C

Woodward-Clyde Consultants

LOG of BORING No. MW-19B

DATE 9/27-28/88 SURFACE ELEVATION 9.96' LOCATION FIGURE 1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45			(See previous page for soil description)					
50		51	becomes orange-brown, yellow-brown, and light gray banded, trace silt and clay	-43.54				
55		29	Red-brown and light gray clayey fine sand becomes red-brown					
60		24	becomes light gray clayey medium to fine sand with thin seams of medium to fine sand					
65		58	becomes light gray, yellow-brown, and red-brown banded clayey fine sand					
70		26	with 1 inch of highly plastic red clay with 2 inches of orange medium to fine sand, trace clay	-63.54				
75		24	Stiff red-brown fine sandy clay, trace light gray	-65.54				
			Light gray clayey fine sand	-68.54				
80		23	Red-brown and light gray mottled silty clay, trace fine sand; interbedded with two 3-inch layers of orange medium to fine sand, trace clay	-70.54				
			Light gray and yellow-brown clayey fine sand	-73.54				
85		45	Very stiff highly plastic olive-brown, light gray, and red banded silty clay	-75.54				
90		57 19B	Light gray and olive-brown clayey medium to fine sand	-79.04				
			Description on next page					

Completion Depth 100.5 Feet Water Depth ~ 8 Feet Date 9/27/88

Project Name DuPont Newport; Phase II RI Project Number 88C2076-4C

Woodward-Clyde Consultants

AR323609

LOG of BORING No. MW-19B

DATE 9/27-28/88 SURFACE ELEVATION 9.96 LOCATION FIGURE 1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
90			Light gray medium to fine quartz sand, trace coarse sand, silt, and mica with 2-inch (2) seams of olive brown coarse to fine sand					
		136	becomes olive-brown and pale red/gray					
95		19B						
			Yellow-brown and red-brown clay interbedded with clayey fine sand	-88.54				
				-89.04				
100		22	Firm to stiff highly plastic violet to pink micaceous silty clay (POTOMAC FORMATION)	-90.54				
105								

Completion Depth 100.5 Feet Water Depth ~ 8 Feet Date 9/27/88

Project Name DuPont Newport; Phase II RI Project Number 88C2076-4C

Woodward-Clyde Consultants

AR323610

No Waste

WALTON CORPORATION

Drilling Contractor

P. O. BOX 1097, NEWARK, DELAWARE 19711

BORING LOG

NAME: DuPont Company
Newport Plant

PROJECT NO.

SUPERVISOR

BORING NO. TB#9 (D-9) | DRILLER G. Truver | DATE 4-10-80

WEATHER Fair | SURFACE ELEVATION | DATUM

Sample No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials	*Blows A		
			0		Brn. Silt w/Some Veg. Tr. Mica			
1	1.0	2.5	Berm	3.5	Same	1	1	2
2	4.0	5.5	3.5	5.0	Gray Silty F Sand Tr. Mica	WH	1	1
			5.0	7.0	Gray Silt w/Some Clay & Veg.			
3	9.0	10.5	7.0	13.0	Gray Sandy Clay w/Tr. Veg. &	WH	1	1
					Mica & Silt			
4	14.0	15.5	13.0	10'	Gray Silt w/Tr. Mica & Veg. &	WH	WH	WH
					F Sand			
	19.0	20.5		20.0	Same	WH	WH	1
			20.0	22.0	Gray Silty F Sand w/Tr. Veg.			
6	24.0	25.5	22.0	28.5	Bl. Gray & Brn. Micaceous Silt	3	5	6
7	29.0	30.5	28.5	33.0	Br. M/C Sand & Gray. Tr. Silt	3	4	6
8	34.0	35.5	33.0		Brn. M/F Micaceous Sand w/Tr.	12	14	22
					Sand			
9	39.0	40.5		39.3	Same	11	22	33
			39.3		White, Pink & Gray Variegated			
					Clay w/Weathered Rock Potomac Fm			
10	44.0	45.5		42.0	Can't Recover Sample Heave 1.0			
11	49.2	50.5	42.0		Brn. F Sand w/Red Clay Layers	34	44	
12	54.5	55.0		57.0	Same	15	20	34
13	59.0	60.5	57.0	60.5	Brn. Silty F Sand w/Pieces Rock	9	8	12

BLOWS ON CASING B
0- 1
1- 2
2- 3
3- 4
4- 5
5- 6
6- 7
7- 8
8- 9
9-10
10-11
11-12
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56-57
57-58
58-59
59-60
60-61

*A Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

* B Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in. casing 12 inches.

REMARKS: Wet on Spoon 3.0
Water Level in Augers 2.0

GROUND WATER

DNE 10000

AR323611

DuPont Environmental Remediation Services
300 Bellevue Parkway, Suite 390
Wilmington, DE 19809-3722

FINAL LOG

LOG OF BORING NO. WB-5

COORDINATES
N 22,895 E 17,897
SURFACE EL: 11.4

ELEV. (FEET M.S.L.)	DEPTH (FEET)	PROFILE	DESCRIPTION	USCS SYMBOL	REMARKS
5.4	5		Loose, Brown, Silt, moist to dry [Distinctive dark brown mottles, in "fern" pattern, seen] 6.0	MH 3' 5'	OVA and H_2/O_2 readings are zero. Shelby Tube "SBT-4"
1.4	10		Very Loose, Black to gray laminated Waste Material, wet. [Brown Silt with root matter from 7.5'-8.0'] 10.0	↑ 4' ↓	
-1.6			Very loose, Green-gray, silts and course to fine, sand, wet 13.0'	SP/MH	Waste ends 10.0' Water taped in augers at 11.0'
-2.6			Very loose, Greenish-white, course, sand, wet 14.0'	SP	
-3.6	15		Very loose, Olive green, Clayey Silt, moist	MH	
			Bottom of Boring 15.0'		Boring grouted thru augers at completion

PROJECT NO.: Newport - South Landfill
DATE BEGAN: 12-29-94
DATE COMPLETED: 12-29-94
FIELD GEOLOGIST: M. Brill
CHECKED BY: J. Guglielmetti

GWL: DEPTH 11' BGS DATE/TIME 12-29/11:00
GWL: DEPTH _____ DATE/TIME _____
DRILLING METHOD: HSA, 3¼" I.D.

NOTES:
Driller: Walton Corp.
Rig: ATV
5' hole for perk test made 5' offset

BORING NO. WB-5
SHEET 1 OF 1

AR323612

LOG of BORING No. TB-4

(MW-4C installed in this boring)

DATE 6/30-7/7/87 SURFACE ELEVATION 12.36 LOCATION

DEPTH, ft.	SAMPLES	DESCRIPTION	ELEVATION
0	MW-4A	Light brown silty SAND with concrete and asphalt fragments at surface	
5		-becomes black silty soupy material [Waste Material]	
10	SCREEN		1.9
		Green silty CLAY	0.9
		Dark gray medium to fine SAND	
15			-2.6
		Dark gray slightly micaceous silty CLAY	
20		MARSH DEPOSIT 11.0'	
25			-13.7
		Dark gray slightly micaceous clayey medium to fine quartz SAND with clay lenses	
30		- becomes dark gray - becomes green-tan stiff sandy clay - becomes light tan slightly micaceous clayey sand	
35			-22.6
		Light orange stained brown micaceous coarse to fine quartz SAND and GRAVEL Basal Columbia	
40		-becomes dark brown to black and less micaceous - becomes yellow-orange and clayey	
45		-becomes red-brown to yellow medium to coarse quartz sand	

Completion Depth 132.0 Feet Water Depth - Feet Date 8/12/87

Project Name Du Pont Newport Project Number 87C2665-1A

Woodward-Clyde Consultants

AR323613

LOG of BORING No. TB-4

DATE 6/30-7/7/87 SURFACE ELEVATION 12.36 LOCATION

DEPTH, ft.	SAMPLES	DESCRIPTION	ELEVATION
45			
50			-37.6
		Red-orange and yellow-orange and light gray mottled sandy CLAY with clay lenses	
		Potomac Fm 55'	-42.6
55		Yellow-orange and red-orange mottled clayey coarse to fine quartz SAND and GRAVEL with clay lenses	
60		- becomes light yellow clay interbedded with quartz sand and gravel, with a red-brown clay lense	
	4B	- becomes red-orange clayey coarse to fine sand and gravel	
		- becomes light yellow and less clayey, no gravel	
65		- becomes red-brown to yellow-brown and clayey	
			-57.6
70		0.2 ft. of black soft silty CLAY underlain by 0.5 ft. of red-brown medium to fine clayey quartz SAND	
		- becomes sandy clay	
		- becomes yellow-brown and light gray clayey sand	-62.6
75		Yellow-brown medium to fine SAND with yellow and red vugs of clay	
80		- becomes yellow-brown, no clay	-68.2
		Yellow to red stained coarse to fine quartz SAND and GRAVEL interbedded with red-white vugs of clay	
		- becomes red-orange	
85		- becomes white to yellow-orange and clayey	-73.6
		Orange to red-orange silty CLAY	
90		- becomes red-white and white mottled and stiff with orange fractures	

Completion Depth 132.0 Feet Water Depth - Feet Date 8/12/87

Project Name Du Pont Newport Project Number 87C2665-1A

Woodward-Clyde Consultants

AR323614

LOG of BORING No. TB-4

DATE 6/30-7/7/87 SURFACE ELEVATION 12.36 LOCATION

DEPTH, ft.	SAMPLES	DESCRIPTION	ELEVATION
90			
95		-becomes light gray and sandy -becomes pink clay with white clay	
100		-becomes gray and stiff	
			-92.6
105		Gray clayey medium to fine quartz SAND interbedded with peat	-93.8
		Gray stiff CLAY	
110		-becomes dark gray and organic - becomes light gray and sandy	
			-102.6
115	4C	Light green-white medium to fine quartz SAND with a few clay lenses	
			-107.6
120		Gray to light green to yellow-brown stiff CLAY -becomes yellow-orange medium to fine sand underlain by a sandy clay	
			-112.6
125		DECOMPOSED METAMORPHIC BEDROCK Yellow-brown, foliated, weathered schist with mica, quartz, and clay minerals present	
130			
			-119.6
		BoB = 132'	
135			

Completion Depth 132.0 Feet Water Depth - Feet Date 8/12/87

Project Name Du Pont Newport Project Number 87C2665-1A

Woodward-Clyde Consultants

AR323615

DuPont Environmental Remediation Services
300 Bellevue Parkway, Suite 390
Wilmington, DE 19809-3722

FINAL LOG

LOG OF BORING NO. WB-6

COORDINATES
N 23,171 E 18,192
SURFACE EL: 14.1

ELEV. (FEET M.S.L.)	DEPTH (FEET)	PROFILE	DESCRIPTION	USCS SYMBOL	REMARKS
			0-2" Orange-brown, sand with root material	ML	OVA and O_2/S_2 readings are zero.
9.6			Loose, Brown, Silt, some gravel, dry to moist 4.5'	GM	
	5		Loose, Black Waste Material, dry to wet	↑ 9' ↓	
			[Brown silt and sand layer 6.0'-6.5']		
	10				▽ Water taped in augers at 11.0'
0.6			13.5'		Waste ends 13.5'
0.1			Loose, Black stained, quartz course, sand, wet 14.0'	SP	
	15		Very Loose, Olive-green, Clayey Silt, trace sand, moist.	MH	
1					
			Bottom of Boring = 18.0'		Boring grouted thru augers at completion

PROJECT NO.: Newport - South Landfill
DATE BEGAN: 12-29-94
DATE COMPLETED: 12-29-94
FIELD GEOLOGIST: M. Brill
CHECKED BY: J. Guglielmetti

GWL: DEPTH 11.0' BGS DATE/TIME 12-29 / 14:30
GWL: DEPTH _____ DATE/TIME _____
DRILLING METHOD: HSA, 3¼" I.D.

NOTES:
Driller: Walton Corp.
Rig: ATV
5' hole for perk test made.
5' offset

BORING NO. WB-6
SHEET 1 OF 1

AR323616

Waste ends 13' BGS

DUPONT CIVIL ENGINEERING SYSTEMS

BORING NUMBER CG-3 | PLANT Newport, DE
PLANT COORDINATES S 814, W 311 | DATE DRILLED 9-28-94
SURFACE ELEVATION 12.6 Feet MSL | DRILLING COMPANY EDI
PROJECT TITLE Ciba-Geigy Bridge | DRILLING METHOD Mud Rotary
PROJECT NO. 3222-01-011180 | INSPECTOR V. H. Ferrero

ELEV (feet)	DEPTH (feet)	SAMPLE	SOIL CLASSIF.	BLOWS/6 in.	SOIL DESCRIPTION AND REMARKS	OTHER TESTS
11.1		X	SM	3-7-7-10	CAP: Light brown sandy SILT to silty SAND with layers of white pigments & roots.	
					LANDFILL MATERIAL: Dark gray sandy SILT to silty SAND.	
	5	X	SM	7-7-3-5	[Waste Material]	
		X	ML	1-1-2-3	- with some coarse sand at 8'.	
	10	X	ML	3-3-2-3	- dark gray clayey silt layer at 10'.	
-.4		X	CL	3-1-2-2	Soft, gray clayey SILT with fine sand to clayey SAND.	
	15	X	ML	1-1-1-1		
					13.2'	
	20	X	ML	1-1-2-2		
		■	ML			PP=0.5 tsf
	25	X	SM	9-9-10-10	- becoming more sandy at 25'.	
-13.9					Gray fine to medium SAND with some silt.	
	30	X	SM	4-12-12-8	- gray silty fine to coarse sand with little fine gravel at 30'.	
-20.9					Tan gravelly medium to coarse SAND with some silt to tan sandy coarse GRAVEL.	
	35	X	SP	15-34-29-37	Basal Columbia Fm	
	40	X	SP	28-30-40-34		
-31.4					44'	
	45	X	SC	10-15-13-17	Red, yellow & gray clayey SAND.	
					Potomac Fm	
	50					

WATER CONTENT, %: PLASTIC LIMIT ○ | NATURAL ● | LIQUID LIMIT ○ (10, 20, 30, 40)

AR323617

DUPONT CIVIL ENGINEERING SYSTEMS

BORING NUMBER CG-3 PLANT Newport, DE
PLANT COORDINATES N 814, E 311 DATE DRILLED 9-28-94
SURFACE ELEVATION 12.6 Feet MSL DRILLING COMPANY EDI
PROJECT TITLE Ciba-Geigy Bridge DRILLING METHOD Mud Rotary
PROJECT NO. 3222-01-011180 INSPECTOR V. H. Ferrero

ELEV (feet)	DEPTH (feet)	SAMPLE	SOIL CLASSIF.	BLOWS/6 in.	GRAPHIC LOG	SOIL DESCRIPTION AND REMARKS	WATER CONTENT, % (PLASTIC LIMIT ○ NATURAL ● LIQUID LIMIT ○; 10 20 30 40)	OTHER TESTS
		X	SC	14-8-13-20		- sandy silty clay to clayey silty sand at 50'.		
	55	X	SC	54-58-62/1"		- with layers of gravel at 55'.		
-45.9						Yellow medium to coarse SAND with little clay & gravel.		
	60	X	SM	28-25-20-28				
	65	X	SM	20-43-40-29				
	70	X	SM	18-25-43-47				
-60.9						Yellow to red clayey SAND with trace of gravel.		
	75	X	SC	24-50/.5"				
-68.9	80	X	SC	12-12-16-28				
						Red clayey SILT, laminated, slickensided.		
-73.4	85	X	CL	22-34-41-50				
-75.9						Yellow, light gray & tan sandy CLAY to clayey SAND.		
	90	X	CL	39-48-50/.5"		Pink to light gray clayey SILT to silty CLAY.		
-79.4						END OF BORING AT 92'.		
	95							
	100							

AR323618

DuPont Environmental Remediation Services
300 Bellevue Parkway, Suite 390
Wilmington, DE 19809-3722

FINAL LOG

LOG OF BORING NO. WB-2

COORDINATES
N 23,366 E 18,612
SURFACE EL: 17.6

ELEV. (FEET M.S.L.)	DEPTH (FEET)	PROFILE	DESCRIPTION	USCS SYMBOL	REMARKS
15.8		S/S	0-2" Brown soil with root material Loose, Brown-gray variegated silt, some clay, moist. 1.8'	ML	OVA and S_2/O_2 readings are zero.
	5	++	Loose, Black Waste Material, moist to wet	3' 5'	Shelby Tube "SBT-1"
	10	++		18.3'	Material in spoons wet below 12.0'.
	15	++			▽ Water taped in augers at 17.0' BGS.
-3.5	20	++	21.1'		Waste ends 21.1'
-4.4		SS	Loose, Black to green-gray, Clayey Silt, moist	MH	
			Bottom of Boring = 22.0'		Boring grouted thru augers at completion

PROJECT NO.: Newport-South Landfill
DATE BEGAN: 12-28-94
DATE COMPLETED: 12-28-94
FIELD GEOLOGIST: M. Brill
CHECKED BY: J. Guglielmetti

GWL: DEPTH 17' BGS DATE/TIME 12-28/12:30
GWL: DEPTH _____ DATE/TIME _____
DRILLING METHOD: HSA, 3¼ I.D.

NOTES:
Driller: Walton Corp.
Rig: ATV
5' hole for perk test made. 15' offset

BORING NO. WB-2
SHEET 1 OF 1

AR323619

LOG of BORING No. MW-16A

DATE 9/23/88 SURFACE ELEVATION 13.45' LOCATION FIGURE 1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION (MW-16A)	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0		32	Brown firm to stiff silty clay, trace fine sand; with 2 inches of black asphalt at 1.5 ft.					
		3		8.95				
5			Soft orange-brown silty clay and fine sand, trace coarse sand and light gray mottling	5.95				
		WOH	Saturated very soft black clay Chemical fill (FILL)	2.95				
10			Soft gray silty clay, trace organics					
15		3 SCREEN						
		WOH						
20								
25		WOH	(MARSH DEPOSITS)	-13.05				
			Loose gray medium to fine quartz sand, trace mica					
30		3						
			-with a trace of gravel (COLUMBIA FORMATION)	-22.05				
35								
40								

Completion Depth 35.5 Feet Water Depth 4 Feet Date 9/23/88

Project Name DuPont, Newport; Phase II RI Project Number 88C2076-4C

Woodward-Clyde Consultants

AR323620

LOG of BORING No. TB-21

DATE 6/26/90 SURFACE ELEVATION 4.8 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0		4	SS	Firm, dark brown with orange mottles, ORGANIC CLAYEY SILT becoming ORGANIC SILTY CLAY, little fine sand, trace medium sand, micaceous	
5		18	SS		
10		2	SS	-Becoming, very soft to soft, olive-gray to gray	
		2	SS		
15				Marsh Deposit	
		2	SS		
20					
		3	SS		-19.2
25				Olive-brown to dark brown with orange mottles, SILTY CLAYEY FINE SAND, micaceous, trace fine quartz gravel to medium sand (OTHER QUATERNARY)	-23.2
		47	SS	SAND AND GRAVEL	
30		45	SS	(COLUMBIA)	-28.2
		22	SS	White and red, COARSE QUARTZ GRAVEL TO COARSE SAND with occassional white clayey fine quartz sand seam/lens	
35		50	SS	White with orange staining, CLAYEY COARSE TO FINE QUARTZ SAND, trace opaque minerals	-33.2
40		34	SS	Interbedded, light orange-yellow and white, CLAYEY FINE SAND AND FINE SANDY CLAY, trace coarse to medium quartz sand, opaque minerals, and mica	-35.2
					-38.2

Continued on Page 2 of 2

Completion Depth: 57.0 ft. Water Depth: ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 3.5" Mud Rotary

Woodward-Clyde Consultants

AR323621

LOG of BORING No. TB-21

DATE 6/26/90 SURFACE ELEVATION 4.8 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
45		100/2"	SS	Orange, MEDIUM TO FINE SAND TO GRAVELLY MEDIUM TO FINE SAND, trace clay, with red and gray clay lenses/stringers	
				(POTOMAC)	-45.2
50		27	SS	White and orange CLAY with biotite becoming brown, orange, red, and green, FINE SANDY CLAY, schistose foliations, biotite	
55		110	SS	-with angular coarse quartz gravel	
				(WEATHERED BEDROCK)	-52.2
60					
65					
70					
75				Note: 1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.	
80					
85					

Completion Depth: 57.0 ft. Water Depth: ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 3.5" Mud Rotary

Woodward-Clyde Consultants

AR323622

LOGS FOR C-C'

LOG of BORING No. TB-6

DATE 6/26-30/87 SURFACE ELEVATION 4.70 LOCATION

D. ft.	SAMPLES	DESCRIPTION	ELEVATION
0		Brown micaceous fine SAND and SILT, with a trace of organics	
5		- very micaceous	
10	26A 5-24'	Mesh P.	- 5.7
		Brown to dark brown coarse to fine SAND and GRAVEL, with a trace of cobbles and silt	-10.3
15		Brown silty fine SAND	-11.3
		Brown coarse to fine SAND and GRAVEL	
20	6A(A) 15'-25'		
25			-20.9
		Yellow-brown and light gray micaceous silty medium to fine SAND	
30		Columbia	-25.7
		Red firm silty CLAY	
35		- becomes red-brown and stiff	
		- becomes light gray and yellow-brown mottled fine sandy clay	
40		- becomes red-brown and light gray soft silty clay	-36.3
		Light gray and brown fine SAND and silty CLAY	-40.3
45		Brown micaceous medium to fine SAND	

Completion Depth 151.8 Feet Water Depth ~6 Feet Date 8/11/87

Project Name DuPont Newport Project Number 87C2665-1A

Woodward-Clyde Consultants

AR323624

LOG of BORING No. TB-6

DATE 6/26-30/87 SURFACE ELEVATION 4.70 LOCATION

DEPTH, ft.	SAMPLES	DESCRIPTION	ELEVATION
45		Brown micaceous medium to fine SAND	-41.8
		Red-brown silty CLAY and fine SAND	
50		becomes clayey fine sand with yellow-brown and light gray banding	
55		becomes red-brown becomes yellow-brown clayey medium to fine sand with layers of light gray clay and coarse to fine sand	
60		becomes light gray clayey fine sand with yellow-brown and red-brown lineations becomes red-brown and yellow-brown mottled silty clay becomes silty clay and fine sand mottled with light gray	
65	6B	becomes light gray and brown mottled	-61.6
		Light gray medium to fine SAND to silty fine sand	
70		becomes light gray, violet/pink, and yellow-brown bands of micaceous gravelly coarse to fine sand	
75		becomes light gray coarse to fine sand and clay interbedded with silty fine sand	
			-75.3
80		Red-brown soft micaceous silty CLAY becomes light gray and yellow-brown varved fine sandy clay	-76.1
		Light gray, red-brown and yellow-brown layers of silty medium to fine SAND	-80.3
85		0.3 ft. of red-brown, yellow-brown, and light gray soft silty CLAY underlain by a micaceous clayey fine SAND	
90		becomes silty clay and fine sand	-86.2

Completion Depth 151.8 Feet Water Depth ~ 6 Feet Date 8/11/87

Project Name DuPont Newport Project Number 87C2665-1A

Woodward-Clyde Consultants

AR323625

LOG of BORING No. TB-6

DATE 6/26-30/87 SURFACE ELEVATION 4.70 LOCATION

DEPTH, ft	SAMPLES	DESCRIPTION	ELEVATION
90			-86.2
		Green-brown coarse to fine SAND with thin layers of light gray fine sand and silty clay and limonite; grades to a medium to fine sand	-90.3
95		Light gray and brown fine sandy silty CLAY 0.4 ft. of yellow-brown and light gray silty fine sand underlain by a fine sand and silty clay	-96.4
100		Yellow-brown medium to fine SAND interbedded with light gray silty fine sand	
105		Becomes brown micaceous coarse to fine sand with a trace of silt and fine gravel becomes yellow-brown and light gray and clayey becomes dark brown to brown, with a trace of silt	-105.3
110		Red-brown and light olive layers of fine SAND and silty clay; becomes a light olive silty CLAY with a fracture having a dip of 30°	-110.3
115		DECOMPOSED METAMORPHIC BEDROCK Olive-green fine sandy silty clay with foliations having a dip of 30°	
120	6C	With coarse quartz sand	
125		Becomes blue-gray and olive-green in color	
130			
135			

Completion Depth 151.8 Feet Water Depth ~ 6 Feet Date 8/11/87

Project Name DuPont Newport Project Number 87C2665-1A

Woodward-Clyde Consultants

AR323626

LOG of BORING No. TB-6

DATE 6/26-30/87 SURFACE ELEVATION 4.70 LOCATION

DEPTH, ft.	SAMPLES	DESCRIPTION	ELEVATION
135			
140		with fracture having a dip of 50°	
145	6c		
150			-147.1

Completion Depth 151.8 Feet Water Depth ~ 6 Feet Date 8/11/87

Project Name DuPont - Newport Project Number 87C2665-1A

Woodward-Clyde Consultants

AR323627

LOG of BORING No. TB-5

DATE 7/7-11/87 SURFACE ELEVATION 2.38 LOCATION

DEPTH, ft.	SAMPLES	DESCRIPTION	ELEVATION
0		Dark brown-gray medium to fine SAND with a trace of organics	
	2.7		
5		becomes brown and slightly micaceous Marsh Deposit	
	5A		
10			-7.6
		Brown micaceous coarse to fine SAND	
	12.7		
15		with coarse to fine gravel	
20		becomes gray-brown with black minerals, no gravel	
25		with fine gravel and vugs of clay	
		Columbia ⇑	-27.6
30		Red-brown and yellow-brown mottled stiff CLAY Potomac ⇓	
35		becomes red-brown clay mottled with light gray fine sandy clay	
40		and light yellow	
			-42.6
45			

Completion Depth 161.8 Feet Water Depth ~6 Feet Date 8/12/87

Project Name Du Pont Newport Project Number 87C2665-1A

Woodward-Clyde Consultants

AR323628

LOG of BORING No. TB-5

DATE 7/7-11/87 SURFACE ELEVATION 2.38 LOCATION

DEPTH, ft.	SAMPLES	DESCRIPTION	ELEVATION
45		Red-brown mottled with light gray clayey SAND with vugs of clay	
50		mottled with yellow-brown	
55		becomes red, brown, and yellow-brown mottled, and red-brown and purple mottled followed by light gray	
60		becomes red-purple to light gray	
65		becomes yellow-brown then changes to red-white and light gray sandy clay	
70		becomes purple and light gray mottled clayey sand to light yellow-brown clay, grading to a red-brown fine sandy clay	
75		becomes purple clayey sand and red-brown coarse sand underlain by light gray and red clayey fine sand	
			-77.6
80	SB	Red-brown coarse to medium SAND with a fine gravel seam becomes red, light gray, and yellow-brown mottled clayey fine sand	
85		becomes gray and light gray layered silty medium sand becomes yellow-brown becomes gray with black minerals	
90		becomes gray and light olive-gray coarse to medium sand underlain by light gray silty fine sand	

Completion Depth 161.8 Feet Water Depth ~6 Feet Date 8/12/87

Project Name Du Pont Newport Project Number 87C2665-1A

Woodward-Clyde Consultants

AR323629

LOG of BORING No. TB-5

DATE 7/7-11/87 SURFACE ELEVATION 2.38 LOCATION

DEPTH, ft.	SAMPLES	DESCRIPTION	ELEVATION
90		Grades to yellow-brown to olive-brown	-89.3
		Red-brown and yellow-brown mottled silty CLAY	
95			
100		-becomes light gray to white with red and olive sand inclusions	
		-becomes red and olive-brown	
105		-becomes light gray silty clay with purple sand inclusions	
110			-107.6
		Light gray to gray clayey SAND	
115			-113.8
	SC	Light gray silty medium to fine SAND	
120		-becomes coarse to fine sand	
			-122.6
125		Purple CLAY becomes black lignite with pyrite nodules	-123.7
130		Light gray to white silty micaceous medium to fine SAND with fine gravel and silica flour	
135		-becomes white and olive silty fine sand and silica flour	

Completion Depth 161.8 Feet Water Depth ~6 Feet Date 8/12/87

Project Name Du Pont Newport Project Number 87C2665-1A

Woodward-Clyde Consultants

AR323630

LOG of BORING No. TB-5

DATE 7/17-11/87 SURFACE ELEVATION 2.38 LOCATION

DEPTH, ft.	SAMPLES	DESCRIPTION	ELEVATION
135			-137.6
140		DECOMPOSED METAMORPHIC BEDROCK Yellow-green foliated schist with mica and quartz	
145			
150		- becomes olive and light gray	
155		-becomes light olive to light gray	
160		-becomes gray	-159.4
165			

Completion Depth 161.8 Feet Water Depth ∿6 Feet Date 8/12/8

Project Name Du Pont Newport Project Number 87C2665-1A

Woodward-Clyde Consultants

AR323631

WALTON CORPORATION

Drilling Contractor

P. O. BOX 1097, NEWARK, DELAWARE 19711

BORING LOG

NAME DuPont Company PROJECT NO.

Newport, Delaware SUPERVISOR

BORING NO.	DRILLER	DATE
TB#7 (D-7)	W. Patterson	4-21-80
WEATHER	**SURFACE ELEVATION**	**DATUM**
Sunny & Cool		

Sample No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials	*Blows A		
			0		Brn. & Gray Silt & Veg. Tr. Sand			
1	1.0	2.5			Same	2	2	3
2	4.0	5.5			Same	2	7	2
3	9.0	10.5		10'	Same	wh	wh	wh
4	14.0	15.5		18.0	Same [Shelby Tube 11.6'-11.8']	wh	1	2
5	19.0	20.5	18.5	23.5	Gray Silt w/Sand Lenses &Tr.Mica	wh	1	2
6	24.0	25.5	23.5	14'	Gray F/C Sand w/Tr. Silt	1	2	2
* 7	29.0	30.5		30.0	Same	2	2	3
			30.0		Gray Silty Clay & F Sand			
* 8	34.0	35.5		39.0	No Recovery because of 1.2 of heave			
					after 3 attempts			
* 9	39.0	40.5	39.0		Variegated Silty M/C Sand w/Tr.	7	9	20
					Clay			
* 10	44.0	45.5			No Rec. 0.9 heave in auger			
* 11	49.0	50.5			No Rec. 1.0 heave in auger			
* 12	54.0	55.5			No Rec. 2.2 heave in auger			
* 13	59.0	60.5			No Rec. 3.2 heave in auger			
* 14	64.0	65.5			No Rec. 11.5 heave in auger			
* 15	69.0	70.5		69.0	No Recovery			

BLOWS ON CASING B
0- 1
1- 2
2- 3
3- 4
4- 5
5- 6
6- 7
7- 8
8- 9
9-10
10-11
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59-60
60-61

*A Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

* B Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in. casing 12 inches.

REMARKS: ... et on Sample 6 Up rods 14.5

Washed Out

Water Lever after 24 hrs. 12.5 4/22

GROUND WATER

DNE 1000087 AR323632

No Waste

WALTON CORPORATION

Drilling Contractor

P. O. BOX 1097, NEWARK, DELAWARE 19711

BORING LOG

NAME DuPont Company PROJECT NO.

Newport, Delaware SUPERVISOR

BORING NO. TB#8 (D-8) DRILLER G. Truver DATE 4-11-80

WEATHER Sunny & Warm SURFACE ELEVATION DATUM

Sample No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials	*Blows A		
			0		Brn. & Gray Micaceous Silt			
					w/Tr. F Sand & Veg.			
1	1.0	2.5		3.5	Same	2	3	2
2	4.0	5.5	3.5	6.0	Brn. & Gray Silt w/Tr Clay, Veg	1	1	1
					Mica & F Sand			
3	9.0	10.5	6.0	8.0	Gray Micaeous Silt w/Veg. & Tr.	WH	1	1
					F Sand			
			8.0	13.0	Gray Micaceous Silt w/Veg. & Sand			
					Lenses [Shelby Tube 11.4'-11.6']			
4	14.0	15.5	13.0	20'	Gray Micaceous Silt w/Tr. Veg.	1	1	2
					& F Sand			
5	19.0	20.5		20.0	Same	1	1	1
			20.0	22.5	Gray Micaceous Silt w/Sand			
					Lenses [Shelby Tube 21.8'-22.0']			
6	24.0	25.5	22.5	28.0	Gray F Sand w/Some Mica Tr Silt	WH	1	1
					& Pieces of Wood			
7	29.0	30.5	28.0	32.5	Gray Micaceous Silty F Sand	1	3	6
* 8	34.0	35.5	32.5		Gray F/C Sand w/Gray. Tr.Silt	20	28	32
9	39.0	40.5		41.0	Same	6	9	8
* 10	44.0	45.5	41.0	47.0	Gray Brn. Silty F Sand w/Tr.Clay	5	6	7
11	49.0	50.5	47.0	53.0	Var. Weathered Rock(Silt,Sand	6	12	22
					Clay)			

*A Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

* B Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in. casing 12 inches.

REMARKS: Wet on Spoon 23.5

*Wash Out

W/L 7:30 a.m. 4/12/80-7.5

GROUND WATER

DNE 1000088

AR323633

BLOWS ON CASING B

0- 1
1- 2
2- 3
3- 4
4- 5
5- 6
6- 7
7- 8
8- 9
9-10
10-11
11-12
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60-61

WALTON CORPORATION

Drilling Contractor

P. O. BOX 1097, NEWARK, DELAWARE 19711

BORING LOG

NAME DuPont Company PROJECT NO.

Newport, Delaware SUPERVISOR

BORING NO.	DRILLER	DATE
TB#8 Continued	G. Truver	4-11-80
WEATHER	**SURFACE ELEVATION**	**DATUM**
Sunny & Warm		

Sample No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials	*Blows A		
12	54.0	55.0	53.0		Var. Silty F/M Sand	6	10	18
13	59.0	60.5		60.5	Same	24	60/.4	

BLOWS ON CASING B
0- 1
1- 2
2- 3
3- 4
4- 5
5- 6
6- 7
7- 8
8- 9
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58-59
59-60

*A Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

*B Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in. casing 12 inches.

REMARKS: .....

GROUND WATER

No Waste

WALTON CORPORATION

Drilling Contractor

P. O. BOX 1097, NEWARK, DELAWARE 19711

BORING LOG

NAME DuPont Company
Newport Plant

PROJECT NO.

SUPERVISOR

BORING NO. TB#9 (D-9) | DRILLER G. Truver | DATE 4-10-80

WEATHER Fair | SURFACE ELEVATION | DATUM

Sample No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials	*Blows A		
			0		Brn. Silt w/Some Veg. Tr. Mica			
1	1.0	2.5	Berm	3.5	Same	1	1	2
2	4.0	5.5	3.5	5.0	Gray Silty F Sand Tr. Mica	WH	1	1
			5.0	7.0	Gray Silt w/Some Clay & Veg.			
3	9.0	10.5	7.0	13.0	Gray Sandy Clay w/Tr. Veg. &	WH	1	1
					Mica & Silt			
4	14.0	15.5	13.0	10'	Gray Silt w/Tr. Mica & Veg. &	WH	WH	WH
					F Sand			
5	19.0	20.5		20.0	Same	WH	WH	1
			20.0	22.0	Gray Silty F Sand w/Tr. Veg.			
6	24.0	25.5	22.0	28.5	Bl. Gray & Brn. Micaceous Silt	3	5	6
7	29.0	30.5	28.5	33.0	Br. M/C Sand & Grav. Tr. Silt	3	4	6
8	34.0	35.5	33.0		Brn. M/F Micaceous Sand w/Tr.	12	14	22
					Sand			
9	39.0	40.5		39.3	Same	11	22	33
			39.3		White, Pink & Gray Variegated			
					Clay w/Weathered Rock Potomac Fm			
10	44.0	45.5		42.0	Can't Recover Sample Heave 1.0			
11	49.2	50.5	42.0		Brn. F Sand w/Red Clay Layers	34	44	
12	54.5	55.0		57.0	Same	15	20	34
13	59.0	60.5	57.0	60.5	Brn. Silty F Sand w/Pieces Rock	9	8	12

BLOWS ON CASING B
0- 1
1- 2
2- 3
3- 4
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5- 6
6- 7
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58-59
59-60
60-61

*A Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

* B Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in. casing 12 inches.

REMARKS: Wet on Spoon 3.0
Water Level in Augers 2.0

GROUND WATER

AR323635 DNE 1000090

DuPont

DuPont Environmental Remediation Services

Final Log

LOG OF BORING NO. NYERB-4

ELEV. (FEET M.S.L.)	DEPTH (FEET) River Bottom	SAMPLE NO. AND TYPE	BLOWS PER 6-INCH INCREMENTS N/A	SAMPLE RECOVERY (IN.)	PROFILE	DESCRIPTION (COORDINATES: N 62,1815 E 60,0873; SURFACE EL: @ -5 below River Surface)	USCS SYMBOL	REMARKS
						Brown to gray brown, med. to fine, sand, wet 1.3'	SP	Core opened on 11-22-95.
	5'	Jar				Green-gray, Clayey Silt, moist	MH	
		Tube				[at 3.0' organic matter, root like]	OH	K = 4.80 x 10^-7 cm/sec
		Jar					ML	
	10'					Bottom of Core = 8.8'		Marsh Deposit 7.5 ft. thick

PROJECT NO.: 2124 Newport
DATE BEGAN: 11-20-95
DATE COMPLETED: 11-20-95
FIELD GEOLOGIST: MPB
CHECKED BY:

GWL:DEPTH N/A DATE/TIME
GWL:DEPTH N/A DATE/TIME
DRILLING METHOD: Vibra-Core using 2 7/8" I.D. Aluminum Core Barrel

NOTES:
CONTRACTOR: OSI
DRILLER: Bob Wallace
HELPER: Mike
RIG: OSI Skiff

AR323636

BORING NO. NYERB-4
SHEET 1 OF 1

DuPont

DuPont Environmental Remediation Services

Final Log

LOG OF BORING NO. NVERB-5

COORDINATES: N 62,1843 E 60,0807

SURFACE EL: @ -5 below River Surface

ELEV. (FEET M.S.L.)	DEPTH (FEET) (River Bottom)	SAMPLE NO. AND TYPE	BLOWS PER 6-INCH INCREMENTS	SAMPLE RECOVERY (IN.)	PROFILE	DESCRIPTION	USCS SYMBOL	REMARKS
			N/A			0-5" Grey-brown med. to fine sand, wet		Core opened 11-22-95
						Green-gray Clayey Silt, TR organic stalks		
	4'							
	5'	Jar				[4' to 5' silt becomes very peaty]	Pt	
	6'							
		Tube					ML	K = 20.1 x 10^{-7} cm/sec
	8'							
	8.5'					8.5'		
	10'	Jar				Orange brown laminated silt, TR fine sand, wet.	SM	Columbia Formation
						Bottom of Core = 11.1'		Marsh Deposit 8.0 ft thick.

PROJECT NO.: 2124 Newport

DATE BEGAN: 11-20-95

DATE COMPLETED: 11-20-95

FIELD GEOLOGIST: MPB

CHECKED BY:

GWL:DEPTH N/A DATE/TIME

GWL:DEPTH N/A DATE/TIME

DRILLING METHOD: Vibra-Core using 2 7/8" I.D. Aluminum Core Barrel

NOTES:

CONTRACTOR: OSI

DRILLER: Bob Wallace

HELPER: Mike

RIG: OSI Skiff

AR323637

BORING NO. NVERB-1

SHEET 1 OF 1

DuPont Environmental Remediation Services

Final Log

LOG OF BORING NO. NVERB-6

COORDINATES: N 62,1886 E 60,0724

SURFACE EL: @ -5 below River Surface

ELEV. (FEET M.S.L.)	DEPTH (FEET) River Bottom	SAMPLE NO. AND TYPE	BLOWS PER 6-INCH INCREMENTS N/A	SAMPLE RECOVERY (IN.)	PROFILE	DESCRIPTION	USCS SYMBOL	REMARKS
						0-9" Gray-brown, med. sand, wet		Core open 11-22-95.
	3'	Jar				Green-gray clayey silt, moist	MH	
	5'	Tube					OH	K=1.35x10^-7
	10'	Jar				[Grading to fine sand and silt below 10.0']	SM	
						Bottom of Core =12.0'		Marsh Deposit 11.0ft thick

PROJECT NO.: 2124 Newport
DATE BEGAN: 11-20-95
DATE COMPLETED: 11-20-95
FIELD GEOLOGIST: MPB
CHECKED BY:

GWL:DEPTH N/A DATE/TIME
GWL:DEPTH N/A DATE/TIME
DRILLING METHOD: Vibra-Core using 2 7/8" I.D. Aluminum Core barrel.

NOTES:
CONTRACTOR: OSI
DRILLER: Bob Wallace
HELPER: Mike
RIG: OSI Stiff

AR323638

BORING NO. NVERB-6
SHEET 1 OF 1

DuPont Environmental Remediation Services
300 Bellevue Parkway, Suite 390
Wilmington, DE 19809-3722

Final Log

LOG OF BORING NO. NVE-1

COORDINATES
N _____ E _____
SURFACE EL: 25 MSL (from Topo)

ELEV. (FEET M.S.L.)	DEPTH (FEET)	PROFILE	DESCRIPTION	USCS SYMBOL	REMARKS
			0-14" Brown organic soil, dry.	–	Radiation Counter registers no Thorium signature on surface or at any point in borehole.
			Mixture of Black to gray Ash and Slag material with layers of Cream yellow slag like material (possible Corian) and red granular Slag like material, dry to moist.	–	
	5			–	
				–	OVA readings zero throughout hole.
	10			–	
			[lens of crushed red brick 2.1' to 2.2']	–	
			[lens of lithopone from 14.1' to 14.2']	–	
	15			SM	
				–	
	20			–	
			22.4'	–	▽ Water taped in augers at 21.0'
			Green-gray to olive-green, clayey Silt, moist to wet.	ml	
	25			ml	
				SM	
	30			ml	
				ml	31' } Shelby Tube "ST-3"
				ml	33' } $K = 4.29 \times 10^{-7}$ cm/sec
	35		34.9'	ml	

PROJECT NO.: 2124
DATE BEGAN: 7-7-95
DATE COMPLETED: 7-10-95
FIELD GEOLOGIST: MPB
CHECKED BY: _____

GWL: DEPTH 21' DATE/TIME 7-10-95
GWL: DEPTH _____ DATE/TIME _____
DRILLING METHOD: HSA 4¼ inch I.D. 2 inch Split-spoon sampler.

NOTES:
Driller: Walton Corp.
Rig: CME-55
Location taped off of Well SM-3.

BORING NO. NVE-1
SHEET 1 OF 3

AR323639

DuPont Environmental Remediation Services
300 Bellevue Parkway, Suite 390
Wilmington, DE 19809-3722

Final Log

LOG OF BORING NO. NVE-1

COORDINATES
N _____ E _____
SURFACE EL: 25 MSL

ELEV. (FEET M.S.L.)	DEPTH (FEET)	PROFILE	DESCRIPTION	USCS SYMBOL	REMARKS
	35		Brown to Oranage to Gray, Course to fine sand, trace gravel, mixed with layers of silty sand, wet.	gm/gw	
	40				
	45			sm	At 47' drill feed pressure increases.
	50				
	55		[lens of red-gray mottled clay - 55.2' to 56.5']	oh	
				oh/sm	
	60				
			64.0		
	65		Brown to white, medium quartz sand, wet.	sp	Heaving sands in augers
	70				

PROJECT NO.: (See page 1)
DATE BEGAN: "
DATE COMPLETED: "
FIELD GEOLOGIST: "
CHECKED BY:

GWL: DEPTH _____ DATE/TIME _____
GWL: DEPTH _____ DATE/TIME _____
DRILLING METHOD: (See page 1)

NOTES: (See Page 1)

BORING NO. NVE-1
SHEET 2 OF 3

AR323640

DuPont Environmental Remediation Services
300 Bellevue Parkway, Suite 390
Wilmington, DE 19809-3722

Final Log

LOG OF BORING NO. NVE-1

COORDINATES
N _____ E _____
SURFACE EL: 25 MSL

ELEV. (FEET M.S.L.)	DEPTH (FEET)	PROFILE	DESCRIPTION	USCS SYMBOL	REMARKS
	70		(Same as above) 71.0'	SP	Red Sandy Clay seen on last 10 feet of auger, upon withdrawal from boring.
	75		Red-gray, stiff mottled clay, grading to red-brown mottled clay, some fine sand, moist. [Clayey sand seen on head of tube at 78']	oh	76' Shelby Tube "ST-4"
				sm/oh	78' K = 9.32 × 10^-5 cm/sec
	80		80.0'		
			Bottom of Boring at 80.0'		Boring grouted thru augers from bottom up.

PROJECT NO.: (See page 1)
DATE BEGAN: _____
DATE COMPLETED: _____
FIELD GEOLOGIST: _____
CHECKED BY: _____

GWL: DEPTH _____ DATE/TIME _____
GWL: DEPTH _____ DATE/TIME _____
DRILLING METHOD: (See page 1)

NOTES:
(See Page 1)

BORING NO. NVE-1
SHEET 3 OF 3

AR323641

LOG of BORING No. B-111

DATE 2/22/85 SURFACE ELEVATION 25.0 (from Topo) LOCATION See Plate 2

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0		9	Topsoil (6")					
		9	Medium dense brown medium to fine sandy silt, trace gravel (Fill)					
5		7						
		9						
		4						
10		8						
		5	Very loose to medium dense miscellaneous fill containing flyash, bottom ash, brick fragments, wood, silt, sand, gravel and other materials					
15		6						
		8	Landfill Material					
		4						
20		2						
		14						
25		4	25.0'					
			Soft to firm greenish gray silty clay Marsh Deposit	~7' thick				
30		7						
		6	Peat 32.0'					
35		10	Interbedded gray loose silty coarse to fine sand and gravel, and firm gray fine sandy silty clay and clayey silt					
40		33						
45		18	Medium dense to dense brown and multi-colored coarse to fine sand, becoming silty and clayey medium to fine sand with depth					
			Continued on Sheet 2					

Completion Depth 100.5 Feet Water Depth See Note Feet Date

Project Name DuPont-Newport, Delaware Project Number 85C2374

Woodward-Clyde Consultants

AR323642

LOG of BORING No. B-111

DATE 2/22/85 SURFACE ELEVATION _____ LOCATION See Plate 2

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45								
50		12						
55		22	Same as above					
60		12	62'					
			Potomac					
65		16	Stiff to very stiff red silty clay, trace fine sand, with thin seams of silty medium to fine sand					
70		20						
			-becoming tan					
75		33						
80		34	Medium dense to dense interbedded tan, light gray and red silty medium to fine sand with thin seams of very stiff silty clay					
85		26						
90		28	-2" seam of gravel		—			
			Continued on Sheet 3					

Completion Depth 100.5 Feet Water Depth See Note Feet Date _____

Project Name DuPont-Newport, Delaware Project Number 85C2374

Woodward-Clyde Consultants

LOG of BORING No. B-111

DATE 2/22/85 SURFACE ELEVATION _____ LOCATION See Plate 2

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
90			Same as above					
			Very stiff red silty clay					
95		22						
			Very stiff brown silty clay becoming clayey silt, trace fine sand					
100		19						
			Groundwater Depth: 18.3 feet encountered 2/22/85 18.0 feet at completion 2/25/85					
105								

Completion Depth 100.5 Feet Water Depth See Note Feet Date _____

Project Name DuPont-Newport, Delaware Project Number 85C2374

Woodward-Clyde Consultants

AR323644

LOG of BORING No. B-112

DATE 2/25/85 SURFACE ELEVATION 23.0 LOCATION See Plate 2

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0		12	Topsoil (8")					
		10						
5		6						
		19						
		6						
10		19	Loose to medium dense miscellaneous fill containing ash, brick fragments, rock fragments, boulders, metal, and clay, silt and sand soil					
		23						
15		20 ✓						
		10 ✓						
		8						
20		8 ✓						
		37 ✓						
			Topsoil		24.0'			
25		4	Peat					
			Marsh Deposit Very stiff black organic silty clay, becoming sandy with depth	8'				
30		20 ✓						
		13 ✓			32.0'			
35			Groundwater Depth: 18.3 feet encountered 2/25/85 24.2 feet at completion 2/25/85					

Completion Depth 32.5 Feet Water Depth See Note Feet Date

Project Name DuPont-Newport, Delaware Project Number 85C2374

Woodward-Clyde Consultants

AR323645

LOG of BORING No. B-113

DATE 2/26/85 SURFACE ELEVATION 13.0 LOCATION See Plate 2

DEPTH, ft. / SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0	5, 11	Medium dense tan medium to fine sand, trace silt, trace gravel (Fill)					
5	42, 11, 6	Black miscellaneous fill containing plastic and wood, with gray silt	10.0'				
10	6, 4, 13, 9, 9	Marsh Deposit Interbedded soft, firm and stiff gray and tan silty clay and clayey silt -Thin seams of gravelly sand	~13' thick 23.0'				
20, 21, 22, 23, 25	7, 6	Firm mottled red and tan silty clay -With seams of silty coarse to fine sand					
30, 35		Groundwater Depth: 8.8 feet encountered 2/26/85					

Completion Depth 30.5 Feet Water Depth See Note Feet Date

Project Name DuPont-Newport, Delaware Project Number 85C2374

Woodward-Clyde Consultants

AR323646

LOG of BORING No. TB-1

DATE 6/18-25/87 SURFACE ELEVATION 20.59 LOCATION

DEPTH, ft.	SAMPLES	DESCRIPTION	ELEVATION
0		Brown organic SILT and fine SAND with a trace of gravel and coarse to medium sand 1.0'	19.8
		Brown fine sandy silty CLAY	
5	MW-1A(F)		15.4
		Gray and brown mottled silty CLAY with a lense of medium to fine sand Marsh Deposit 8.5'	
10		becomes orange and gray mottled with a trace of well rounded gravel 11.5'	9.2
		Gray to orange-brown micaceous coarse to fine SAND	
15			5.6
		Orange and brown mottled CLAY underlain by organic brown-black to gray silty clay 17' BGS	3.6
		Gray coarse to fine SAND with limonite	
20		with well rounded quartz gravel	
25	MW-1A(A)	becomes yellow-brown	
30		and coarse to fine gravel, micaceous	
			-14.4
35		Brown, yellow-brown, red-brown, light brown mottled micaceous medium to fine SAND and SILT	
		with fine quartz and feldspar gravel and thin lenses of red-brown clay	
40		becomes red-brown, and clayey	
		becomes yellow-brown mottled with red clay	
			-24.4
45		Pink, yellow-brown, and light gray mottled fine sandy silty CLAY	

Completion Depth 152 Feet Water Depth ~ 25 Feet Date 7/22/87

Project Name DuPont Newport Project Number 87C2665-1A

Woodward-Clyde Consultants

AR323647

LOG of BORING No. TB-1

DATE 6/18-25/87 SURFACE ELEVATION 20.59 LOCATION

DEPTH, ft.	SAMPLES	DESCRIPTION	ELEVATION
45			-24.4
		Red-brown and yellow-brown medium to fine SAND and silty CLAY	
50		becomes fine sand and clay with light gray	
55	MW-18	becomes light gray	
			-39.4
60		Yellow-brown streaked with light gray medium to fine SAND underlain by a yellow-brown coarse to fine sand	-40.4
		Light gray micaceous fine SAND and silty CLAY	
65		Light gray coarse to fine quartz SAND	-44.9
		becomes fine sand and clay	
		grades to a coarse to fine sand and clay then to a light gray and yellow-brown banded fine sand and clay	
70		returns to a light gray coarse to fine sand	
		becomes yellow-brown medium to fine sand with silty clay	
75		becomes coarse to fine quartz sand with a trace of fine gravel and pockets of light gray clay	-55.2
		becomes red medium to fine sand with thin layers of yellow-brown	
80		Red with very thin layers of light gray micaceous fine SAND and silty CLAY	-60.6
		becomes light gray silty clay and fine sand	
		becomes yellow-brown, red, and light gray interbedded clayey medium to fine sand	
85		Red, yellow-brown, and light gray stiff silty CLAY	-65.1
		Yellow-brown CLAY and fine SAND, changing to a light gray	-69.4
90		Red, purple, and tan mottled hard silty CLAY, becoming more purple with depth	

WW-13 88' BGS

Completion Depth 152 Feet Water Depth ~25 Feet Date 7/22/87

Project Name DuPont Newport Project Number 87C2665-1A

Woodward-Clyde Consultants

AR323648

LOG of BORING No. TB-1

DATE 6/18-25/87 SURFACE ELEVATION 20.59 LOCATION

DEPTH, ft.	SAMPLES	DESCRIPTION	ELEVATION
90		Red, purple, and tan mottled hard silty CLAY, becoming more purple with depth	
		becomes light gray fine sand and clay	-74.4
95		Yellow-brown clayey medium to fine SAND	
		becomes orange-brown	
100		becomes yellow-brown, interbedded with red-brown and light gray mottled fine sandy clay	
			-84.4
105		Light gray and yellow-brown silty CLAY and fine SAND mottled with very stiff purple CLAY	
		becomes red, yellow-brown, and light gray silty clay	-89.6
110		Yellow-brown coarse to fine quartz SAND	-90.7
		becomes red-brown	
		becomes yellow-brown to light gray	
115		Red, yellow-brown, and light gray varved micaceous silty CLAY	
		becomes red and light gray mottled with lenses of yellow-brown medium to fine sand	
120	MW-1C	0.3 feet of light gray silty coarse to fine sand	-100.1
		becomes red, yellow-brown, and light gray fine sand and clay	
125		Red and yellow-brown coarse to fine SAND with small pockets of light gray clay with quartz gravel	
			-109.4
130		Red-brown and purple mottled fine SAND and silty CLAY	
135			-114.4
		DECOMPOSED METAMORPHIC BEDROCK	

MW-1B coar.

99' BGS

Completion Depth 152 Feet Water Depth ~25 Feet Date 7/22/87

Project Name DuPont Newport Project Number 87C2665-1A

Woodward-Clyde Consultants

AR323649

LOG of BORING No. TB-1

DATE 6/18-25/87 SURFACE ELEVATION 20.59 LOCATION

DEPTH, ft. / SAMPLES		DESCRIPTION	ELEVATION	
135		DECOMPOSED METAMORPHIC BEDROCK Brown, green-brown, and light gray CLAY and gravelly coarse to fine quartz SAND with veins of yellow-green quartz and pockets and foliations of light gray clay		
140		becomes foliated blue-gray and green-brown micaceous fine sandy clay		
145				
150		becomes dark gray with a vertical vein of granitic material	-131.4	

Completion Depth 152 Feet Water Depth ~ 25 Feet Date 7/22/87

Project Name Dupont - Newport Project Number 87C2665-1A

Woodward-Clyde Consultants

AR323650

LOGS FOR D-D'

No Waste

WALTON CORPORATION
Drilling Contractor

P. O. BOX 1097, NEWARK, DELAWARE 19711

BORING LOG

E DuPont Company PROJECT NO.

Newport Delaware SUPERVISOR

ING NO.	DRILLER	DATE
TB#5 (D-5)	Wayne Patterson	4-22-80
ATHER	SURFACE ELEVATION	DATUM
Sunny & Warm		

nple No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials	*Blows A		
			0		Brn. & Gray Silt w/Veg. & Sand			
1	1.0	2.5			Same	3	4	3
2	4.0	5.5			Same	1	2	2
3	9.0	10.5		10.0	Same	WH	1	2
4	14.0	15.5			Same	WH	2	2
5	19.0	20.5		23.0	Same	WH	2	2
6	24.0	25.5	23.0		Brn. & Gray M/C Sand, Silt &	14	50/	3
					Gravel & Mica [Shelby Tube 21.8'-21.9']			
7	9.0	30.5		34.0	Same	15	16	20
8	34.0	35.5	34.0	36.5	Gray White F M Silty Sand &Clay	3	4	8
9	39.0	40.5	36.5	43.0	Variegated Silty Clay & Sand	2	7	9
10	44.0	45.5	43.0	48.5	Reddish Brn Clay w/Silt & Sand	3	5	8
11	49.0	50.5	48.5		Var Clayey M/C Sand w/Tr. Silt	11	20	27
12	54.0	55.5		55.0	Same	7	12	24
			55.0		Lt. Brn F/M Sand & Silt			
13	59.0	60.5			No Rec Heave in augers 1.5			
14	64.0	65.5			" " " " " 2.3			
15	69.0	70.5		69.0	" " " " " 5.2			

berm 13'

BLOWS ON CASING B
0- 1
1- 2
2- 3
3- 4
4- 5
5- 6
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59-60
60-61

. Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three in. increments.

B Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in. casing 12 inches.

CM ....Wet on Apron...23.5

.....*Washed Out

Water Level after 24 hrs. 9.0

GROUND WATER

DNE 1000085 AR323652

LOG of BORING No. TB-4

(MW-4C installed in this boring)

DATE 6/30-7/7/87 SURFACE ELEVATION 12.36 LOCATION

DEPTH, ft.	SAMPLES	DESCRIPTION	ELEVATION
0	MW-4A	Light brown silty SAND with concrete and asphalt fragments at surface	
5		becomes black silty soupy material [Waste Material]	
10	SCREEN		1.9
		Green silty CLAY	0.9
		Dark gray medium to fine SAND	-2.6
15		Dark gray slightly micaceous silty CLAY	
20		MARSH DEPOSIT 11.0'	
25			-13.7
		Dark gray slightly micaceous clayey medium to fine quartz SAND with clay lenses	
30		becomes dark gray becomes green-tan stiff sandy clay becomes light tan slightly micaceous clayey sand	
35			-22.6
		Light orange stained brown micaceous coarse to fine quartz SAND and GRAVEL Basal Columbia	
40		becomes dark brown to black and less micaceous becomes yellow-orange and clayey	
45		becomes red-brown to yellow medium to coarse quartz sand	

Completion Depth 132.0 Feet Water Depth - Feet Date 8/12/87

Project Name Du Pont Newport Project Number 87C2665-1A

Woodward-Clyde Consultants

AR323653

LOG of BORING No. TB-4

DATE 6/30-7/7/87 SURFACE ELEVATION 12.36 LOCATION

DEPTH, ft.	SAMPLES	DESCRIPTION	ELEVATION
45			
50		Red-orange and yellow-orange and light gray mottled sandy CLAY with clay lenses	-37.6
		Potomac Fm 55'	
55		Yellow-orange and red-orange mottled clayey coarse to fine quartz SAND and GRAVEL with clay lenses	-42.6
60		becomes light yellow clay interbedded with quartz sand and gravel, with a red-brown clay lense	
	4B	becomes red-orange clayey coarse to fine sand and gravel	
65		becomes light yellow and less clayey, no gravel	
		becomes red-brown to yellow-brown and clayey	
70		0.2 ft. of black soft silty CLAY underlain by 0.5 ft. of red-brown medium to fine clayey quartz SAND	-57.6
		becomes sandy clay	
		becomes yellow-brown and light gray clayey sand	-62.6
75		Yellow-brown medium to fine SAND with yellow and red vugs of clay	
80		becomes yellow-brown, no clay	-68.2
		Yellow to red stained coarse to fine quartz SAND and GRAVEL interbedded with red-white vugs of clay	
		becomes red-orange	
85		becomes white to yellow-orange and clayey	-73.6
		Orange to red-orange silty CLAY	
90		becomes red-white and white mottled and stiff with orange fractures	

Completion Depth 132.0 Feet Water Depth - Feet Date 8/12/87

Project Name Du Pont Newport Project Number 87C2665-1A

Woodward-Clyde Consultants

AR323654

LOG of BORING No. TB-4

DATE 6/30-7/7/87 SURFACE ELEVATION 12.36 LOCATION

DEPTH, ft.	SAMPLES	DESCRIPTION	ELEVATION
90			
95		-becomes light gray and sandy -becomes pink clay with white clay	
100		-becomes gray and stiff	
			-92.6
105		Gray clayey medium to fine quartz SAND interbedded with peat	-93.8
		Gray stiff CLAY	
110		-becomes dark gray and organic -becomes light gray and sandy	
			-102.6
115	UC	Light green-white medium to fine quartz SAND with a few clay lenses	
			-107.6
120		Gray to light green to yellow-brown stiff CLAY -becomes yellow-orange medium to fine sand underlain by a sandy clay	
			-112.6
125		DECOMPOSED METAMORPHIC BEDROCK Yellow-brown, foliated, weathered schist with mica, quartz, and clay minerals present	
130			
			-119.6
135		BoB = 132'	

Completion Depth 132.0 Feet Water Depth - Feet Date 8/12/87

Project Name Du Pont Newport Project Number 87C2665-1A

AR323655

Woodward

DuPont

DuPont Environmental Remediation Services

Final Log

LOG OF BORING NO. NVERB-1

COORDINATES: N 62,2316 E 60,1236

SURFACE EL: @ -6 below River Surface

ELEV. (FEET M.S.L.)	DEPTH (FEET) River Bottom	SAMPLE NO. AND TYPE	BLOWS PER 6-INCH INCREMENTS N/A	SAMPLE RECOVERY (IN.)	PROFILE	DESCRIPTION	USCS SYMBOL	REMARKS
						Gray to brown, medium to fine sand, some to trace mica, wet. 3.0'	SP	Core opened on 11-22-95.
	5'					Green-gray clayey silt, moist		
	6'	Jar					MH	
	8'							
	10'	Tube						Not run.
						11.2' Orange brown medium to fine Sand, TR mica	SM	Columbia Formation
						Bottom of Core = 11.8'		Marsh Deposit 8 ft. thick

PROJECT NO.: 2124 Newport

DATE BEGAN: 11-17-95

DATE COMPLETED: 11-17-95

FIELD GEOLOGIST: MPB

CHECKED BY:

GWL:DEPTH N/A DATE/TIME

GWL:DEPTH N/A DATE/TIME

DRILLING METHOD: Vibra-Core using 2 7/8" I.D. Aluminum Core barrel.

NOTES:

CONTRACTOR: OSI

DRILLER: Bob Wallace

HELPER: Mike

RIG: OSI Skiff

AR323656

BORING NO. NVERB-1

SHEET 1 OF 1

DuPont

DuPont Environmental Remediation Services

Final Log

LOG OF BORING NO. NVERB-2

COORDINATES: N 62,2371 E 60,1202

SURFACE EL: @ -8 below River Surface

ELEV. (FEET M.S.L.)	DEPTH (FEET) (River Bottom)	SAMPLE NO. AND TYPE	BLOWS PER 6-INCH INCREMENTS	SAMPLE RECOVERY (IN.)	PROFILE	DESCRIPTION	USCS SYMBOL	REMARKS
			N/A			Brown to gray, medium to fine sand, trace to some mica, wet 1.5'	SP	Core opened on 11-22-95
						Same as above but gray-green 4.0'	SP	
	5'	Jar				Green-gray, Clayey Silt, moist	MH	
	10'	Tube					MH	K = 1.61 x 10^-7 cm/sec
		Jar				[11.5' some fine sand]	SM	
						Bottom of Core = 12.1'		Marsh Deposit 8ft thick.

PROJECT NO.: 2124 Newport

DATE BEGAN: 11-20-95

DATE COMPLETED: 11-20-95

FIELD GEOLOGIST: MPB

CHECKED BY:

GWL:DEPTH N/A DATE/TIME

GWL:DEPTH N/A DATE/TIME

DRILLING METHOD: Vibra-Core using 2 7/8" I.D. Aluminum Core barrel.

NOTES:

CONTRACTOR: OSI

DRILLER: Bob Wallace

HELPER: Mike

RIG: OSI Skiff

AR323657

DuPont

DuPont Environmental Remediation Services

Final Log

LOG OF BORING NO. NVERB-3

ELEV. (FEET M.S.L.)	DEPTH (FEET) River Bottom	SAMPLE NO. AND TYPE	BLOWS PER 6-INCH INCREMENTS N/A	SAMPLE RECOVERY (IN.)	PROFILE	DESCRIPTION	USCS SYMBOL	REMARKS
						Coarse gravel and rip-rap, wet		Core in Storage.
	5'					Core Refusal at 3.0'		Core barrel could not penetrate rip-rap. Lead edge of core barrel bent after 3 attempts.

COORDINATES: N 62,2465 E 60,1147

SURFACE EL: @ -6 below River Surface

PROJECT NO.: 2124 Newport

DATE BEGAN: 11-20-95

DATE COMPLETED: 11-20-95

FIELD GEOLOGIST: MIB

CHECKED BY:

GWL:DEPTH N/A DATE/TIME

GWL:DEPTH DATE/TIME

DRILLING METHOD: Vibra-Core using 2 7/8" I.D. Aluminum Core Barrel

NOTES:

CONTRACTOR: OSI

DRILLER: Bob Wallace

HELPER: Mike

RIG: OSI Skiff

AR323658

BORING NO. NVERB-3

SHEET 1 OF 1

LOG of BORING No. TB-33

DATE 7/11/90 SURFACE ELEVATION 21.6 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0		20	SS	Light brown, SILTY FINE SAND with roots .5	21.1
		25*	SS	Black, brown, and dark gray, with trace white stipples, SILTY COARSE TO FINE SAND, brick fragments and dense, gray clinker Lithopone	
5		2	SS	Dark orange-brown, CLAYEY FINE SANDY SILT, trace coarse to medium sand and asphalt pavement fragments	17.1
		19	SS	Brown with orange mottling and white streaks, SILTY COARSE TO FINE SAND, brick fragments	15.6
		16*	SS	- with tan mottling at 8.0 feet	
10		14	SS		
		8	SS	- with lenses of tan silty sand at 12.0 feet	
15		26*	SS		
		8	SS	Blue-gray to green-gray with trace white mottling, FINE SANDY SILT 18' 18' (FILL)	5.6
		10	SS	Orange-brown, FINE SANDY CLAYEY SILT, trace root fragments	3.8
20		12*	SS	Blue-black FINE SANDY SILTY CLAY, trace coarse to medium sand and mica ~@8' thick MARSH DEPOSIT (OTHER QUATERNARY)	3.6
sample taken	MW-33A			White, orange, and black, moderately-sorted, COARSE TO MEDIUM SANDY GRAVEL, trace fine sand, coarse gravel and mica, sub-angular to round 25.9'	-1.4
25		114*	SS		
30				(COLUMBIA)	-10.4
		36*	SS	Yellow, orange, and white with orange and red mottling, well-sorted, CLAYEY MEDIUM TO FINE SAND, trace coarse sand and fine sandy clay lenses, quartzose	
35		16	SS		
40	MW-33B(R)	12	SS	- becoming orange clayey fine sand at 39.0 feet	-18.4
				Stiff, red with gray mottling, FINE SANDY CLAY	-21.9
		25	SS	Lithology description on Page 2 of 3	

Completion Depth: 101.0 ft. Water Depth: ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 5.25" Mud Rotary

Woodward-Clyde Consultants

AR323659

LOG of BORING No. TB-33

DATE 7/11/90 SURFACE ELEVATION 21.6 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
45				Light orange to orange-brown, CLAYEY MEDIUM TO FINE SAND with light gray and orange medium sandy clay lenses	
	33B(R)				
50		21	SS		
55		25	SS	Stiff, red with light gray and orange mottling, FINE SANDY CLAY with medium to fine sand lenses	-32.9
				Red and gray MEDIUM TO FINE SANDY CLAY	-33.9
60		35	SS	Gray, FINE SANDY CLAY	-37.9
				Orange-brown to yellow, MEDIUM TO FINE SAND, trace clay, then light gray, CLAYEY FINE SAND with red clay lenses	-38.4
65		22	SS	Orange-brown to yellow, COARSE TO FINE SAND, trace clay,	-42.4
				Red and blue-gray, CLAYEY MEDIUM TO FINE SAND	-43.4
70	MW-33C	25	SS	- becoming orange to yellow with purple-gray mottling, trace coarse sand	
75		46	SS	Orange to yellow-brown, MEDIUM TO FINE SAND with brown and gray, clayey medium to fine sand lenses, trace coarse sand- to fine gravel-size schist or gneiss fragments	-52.4
80		7	SS	Orange-brown to yellow-brown, MEDIUM TO FINE SAND AND CLAY, little coarse sand	-57.4
				- becoming mottled white and black, trace fine quartz gravel at 80.9 feet	-59.3
				Red with white mottling, MEDIUM TO FINE SAND CLAY	
85		13	SS	- becoming firm, yellow-brown, FINE SANDY CLAY	
				(POTOMAC)	-66.9
		89	SS	Lithology description on Page 3 of 3	

Completion Depth: 101.0 ft. Water Depth: — ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 5.25" Mud Rotary

Woodward-Clyde Consultants

AR323660

LOG of BORING No. TB-33

DATE 7/11/90 SURFACE ELEVATION 21.6 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
90				Yellow-brown with red, gray, and dark brown mottling, COARSE TO FINE SANDY CLAY, quartzose, schistose foliation, saprolite	
95					
100				101 (WEATHERED BEDROCK)	-79.4
105					
110					
115					
120				Note: 1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.	
125					
130					

Completion Depth: 101.0 ft. Water Depth: — ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 5.25" Mud Rotary

Woodward-Clyde Consultants

LOG of BORING No. B-12

DATE 7/17/90 SURFACE ELEVATION ~~13.0~~ 17.5 from Topo LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0				Asphalt Pavement	12.8
		22*	SS	Brown to orange-brown with gray and orange mottling, FINE SANDY SILT, little coarse to medium sand and gravel, construction debris and clinker	
		12	SS	Light olive-brown, orange and gray mottled, CLAYEY SILT, little fine sand, micaceous	9.0
5		25	SS	Marsh Deposit ~8' thick	
		14*	SS		
10				12.0 (est.)	1.0
				Orange, SILTY COARSE TO FINE SAND AND COARSE TO FINE GRAVEL, trace clay lenses, quartzose and micaceous	
15		8*	SS		
20		12*	SS		
25		24*	SS	-Becoming coarse to medium sand and gravel	
30				-Becoming brown, medium to fine sand, little silt (COLUMBIA)	
		61*	SS	Red, orange, and gray mottled MEDIUM TO FINE SANDY CLAY	-19.5
				Orange and white, MEDIUM TO FINE SAND	-20.5
35		45	SS		-22.5
				White, MEDIUM TO FINE SANDY CLAY (POTOMAC)	-23.0
40					

Notes:
1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.
2) Surface elevation is estimated from the Newport Landfill topographic map (5/87) supplied by DuPont.

Completion Depth: 36.0 ft. Water Depth: — ft.

Project No.: 88C2076-4S ft

Project Name: Du Pont Newport Site

Drilling Method: 4.25" I.D. H.S.A.

Woodward-Clyde Consultants

LOG of BORING No. TB-32

DATE 7/12/90 SURFACE ELEVATION 17.5 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATI ELEVAT
0		35	SS	Dark brown, SILTY COARSE TO MEDIUM SAND, trace asphalt fragments	16.8
		40*	SS	Orange-brown, SILTY COARSE TO FINE SAND, trace gravel, micaceous and quartzose, sub-angular to round, becoming wet at 2.0 feet	
		22	SS		
5		15	SS		
		31*	SS	- becoming silty medium to fine sand with dark red mottling at 7.0 feet	
10		21	SS	- with olive-brown, clayey silt stringers	
		12	SS	(FILL)	4.5
		20*	SS	Light yellow-brown to tan, well-sorted, MEDIUM TO FINE QUARTZ SAND, micaceous.	3.5
15				Orange-brown, SILTY FINE SAND with dark brown clay stringers, trace rounded fine gravel to coarse sand	
				16.1'?	
				Marsh Deposit ~ 4.5' thick (maxium)	
20		30*	SS	Dark gray, ORGANIC FINE SANDY CLAY, micaceous 20.6' (OTHER QUATERNARY)	
				Stiff, orange, SILTY CLAY	
				Brown, SILTY MEDIUM TO FINE QUARTZ SAND, trace rounded coarse sand and mica	-6.5
25		46*	SS	Medium dense to dense, black, orange, and white, moderately-sorted, GRAVELLY COARSE TO MEDIUM SAND, trace fine sand and silt	
30		75*	SS	- becoming light orange-brown	
				(COLUMBIA)	-17.7
35		35*	SS	Gray and light brown, MEDIUM TO FINE SANDY CLAY to CLAYEY SAND	-19.0
				Red with gray and yellow mottling, MEDIUM TO FINE SANDY CLAY	
40		27	SS	- becoming stiff, fine sandy clay at 40.0 feet	-26.0

MW-32

MW-32A

no samples taken

Continued on Page 2 of 3

Completion Depth: 92.0 ft. Water Depth: — ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 3.5" Mud Rotary

Woodward-Clyde Consultants

AR323663

LOG of BORING No. TB-32

DATE 7/12/90 SURFACE ELEVATION 17.5 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
45		20	SS	Very stiff to stiff, orange-brown with orange mottling becoming red with gray and purple mottling, FINE SANDY CLAY	
50		20	SS	Stiff to firm, gray, MEDIUM TO FINE SANDY CLAY	-32.8
				Gray, well-sorted, MEDIUM SAND	-33.5
	MW-32B			Gray, red, and yellow, FINE SANDY CLAY	-34.0
55		23	SS	Stiff, light orange with red mottling, MEDIUM TO FINE SANDY CLAY grading to CLAYEY MEDIUM TO FINE SAND.	-37.5
				Red and orange FINE SANDY CLAY	-39.1
60		54	SS	Light orange, CLAYEY FINE SAND, trace coarse to medium sand	-42.5
				Red and gray with orange mottling, FINE SANDY CLAY	-43.7
65		35	SS	- Stiff RED CLAY	-47.5
				Orange COARSE TO FINE SAND, trace clay	-48.3
				Stiff, yellow MEDIUM TO FINE SANDY CLAY	-49.2
70		11	SS	Yellow, tan, and white, MEDIUM SANDY CLAY	-52.5
				Hard to very stiff, red, purple, and gray, CLAY, trace silt and quartz coarse sand, little biotite	-53.5
				(POTOMAC)	
75		20	SS	Black and white stippled with dark red and orange-yellow streaks, CLAY TO SILTY CLAY, trace fine sand, gneissic Banding	-57.5
80		26	SS	- becoming predominantly white with black stipples, MEDIUM TO FINE SANDY CLAY, gneissic, saprolite	
85					
					-70.5

Continued on Page 3 of 3

Completion Depth: 92.0 ft. Water Depth: — ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 3.5" Mud Rotary

Woodward-Clyde Consultants

LOG of BORING No. TB-32

DATE 7/12/90 SURFACE ELEVATION 17.5 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
90				Same as above	
				(WEATHERED BEDROCK)	-74.5
95					
100				Note: 1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.	
105					
110					
115					
120					
125					
130					

Completion Depth: 92.0 ft. Water Depth: — ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 3.5" Mud Rotary

Woodward-Clyde Consultants

LOG of BORING No. B-15

DATE 7/23/90 SURFACE ELEVATION 21.5 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0				Brown to tan, SILTY COARSE TO FINE SAND, occassional red clay lens, trace fine gravel, micaceous	
		14*	SS		
		19	SS	- becoming orange with increasing gravel content at 4.0 feet	
5				6.0'	
		15	SS	Orange, gray, olive-gray mottled, SILTY MEDIUM TO FINE SAND, little clay stringers, micaceous	15.5
		25*	SS	- becoming fine sandy silt at 8.0 feet	
				(FILL)	12.0
10		8	SS	Dark gray, CLAYEY FINE SANDY SILT TO SILTY SAND, micaceous	
				Marsh Deposit	
				29'	
				15.0'	
15		24*	SS	Orange-brown to olive-brown, SILTY MEDIUM TO FINE SAND, trace coarse sand, orange silt lens	6.5
20		13*	SS	Dark gray, ORGANIC SILTY CLAY TO FINE SANDY SILTY CLAY, red root traces and fragments, micaceous	1.5
				Also Marsh Deposit	
25		50*	SS	(OTHER QUATERNARY)	-5.5
				Orange-brown, SILTY COARSE TO MEDIUM SAND AND GRAVEL, trace fine sand and clay	
				(COLUMBIA)	-8.5
30				Very stiff to stiff, red with yellow and tan mottling, MEDIUM TO FINE SANDY CLAY, slightly micaceous	
		20*	SS	(POTOMAC)	-12.5
35					
40					

Notes:
1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.
2) Surface elevation is estimated from the Newport Landfill topographic map (5/87) supplied by DuPont.

Completion Depth: 34.0 ft. Water Depth: ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 3.25" I.D. H.S.A.

Woodward-Clyde Consultants

LOGS FOR E-E'

LOG of BORING No. TB-7

DATE 7/6-10/87 SURFACE ELEVATION 4.11 LOCATION

DEPTH, ft.	SAMPLES	DESCRIPTION	ELEVATION
0		Dark brown and brown organic silty CLAY	3.3
		Brown fine sandy SILT, trace medium to coarse sand and gravel	2.5
5	MW-7A	Dark gray soft CLAY Ancient Marsh Deposit	
10			- 6.0
		Brown micaceous medium to fine SAND	- 6.6
		Brown coarse to fine SAND and GRAVEL	
15		with a trace of cobbles Columbia Fm	
20			
			-20.9
25		Orange-brown micaceous medium to fine SAND with coarse sand	
			-25.9
30		Mottled red-brown and light gray fine sandy silty CLAY	
35		with yellow-brown Potomac Fm	
40		no fine sand, red-brown in color with a trace of yellow-brown	
			40.9
45		Mottled yellow-brown and light gray micaceous fine SAND	

Completion Depth 117 Feet Water Depth ~ 6.5 Feet Date 7/23/87

Project Name DuPont Newport Project Number 87C2665-1A

Woodward-Clyde Consultants

AR323668

LOG of BORING No. TB-7

DATE 7/6-10/87 SURFACE ELEVATION 4.11 LOCATION

DEPTH, ft.	SAMPLES	DESCRIPTION	ELEVATION
45		Mottled yellow-brown and light gray micaceous fine SAND	-42.0
50		Mottled yellow-brown, light gray, and red-brown stiff silty CLAY with a trace of fine sand, trace light gray	-50.9
55		Red-brown and yellow-brown fine SAND and silty CLAY with seams of yellow-brown medium to fine sand 0.3 ft of coarse to fine sand	
60		becomes light gray underlain by brown fine sand and silty clay becomes brown silty clay with a trace of fine sand becomes brown, yellow-brown, and light gray layered fine SAND with a trace of silty clay and thin layers of limonite	-60.9
65		Yellow-brown and light gray with a trace of red coarse to fine SAND, grades to a white clayey coarse to fine quartz SAND and GRAVEL	-65.9
70	78	Yellow-brown medium to fine SAND, trace silt and gravel with a 0.3 ft seam of red-brown and light gray mottled fine sand and silty clay becomes light gray and yellow-brown with seams of light gray clay, no gravel	
75		becomes a light gray fine sand	-71.5
80		Light gray and yellow-brown silty coarse to fine SAND brown with a trace of fine gravel	-76.8
85		Light olive and light gray micaceous silty CLAY with a trace of fine sand and gravelly coarse to fine sand becomes light olive silty clay, with a trace of fine sand and red clay becomes light olive and light gray fine sand and silty clay becomes light olive silty clay with a trace of fine sand, changing to a mottled red and light gray and then to a light gray	-85.9
90			

Completion Depth 117 Feet Water Depth ∿ 6.5 Feet Date 7/23/87

Project Name DuPont Newport Project Number 87C2665-1A

Woodward-Clyde Consultants

AR323669

LOG of BORING No. TB-7

DATE 7/6-10/87 SURFACE ELEVATION 4.11 LOCATION

DEPTH, ft.	SAMPLES	DESCRIPTION	ELEVATION
90		Light olive with a trace of red and light gray medium to fine SAND with seams of coarse to fine sand and pockets of clay	- 90.9
95	7C	Brown coarse to fine quartz SAND with a trace of fine gravel and silt, changes to a yellow-brown	- 91.9
		Mottled yellow-brown and light gray fine SAND and silty CLAY	- 95.9
100		Mottled light-olive and light gray silty CLAY with lenses of fine sand and clay	-100.9
105		Olive clayey fine SAND becomes silty micaceous medium to fine sand	
110		With seams of light olive and light gray silty clay	-107.4
		DECOMPOSED METAMORPHIC ROCK coarse to fine sand-sized quartz granules yellow-brown to olive clayey matrix	
115		Light gray and olive colored with angular quartz granules throughout in a light gray clayey matrix, banded with schisty foliations having dips of approximately 45° in opposite directions.	-112.3
120			

Completion Depth 116.4 Feet Water Depth ~ 6.5 Feet Date 7/23/87

Project Name DuPont - Newport Project Number 87C2665-1A

Woodward-Clyde Consultants

AR323670

DuPont Environmental Remediation Services
300 Bellevue Parkway, Suite 390
Wilmington, DE 19809-3722

FINAL LOG

LOG OF BORING NO. WB-4

COORDINATES
N 22,827 E 18,650
SURFACE EL: 14.5

ELEV. (FEET M.S.L.)	DEPTH (FEET)	PROFILE	DESCRIPTION	USCS SYMBOL	REMARKS
7.5	5	0' 0.5	0"-2" Brown organic soil with root material Loose, Brown to orange-brown, course to fine sand, trace to some gravel, dry to moist. 7.0	SW	OVA and S_2/O_2 readings are zero. 3' 5' Shelby Tube "SBT-3"
-4.5	10 15		Very Loose, Black Waste Material, moist to wet 19.0'	↑ 12' ↓	Waste ends 19.0'
-7.5	20		Loose, Dark Olive Green, Clayey Silt, trace of straw like organic matter, moist.	MH	
			Bottom of Boring = 22.0'		Boring grouted thru augers at completion

PROJECT NO.: Newport-South Landfill
DATE BEGAN: 12-29-94
DATE COMPLETED: 12-29-94
FIELD GEOLOGIST: M. Brill
CHECKED BY: J. Guglielmetti

GWL: DEPTH 16' BGS DATE/TIME
GWL: DEPTH DATE/TIME
DRILLING METHOD: HSA, 3 1/4" I.D.

NOTES:
Driller: Walton Corp.
Rig: ATV
5' hole for perk test made 5' offset

BORING NO. WB-4
SHEET 1 OF 1

AR323671

DuPont Environmental Remediation Services
300 Bellevue Parkway, Suite 390
Wilmington, DE 19809-3722

FINAL LOG

LOG OF BORING NO. WB-1

COORDINATES
N 2,3097 E 18,434
SURFACE EL: 15.6

ELEV. (FEET M.S.L.)	DEPTH (FEET)	PROFILE	DESCRIPTION	USCS SYMBOL	REMARKS
11.6			0-2" Brown organic soil with root material Loose, Red, Brown, Gray, variegated silt, sand and Clay, moist to dry 4.0'	SM	OVA and S_2/O_2 readings are zero.
	5, 10, 15, 20		Loose, Black Waste Material, moist to wet 23.2'	19.2'	Material in Spoons wet below 10.0'
-7.6					Waste ends 23.2'
-10.4	25		Loose, Dark Olive-Green, Clayey Silt, trace of straw like organic matter, moist.	MH	Shelby Tube "SBT-6", 24'-26'
			Bottom of Boring = 26.0'		Boring grouted thru augers at completion

PROJECT NO.: Newport Southlandfill
DATE BEGAN: 12-29-94
DATE COMPLETED: 12-30-94
FIELD GEOLOGIST: M. Brill
CHECKED BY: J. Gvildmetti

GWL: DEPTH N/A DATE/TIME
GWL: DEPTH DATE/TIME
DRILLING METHOD: Hollow Stem Auger (HSA), 3 1/4 I.D.

NOTES:
Driller: Walton Corp.
Rig: ATV
5' hole for perch test made 5' offset

BORING NO. WB-1
SHEET 1 OF 1

AR323672

Waste ends 15' BGS

DUPONT CIVIL ENGINEERING SYSTEMS

BORING NUMBER CG-3 | PLANT Newport, DE
PLANT COORDINATES S 814, W 311 | DATE DRILLED 9-28-94
SURFACE ELEVATION 12.6 Feet MSL | DRILLING COMPANY EDI
PROJECT TITLE Ciba-Geigy Bridge | DRILLING METHOD Mud Rotary
PROJECT NO. 3222-01-011180 | INSPECTOR V. H. Ferrero

ELEV (feet)	DEPTH (feet)	SAMPLE	SOIL CLASSIF.	BLOWS/6 in.	GRAPHIC LOG	SOIL DESCRIPTION AND REMARKS	WATER CONTENT, % (PLASTIC LIMIT ○ / NATURAL ● / LIQUID LIMIT ○; 10 20 30 40)	OTHER TESTS
11.1		X	SM	3-7-7-10		CAP: Light brown sandy SILT to silty SAND with layers of white pigments & roots.		
						LANDFILL MATERIAL: Dark gray sandy SILT to silty SAND.		
	5	X	SM	7-7-3-5		[Waste Material]		
		X	ML	1-1-2-3		- with some coarse sand at 8'.		
	10	X	ML	3-3-2-3		- dark gray clayey silt layer at 10'.		
-.4		X	CL	3-1-2-2		Soft, gray clayey SILT with fine sand to clayey SAND.		
	15	X	ML	1-1-1-1				
						13.2'		
	20	X	ML	1-1-2-2				
		■	ML					PP=0.5 tsf
-13.9	25	X	SM	9-9-10-10		- becoming more sandy at 25'.		
						Gray fine to medium SAND with some silt.		
	30	X	SM	4-12-12-8		- gray silty fine to coarse sand with little fine gravel at 30'.		
-20.9						Tan gravelly medium to coarse SAND with some silt to tan sandy coarse GRAVEL.		
	35	X	SP	15-34-29-37		Basal Columbia Fm		
	40	X	SP	26-30-40-34				
-31.4						44'		
	45	X	SC	10-15-13-17		Red, yellow & gray clayey SAND.		
						Potomac Fm		
	50							

AR323673

DUPONT CIVIL ENGINEERING SYSTEMS

BORING NUMBER CG-3 PLANT Newport, DE
PLANT COORDINATES N 814, E 311 DATE DRILLED 9-28-94
SURFACE ELEVATION 12.6 Feet MSL DRILLING COMPANY EDI
PROJECT TITLE Ciba-Geigy Bridge DRILLING METHOD Mud Rotary
PROJECT NO. 3222-01-011180 INSPECTOR V. H. Ferrero

ELEV (feet)	DEPTH (feet)	SAMPLE	SOIL CLASSIF.	BLOWS/6 in.	GRAPHIC LOG	SOIL DESCRIPTION AND REMARKS	WATER CONTENT, % (PLASTIC LIMIT ○ NATURAL ● LIQUID LIMIT ○; 10 20 30 40)	OTHER TESTS
		X	SC	14-8-13-20		- sandy silty clay to clayey silty sand at 50'.		
	55	X	SC	54-58-82/1"		- with layers of gravel at 55'.		
-45.9						Yellow medium to coarse SAND with little clay & gravel.		
	60	X	SM	28-25-20-28				
	65	X	SM	20-43-40-29				
	70	X	SM	16-25-43-47				
-60.9						Yellow to red clayey SAND with trace of gravel.		
	75	X	SC	24-50/.5"				
-68.9	80	X	SC	12-12-16-26				
-73.4						Red clayey SILT, laminated, slickensided.		
-75.9	85	X	CL	22-34-41-50		Yellow, light gray & tan sandy CLAY to clayey SAND.		
-78.4	90	X	CL	39-48-50/.5"		Pink to light gray clayey SILT to silty CLAY.		
						END OF BORING AT 92'.		
	95							
	100							

AR323674

DuPont

DuPont Environmental Remediation Services

Final Log

LOG OF BORING NO. PB-2

ELEV. (FEET M.S.L.)	DEPTH (FEET)	SAMPLE NO. AND TYPE	BLOWS PER 6-INCH INCREMENTS	SAMPLE RECOVERY (IN.)	PROFILE	DESCRIPTION	USCS SYMBOL	REMARKS
	River Bottom		N/A			COORDINATES N 62,2550 E 60,1490; SURFACE EL: @ -6 below River Surface		
						0-9" Brown, medium to fine Sand, wet	SM	Core opened on 11-22-95.
		Jar				Green-gray clayey silt, moist	MH	
	5'							
	6'	Tube		24"			MH	K = 3.4 x 10^-7 cm/sec
	8'	Jar					MH	
	9'					[9.5'-10.5' Green Gray Silt and Sand]		
	10'					Bottom of Core = 10.5'		Marsh Deposit 9 ft thick.

PROJECT NO.: 2124 Newport
DATE BEGAN: 11-17-95
DATE COMPLETED: 11-17-95
FIELD GEOLOGIST: MPB
CHECKED BY:

GWL:DEPTH N/A DATE/TIME
GWL:DEPTH N/A DATE/TIME
DRILLING METHOD: Vibra-Core using 2 7/8" I.D. Aluminum Core barrel.

NOTES:
CONTRACTOR: OSI
DRILLER: Bob Wallace
HELPER: Mike
RIG: OSI Skiff

BORING NO. PB-2
SHEET 1 OF 1

AR323675

DUPONT CIVIL ENGINEERING SYSTEMS

BORING NUMBER WB-5 PLANT Newport, DE
PLANT COORDINATES S 588.9, W 416.6 DATE DRILLED 3/16/94
SURFACE ELEVATION -5.8 Feet MSL DRILLING COMPANY Warren George Inc.
PROJECT TITLE Riverbank Cover System DRILLING METHOD Barge - Mud Rotary
PROJECT NO. 2763-03-6210-04 INSPECTOR Victor Ferrero

ELEV (feet)	DEPTH (feet)	SAMPLE	SOIL CLASSIF.	BLOWS/6 in.	GRAPHIC LOG	SOIL DESCRIPTION AND REMARKS	WATER CONTENT, % (PLASTIC LIMIT ○ / NATURAL ● / LIQUID LIMIT ○)	OTHER TESTS
		X		7-9-17-10		FILL: Gray gravelly SAND with organics, pieces of concrete & roots.		
		X		30-21-19-16		Marsh Deposit 5'		
-10.8	5	X		3-6-8-12		Red & gray sandy CLAY with trace of fine gravel. (CL) 9'	●	
-14.3		X		8-10-14-16		9		
-15.3						Tan silty fine SAND with some clay. (SM) Colum		
-18.3	10	X		4-5-7-9		Multicolor silty clayey fine to medium SAND. (SC)	● ○	P
	15	X		3-5-5-8		Tan, gray & white silty clayey fine to coarse SAND, trace of fine gravel, mica. (SC) Potomac		G
-27.3	20	X		7-7-14-17				
-31.8	25	X		6-12-12-14		Tan, silty, fine to medium SAND, trace of fine gravel & coarse sand. (SM)		
-37.3	30	X		8-14-17-22		Tan, silty clayey, fine to medium SAND. (SC) 31.3		
	35	X		10-14-16-18		Tan medium SAND with little to some silt. (SP-SM) - layer of gravelly sand at 34'.		
-47.3	40	X		10-14-13-20		- layer of gravel at 40'. 41.3		
-50.8	45	X		10-11-17-18		Tan to gray silty clayey fine SAND. (SC)	●	
	50					END OF BORING AT 45'. P = Percent Passing #200 Sieve G = Grain Size Analysis		
	55							
	60							

AR323676

LOG of BORING No. MW-17A/17B North side of River

DATE 9/12-15/88 SURFACE ELEVATION 18.62' LOCATION FIGURE 1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0		8	Moist silty fine sand with a 1-inch seam of orange-brown medium to fine sand, trace gravel	15.12				
5		2	Moist to wet dark brown coarse to fine sand with black coal-like gravel throughout with white clay-like material -becomes dark brown to black and silty -with white clay-like material (FILL)	8.62				
10		5	Moist yellow-brown medium to fine sand and silt	5.12 3.62				
15	17A	38	Moist to wet dark-brown to dark gray coarse to fine sand and well rounded gravel					
20		24	Moist to wet brown silty coarse to fine sand and well rounded gravel trace silt	23 -4.38				
25		10	Moist dark gray to black micaceous fine sand, silt content increases with depth becoming a soft to firm dark gray micaceous silty clay	6.5' Marsh Deposit				
30		14	Dark gray clayey gravelly coarse to fine sand (COLUMBIA FORMATION)	29.5' -10.88 -11.38				
35		25	Red-brown, yellow-brown, light gray mottled fine sandy silty clay becomes stiff	-19.88				
40		17	Light gray silty clayey fine sand with a 7-inch lense of red-grown and light gray Yellow-brown clayey coarse to fine sand	-24.38 -24.88				
45		12	Stiff yellow-brown, light gray, red mottled silty clay Continued on next page	-26.38				

Completion Depth 70.5 Feet Water Depth 15 Feet Date 9/12/88

Project Name DuPont Newport, Phase II RI Project Number 88C2076-4C

Woodward-Clyde Consultants

AR323677

LOG of BORING No. MW-17A/17B

DATE 9/12-15/88 SURFACE ELEVATION 18.62' LOCATION FIGURE 1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45			(See previous page for soil description)	-29.88				
50		11	Moist to wet yellow-brown, light gray mottled silty coarse to fine sand; the sand is a weathered quartz					
		17B	-becomes tan in color and loose, trace silt	-35.38				
55			Light gray and tan mottled silty medium to fine sand	-39.88				
60		23	Red-brown highly plastic silty clay, trace fine sand	-44.88				
65		29	Yellow-brown and red-brown mottled silty clay and fine sand	-49.88				
70		18	Yellow-brown and red-brown mottled clayey medium to fine sand	-51.38				
			Yellow-brown gravelly medium to fine sand (POTOMAC FORMATION)	-51.88				
75								

Completion Depth 70.5 Feet Water Depth 15 Feet Date 9/12/88

Project Name DuPont Newport; Phase II RI Project Number 88C2076-4C

Woodward-Clyde Consultants

AR323678

LOG of BORING No. TB-31

DATE 7/16/90 SURFACE ELEVATION 23.5 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATI
0				Asphalt Pavement and concrete pad	
		4*	SS	Brown and gray crushed stone fill	21.5
		3	SS	Brown,light orange-brown, and tan with orange mottling, SILTY CLAY TO FINE SANDY SILTY CLAY, trace gravel, slightly micaceous increasing with depth	19.5
5		2	SS		
		55/6"*	SS	- becoming gravelly with wood fragments at 8.0 feet	
10		6	SS	(FILL)	
		30	SS	Dark orange-brown with orange mottling, CLAYEY MEDIUM TO FINE SAND	11.5
		18*	SS	Orange with some black staining, SILTY MEDIUM TO FINE SAND with occassional orange and gray clay lenses, trace gravel and coarse sand, sub-angular to round, micaceous	10.5
15					
20	31.F	37*	SS	- black staining at 22.0 feet	
25				- becoming silty coarse to medium sand and gravel	
		20*	SS	Orange-brown, CLAYEY SILT with trace fine sand 27.5	-3.0
				Dark gray, ORGANIC SILTY CLAY, little fine sand, micaceous 3' thick 30.5 Marsh Deposit (OTHER QUATERNARY)	-4.0
30		52*	SS	Very dense, black becoming orange-brown, poorly-sorted, COARSE TO MEDIUM SAND AND GRAVEL, little to trace silt, sub-angular to sub-round, micaceous and quartzose	-7.0
35	31A			- becoming gravelly/cobblely at 35.0 feet	
		65*	SS	(COLUMBIA)	
40		13	SS	Lithology description on Page 2 of 3	-18.5

Completion Depth: 102.0 ft. Water Depth: — ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 5.25" Mud Rotary

Woodward-Clyde Consultants

AR323679

LOG of BORING No. TB-31

DATE 7/16/90 SURFACE ELEVATION 23.5 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
45				Red, orange, and yellow MEDIUM TO FINE SANDY CLAY, trace coarse sand, grading to CLAYEY MEDIUM TO FINE SAND, then to SILTY CLAY, trace fine sand	
		15	SS	- becoming FINE SANDY CLAY, trace medium sand	
50					
		45	SS	- with dark red mottling at 52.0 feet	-28.8
				Gray, CLAYEY MEDIUM TO FINE SAND, trace coarse sand to fine gravel	-30.0
55				Yellow-brown with orange mottling, MEDIUM TO FINE SANDY CLAY	
		69	SS	Very stiff, dark red with gray and yellow mottling, FINE SANDY CLAY, trace mica	-33.5
60					
		44	SS	- becoming yellow-orange then gray	-39.5
				Brown and yellow-orange, CLAYEY FINE SAND, little medium sand	
65		38			
		33	SS	Gray with red mottling, FINE SANDY CLAY	-43.7
				Orange, MEDIUM TO FINE QUARTZ SAND, trace clay	-44.8
70					
		30	SS	Orange-yellow with white mottling, CLAYEY COARSE TO MEDIUM QUARTZ SAND	-48.5
				Stiff, red with gray mottling, FINE SANDY CLAY	-49.0
				Orange, tan, and gray, MEDIUM TO FINE SAND, little to trace clay, micaceous	-50.0
75					
		36	SS	Orange-brown with white mottling, CLAYEY COARSE TO MEDIUM QUARTZ SAND, sub-angular to sub-round	-53.5
				Orange with purple mottling CLAY	-54.5
				White, CLAYEY COARSE TO MEDIUM QUARTZ SAND	-55.0
80					
		48	SS	Orange-brown with white grains, CLAYEY COARSE TO FINE QUARTZ SAND, angular to sub-angular, trace mica	-58.5
				Hard, dark red becoming orange-brown, FINE SANDY SILTY CLAY, trace mica and coarse sand-size schist fragments	-59.5
85					
		41	SS		
				(POTOMAC)	-65.3

Lithology description on Page 3 of 3

Completion Depth: 102.0 ft. Water Depth: ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 5.25" Mud Rotary

Woodward-Clyde Consultants

LOG of BORING No. TB-31

DATE 7/16/90 SURFACE ELEVATION 23.5 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
90				Olive-brown, red and white CLAYEY COARSE TO FINE SAND, gneissic banding, quartz, mica, and opaque minerals	
95					
100		83/Top 1	SS	(WEATHERED BEDROCK)	-78.5
105					
110					
115					
120				Note: 1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.	
125					
130					

Completion Depth: 102.0 ft. Water Depth: ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 5.25" Mud Rotary

Woodward-Clyde Consultants

AR323681

LOG of BORING No. B-25

DATE 7/31/90 SURFACE ELEVATION 23.5 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0				Concrete Pad (8")	22.8
		38*	SS	Brown with dark green product, SILTY CLAYEY COARSE TO FINE SAND with trace fine gravel	
		32*	SS	-With oily clinker	
		16*	SS	Brown with orange mottling, CLAYEY FINE SAND, trace fine gravel, coarse sand, silt, blue-green product	19.3
5		24*	SS	Brown with orange brown mottles, blue green product and dark gray coarse fragments, FINE SANDY CLAY, little coarse to medium sand and fine gravel	17.5
		19*	SS	(FILL)	14.3
				Brown and dark orange SILTY FINE SAND with little clay, micaceous	13.5
10		68*	SS	Orange brown with varigated coarse fraction, poorly-sorted, SILTY COARSE TO FINE SAND AND GRAVEL, sub-round to round, micaceous	
		24*	SS		
15		54*	SS	no sample	
				? 17.0' @ 25' thick	
20		16*	SS	Orange-brown and light olive-gray SILTY COARSE TO FINE SAND AND FINE GRAVEL, with lenses of fine sandy clay with trace reeds	3.5
				22.0 (OTHER QUATERNARY)	2.0
				Brown to orange-brown, COARSE TO MEDIUM SAND AND COARSE TO FINE GRAVEL	
25		17*	SS		
30		44*	SS	(COLUMBIA)	-9.8
				Red brown, FINE SANDY SILTY CLAY	-10.1
35				Varigated clayey COARSE TO FINE SAND AND GRAVEL, subangular to subround (POTOMAC)	-10.5
40					

Notes:
1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.
2) Surface elevation is estimated from the Newport Landfill topographic map (5/87) supplied by DuPont.

Completion Depth: 34.0 ft.

Water Depth: 14.0 ft.

Project No.: 88C2076-4S

Project Name: Du Pont Newport Site

Drilling Method: 4.25" I.D. H.S.A.

Woodward-Clyde Consultants

LOG of BORING No. B-2

DATE 7/25/90 SURFACE ELEVATION 25.0 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0				Orange-brown with dark gray gravel, SILTY COARSE TO FINE SAND, little crushed stone	
		18*	SS		22.0
				Orange-brown, CLAYEY FINE SAND AND SILT becoming SILT	
		11	SS		
5		20	SS		
				Orange to dark gray, CLAYEY COARSE TO FINE SAND	18.0
		11*	SS	Orange-brown to brown with orange mottles, FINE SANDY SILT TO SILT, micaceous	17.0
10		12	SS		
				-Becoming gray with orange mottles	
		47*	SS	(FILL)	10.0
15				Orange-brown, SILTY COARSE TO FINE SAND AND GRAVEL, quartzose and micaceous, sub-round to round	
20		15*	SS	Olive gray to orange CLAYEY SILT, trace fine sand	20.0
				Dark brown, ORGANIC SILT with little clay, vegetative matter, micaceous	
				≈ 10.0' thick	
25					0.0
				Orange and gray, MEDIUM TO FINE SAND TO CLAYEY MEDIUM TO FINE SAND, little coarse sand	-1.0
		17*	SS	Dark brown, ORGANIC SILT	
				30.0' (OTHER QUATERNARY)	-5.0
30				Light brown, MEDIUM TO FINE SAND, trace silt and coarse sand	
		95*	SS		-8.0
				Orange and brown, CLAYEY FINE SAND, little silt, micaceous	
35					-10.4
				Orange, COARSE TO FINE SAND, little silt and clay, micaceous	
				(COLUMBIA)	-13.0
		20*	SS	Red, olive-gray, and yellow with white mottles, CLAYEY MEDIUM TO FINE SAND, trace coarse sand	
40				(POTOMAC)	-15.0

Note:
1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.
2) Surface elevation is estimated from the Newport Landfill topographic map (5/87) supplied by DuPont.

Completion Depth: 40.0 ft.

Water Depth: 10.0 ft.

Project No.: 88C2076-4S

Project Name: Du Pont Newport Site

Drilling Method: 3.25" I.D. H.S.A.

Woodward-Clyde Consultants

AR323683

LOG of BORING No. B-34

DATE 6/26/90 SURFACE ELEVATION 28.0 LOCATION See Figure #1

DEPTH, ft. / SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0	39	SS	Brown to olive, GRAVELLY SANDY SILTY CLAY	
	22*	SS	Stiff, orange to red with gray streaks, SILTY CLAY, little to trace sand and gravel, trace micaceous (2.0' – 7.0', 25' thick)	26.0
5	14	SS		
	30	SS		20.5
	23*	SS	Stiff brown, SANDY CLAY, trace micaceous	19.0
			Brown, trace orange, CLAYEY COARSE TO FINE SAND	18.0
10	25	SS	Brown, COARSE TO FINE SAND GRAVEL, micaceous and quartzose	
	28	SS	(FILL)	14.0
15				
20				
25				
30				
35				
40				

Notes:
1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.
2) Surface elevation is estimated from the Newport Landfill topographic map (5/87) supplied by DuPont.

Completion Depth: 14.0 ft. Water Depth: — ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 3.25" I.D. H.S.A.

Woodward-Clyde Consultants

AR323684

LOGS FOR F-F'

DUPONT CIVIL ENGINEERING SYSTEMS

BORING NUMBER WB-2 PLANT Newport, DE
PLANT COORDINATES S 383.4, W 16.6 DATE DRILLED 3/11/94
SURFACE ELEVATION -9.3 Feet MSL DRILLING COMPANY Warren George Inc.
PROJECT TITLE Riverbank Cover System DRILLING METHOD Barge - Mud Rotary
PROJECT NO. 2763-03-6210-04 INSPECTOR Victor Ferrero

ELEV (feet)	DEPTH (feet)	SAMPLE	SOIL CLASSIF.	BLOWS/6 in.	GRAPHIC LOG	SOIL DESCRIPTION AND REMARKS	WATER CONTENT, % (PLASTIC LIMIT ○ / NATURAL ● / LIQUID LIMIT ○; 10 20 30 40)	OTHER TESTS
			Marsh	WH-2-1-7		FILL: Dark-gray, light-gray & tan silty fine to medium SAND with little gravel & organics. (SM)		
-12.3				5-5-4-8				G
-13.8			Columbia			Yellow-brown, silty clayey, medium to fine SAND, trace mica. (SC)		
	5		Rotary	6-7-10-14		Yellow, gray & red clayey SILT to silty CLAY with little fine to medium sand. (CL)		
				9-11-13-18				P
-19.0	10					Yellow, red, tan, gray & green silty clayey fine to medium SAND. (SC)		Q
				13-9-10-10				
				7-18-15-20				G
-26.3	15							
	20			10-11-18-25		Red, gray, green, silty fine to medium SAND, little to trace of clay. (SM)		
-33.3	25			11-25-14-15		Tan, red & green fine to medium SAND with little to some gravel-sized cemented sand. (SP)		
-37.8	30			9-11-14-19		Pink, green & multicolored sandy SILT with some red clay to tan silty fine to medium SAND. (SM-ML)		
	35			11-20-22-33				
-48.0	40			16-12-15-21		Pink & green silty clayey SAND. (SC)		P
-53.0	45			11-24-34-35		Tan silty fine to medium SAND with trace of clay. (SP)		
-59.3	50			15-15-12-20				
						END OF BORING AT 50'.		
	55					G = Grain Size Analysis Q = Unconsolidated-Undrained Triaxial P = Percent Passing #200 Sieve		
	60							

AR323686

WALTON CORPORATION

Drilling Contractor

NEWARK, DELAWARE

BORING LOG

NAME: DU PONT-NEWPORT PLANT

CREEK BORING

S528, E22

HOLE NO. BW-1 DRILLER L. BROWN DATE 3-29-56

SURFACE ELEVATION -2.1 DATUM GROUND WATER DEPTH

Sample No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Description of Materials	*Blows A
1	0	1.5		2.0	BROWN SAND & GRAVEL	3/9/9
2	2.5	4.0	2.0		BROWN & RED CLAY	6/7/9
3	5.0	6.5		7.0	RED SANDY CLAY W/GRAVEL	4/4/6
4	7.0	8.5	7.0	[illegible]	WHITE SILTY SAND	4/7/11
	10.0	11.5	[illegible]	15.5	BROWN & WHITE SILTY SAND 10-15.5 Col.	6/7/7
6	15.0	16.5	15.5		RED SANDY CLAY 15.5	6/4/7
7	20.0	21.5		25.0	BROWN & RED SANDY CLAY Potomac	13/11/11
8	25.0	26.5	25.0		COARSE BROWN SAND	13/13/14
9	30.0	31.5		34.0	" " " W/GRAVEL	36/41/42
10	35.0	36.5	34.0	37.0	BROWN & RED CLAY	7/8/10
11	40.0	41.5	37.0	41.5	BROWN SILTY SAND	8/12/13

BLOWS ON CASING	B*
0- 1	1
1- 2	1
2- 3	3
3- 4	12
4- 5	14
5- 6	8
6- 7	15
7- 8	13
8- 9	16
9-10	20
10-11	25
11-12	36
12-13	33
13-14	26
14-15	25
15-16	45
16-17	31
17-18	38
18-19	45
19-20	3[illegible]
20-21	2[illegible]
21-22	32
22-23	32
23-24	29
24-25	49
25-26	39
26-27	39
27-28	43
28-29	33
29-30	30
30-31	100
31-32	105
32-33	80
33-34	73
34-35	52
35-36	75
36-37	125
37-38	
38-39	
39-40	
40-41	
41-42	
42-43	
43-44	
44-45	
45-46	
46-47	
47-48	
48-49	
49-50	
50-51	

* A Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler ~~1 ft. after first being driven 6 in.~~ FOR EACH OF THREE 6" INCREMENTS

* B Number of blows of 300 lb. hammer dropped 18 in. required to drive 22 in. casing 12 inches.

Casing 25 in. diameter.

REMARKS: OFFSET 7 FEET

AR323687

WALTON CORPORATION
Drilling Contractor

P. O. BOX 1097, NEWARK, DELAWARE 19711

BORING LOG

NAME DuPont Company PROJECT NO. 7646

Newport, Delaware Plant SUPERVISOR W.A.Barlow

BORING NO.	DRILLER	DATE
B-79	E. Shaver	11-12-70
WEATHER	**SURFACE ELEVATION**	**DATUM**
Cloudy & Showers		5284 E 5

Sample No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials	*Blows A		
			0	0.4	Black Top			
1	1.0	2.5	0.4		Brown Sand Fill	5	5	4
2	3.5	5.0		5.5	Brown Sand Fill	2	3	4
3	6.0	7.5	5.5	8.0	Sand & Gravel	5	5	8
4	9.0	10.5	8.0	15.0	Gray Silty Sand & Gravel	8	11	16
5	15.0	16.5	15.0	17.5	Sand & Gravel w/Black Organic	13	23	23
					Paint Waste			
	20.0	21.5	17.5	24.0	Variegated Clay Organic Waste	7	12	17
7	25.0	26.5	24.0		Brown Clayey Med. to Fine Sand	7	7	11
8	30.0	31.5		32.5	Red. Clay 32.5+	9	9	16
9	35.0	36.5	32.5	36.5	Brown Clayey Med. to Fine Sand	13	13	13

* BLOWS ON CASING B	
0- 1	3
1- 2	7
2- 3	10
3- 4	10
4- 5	5
5- 6	10
6- 7	13
7- 8	9
8- 9	14
9-10	15
10-11	21
11-12	30
12-13	45
13-14	45
14-15	
15-16	
16-17	
17-18	
18-19	
19-20	
20-21	
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50-51	
51-52	
52-53	
53-54	
54-55	
55-56	
56-57	
57-58	
58-59	
59-60	

*A Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

* Number of blows of 300 lb. hammer dropped 18 in. required to drive 2½ in. casing 12 inches.

REMARKS: S - 4 Piece of gravel jammed at bottom of drive shoe in spoon.

GROUND WATER

11-12-70	8.5

AR323688

LOG of BORING No. TB-35

DATE 7/4/90 SURFACE ELEVATION 9.0 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0		13	SS	Brown to orange-brown, SILTY SANDY GRAVEL, trace debris and mica	8.0
		13*	SS	Orange, CLAYEY SILTY FINE SAND	5.5
		3	SS	Dark brown, SILTY MEDIUM TO FINE SAND with decomposed organics	5.0
5		7	SS	Blue-black product-stained, SILTY FINE SAND TO FINE SANDY SILT, little to trace clay, micaceous	2.5
				Brown, organic CLAYEY FINE SANDY SILT	1.8
				Firm to soft, gray, FINE SANDY SILTY CLAY, micaceous — 6.5 — 3.5' thick — 10.0 (OTHER QUATERNARY)	-1.0
10		20*	SS	Orange becoming brown, SILTY COARSE TO MEDIUM SAND, trace fine sand and fine quartz gravel, gravel content increasing with depth, micaceous	
15		25*			-9.0
		25*	SS	Orange, COARSE QUARTZ SAND AND FINE GRAVEL, little to trace clay, medium sand, and coarse gravel, sub-angular to round	
20					
25		10*	SS	- becoming clayey coarse quartz sand and fine gravel (COLUMBIA)	-17.0
		18	SS	White becoming orange, CLAYEY MEDIUM TO FINE QUARTZ SAND, little mica, trace red and white clay seams	-21.0
30		15	SS	Red, orange, and light olive-brown, thinly interbedded MEDIUM TO FINE SANDY CLAY AND CLAYEY MEDIUM TO FINE SAND	-26.0
35		20	SS	Orange to red, well-sorted, MEDIUM TO FINE SAND, little to trace clay and mica	
40		22	SS	Orange to gray, CLAYEY MEDIUM TO FINE SAND with red clay stringers	-31.8
					-34.0

Continued on Page 2 of 2

Completion Depth: 75.0 ft. Water Depth: ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 5.25" Mud Rotary

Woodward-Clyde Consultants

LOG of BORING No. TB-35

DATE 7/4/90 SURFACE ELEVATION 9.0 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
45		38	SS	Red, orange, and gray mottled, CLAY, trace fine sand	
				Orange and brown, well-sorted, CLAYEY FINE SAND	-37.0
50		30	SS	Yellow-brown to orange, MEDIUM TO FINE SAND, little to trace clay, trace coarse sand and fine gravel, occassional red and white fine sandy clay seam	-41.0
55		35	SS	Gray, CLAYEY MEDIUM TO FINE SAND, trace coarse sand and fine gravel, mica	-46.0
60		42	SS	Brown with dark gray to purple streaks, CLAYEY MEDIUM TO FINE SAND	-51.0 ~~51.5~~
				Orange-brown with white mottling, CLAYEY COARSE TO FINE SAND AND FINE GRAVEL, quartz and schist fragments (POTOMAC)	-56.0
65		25	SS	Stiff, red, green, and white mottled, SILTY CLAY TO CLAYEY SILT, little mica, schistose foliations, saprolite	
70		27	SS	(WEATHERED BEDROCK)	-66.0
75					
80					
85					

35c

Note:
1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.

Completion Depth: 75.0 ft. Water Depth: ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 5.25" Mud Rotary

Woodward-Clyde Consultants

AR323690

LOG of BORING No. TB-30

DATE 6/28/90 SURFACE ELEVATION 12.3 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0				Asphalt Pavement and Stone Sub-base	11.8
		19	SS	Black and gray with orange grains, white product, SILTY GRAVELLY COARSE TO FINE SAND, trace ash and clinker	
		52*	SS		
					8.3
5		12/1.5'	SS	Brown and gray with blue-black product, CLAYEY SILT, micaceous	
		12	SS		
		39*	SS	- Becoming FINE SANDY SILTY CLAY	
10		27*	SS	Light gray with orange mottling and blue-black product, well-sorted, FINE SAND, micaceous (FILL)	2.3
		30F		12.0	
		16	SS	Very stiff, gray with light orange mottling, FINE SANDY CLAY, trace medium to coarse sand, micaceous	0.3
		20	SS	Main deposit 3' thick 15.0	
15				Medium dense, light orange-brown, SILTY MEDIUM TO FINE SAND, micaceous (OTHER QUATERNARY)	-2.7
		24*	SS		
				Dense to medium dense, light brown and white, moderately-sorted, MEDIUM TO FINE SANDY COARSE SAND AND GRAVEL, quartzose, sub-angular to round, black stain at 17.5 feet	-4.7
20		30F			
		46*	SS		
25				(COLUMBIA)	
		18*	SS	Orange-brown to orange-yellow with white mottling, CLAYEY MEDIUM TO FINE SAND with occassional red and gray silty clay stringers, slightly micaceous	-15.7
30		20	SS		
35		6	SS	Orange and red with gray mottling, CLAYEY FINE SAND	-22.7
				- Becoming FINE SANDY CLAY	
40		19	SS	Very stiff to stiff, red CLAY	-27.7
				Orange-yellow with gray and red mottling, MEDIUM TO FINE SAND, trace clay	-28.7
		30B			-30.7

Continued on Page 2 of 2

Completion Depth: 72.0 ft. Water Depth: ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 5.25" Mud Rotary

Woodward-Clyde Consultants

AR323691

LOG of BORING No. TB-30

DATE 6/28/90 SURFACE ELEVATION 12.3 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
45		14	SS	Same as above	-33.9
				Very stiff to stiff, red with gray and yellow mottling, FINE SANDY CLAY, quartzose and micaceous	
50		18	SS	Light orange, yellow, gray, and white, well-sorted, FINE SAND with clayey fine sand stringers, trace medium sand, quartzose	-37.7
55		14	SS	Tan to light brown, CLAYEY COARSE TO FINE SAND	-42.7
				Very stiff, red, purple, gray, with slight orange mottling, FINE SANDY CLAY	-44.2
60		24	SS	Light brown and gray with white mottling, CLAYEY COARSE TO FINE QUARTZ SAND, trace fine gravel-sized severely weathered schist fragments (POTOMAC)	-47.7
65		23	SS	White, orange-yellow, and red, MEDIUM TO FINE SANDY CLAY, gneissic banding, little quartz, mica, and opaque minerals	-52.7
70		28	SS	(WEATHERED BEDROCK)	-59.7
75				Notes: 1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications. 2) Auger refusal encountered at 2.0 feet, drive split-spoon sampler to 4.5 feet. Offset boring location 2.0 feet north and continue to completion.	
80					
85					

Completion Depth: 72.0 ft. Water Depth: ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

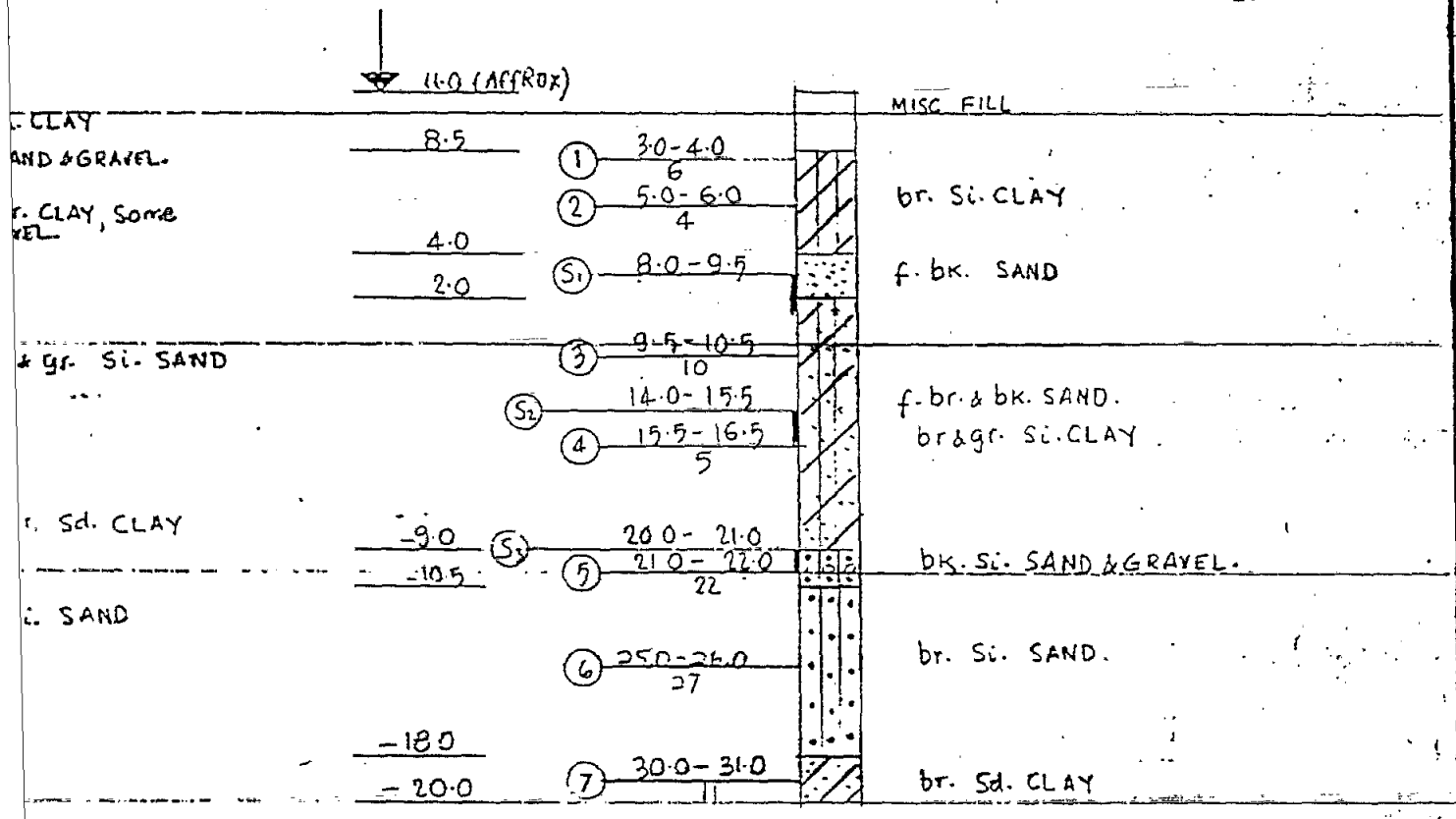
Drilling Method: 5.25" Mud Rotary

Woodward-Clyde Consultants

AR323692

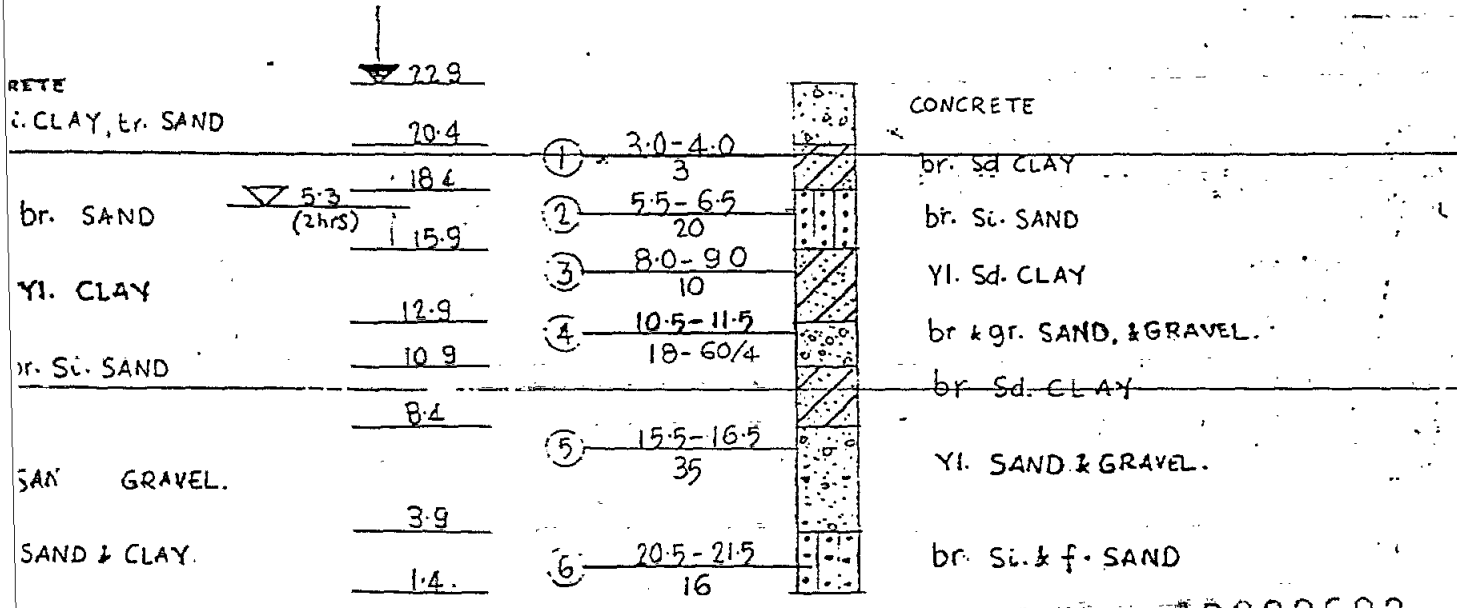
br. Si. SAND.

B-50



B-58

S100, W178



LOG of BORING No. B-4

DATE 7/26/90 SURFACE ELEVATION 14.0 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0				Dark brown with orange and white mottles, SILTY COARSE TO FINE SAND, trace fine gravel and clay, asphalt pavement fragments and coal ash	
		23*	SS		
		5	SS		
5					8.0
		5	SS	Light gray with orange mottles, CLAYEY MEDIUM TO FINE SAND	7.0
				Light-gray MEDIUM TO FINE SANDY CLAY (FILL)	6.0
		11*	SS	Dark brown SILTY CLAY 8.0'	5.0
10				Orange-brown, SILTY COARSE TO FINE SAND, trace fine gravel, very micaceous	
				2 @ 1' sheet	
		19*	SS	Dark brown, CLAYEY SILT, little fine sand 1' 15.0 Marsh (OTHER QUATERNARY)	0.0
15				Orange-brown SILTY COARSE TO MEDIUM SAND, trace gravel, micaceous	-1.0
20		38*	SS	Orange-brown COARSE TO FINE SAND AND FINE GRAVEL -Becoming black with trace clay at 21.5'	-6.0
25		16*	SS	(COLUMBIA)	-13.0
				Red, orange, and yellow, CLAYEY MEDIUM TO FINE SAND (POTOMAC)	-14.0
30					
35					
40					

Note:
1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.
2) Surface elevation is estimated from the Newport Landfill topographic map (5/87) supplied by DuPont.

Completion Depth: 28.0 ft. Water Depth: 15.5 ft.

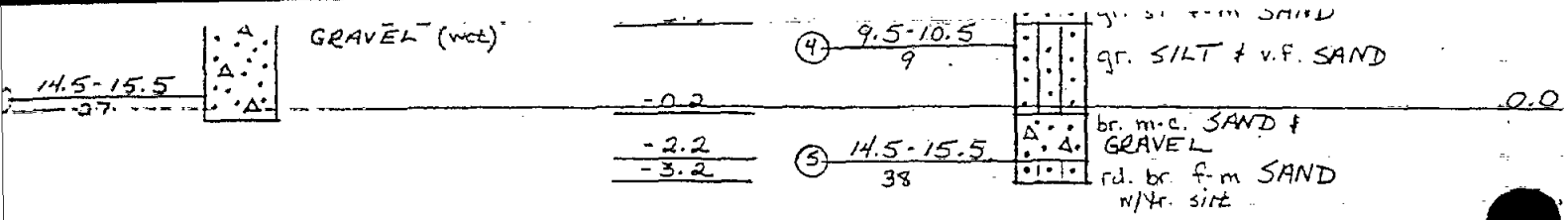
Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 4.25" I.D. H.S.A.

Woodward-Clyde Consultants

AR323694



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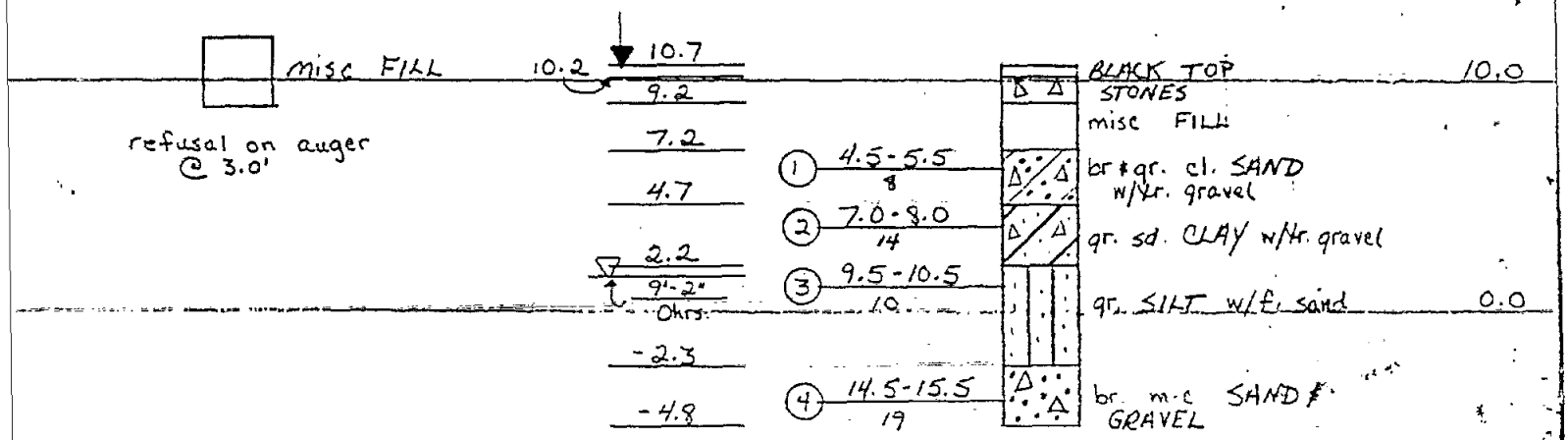

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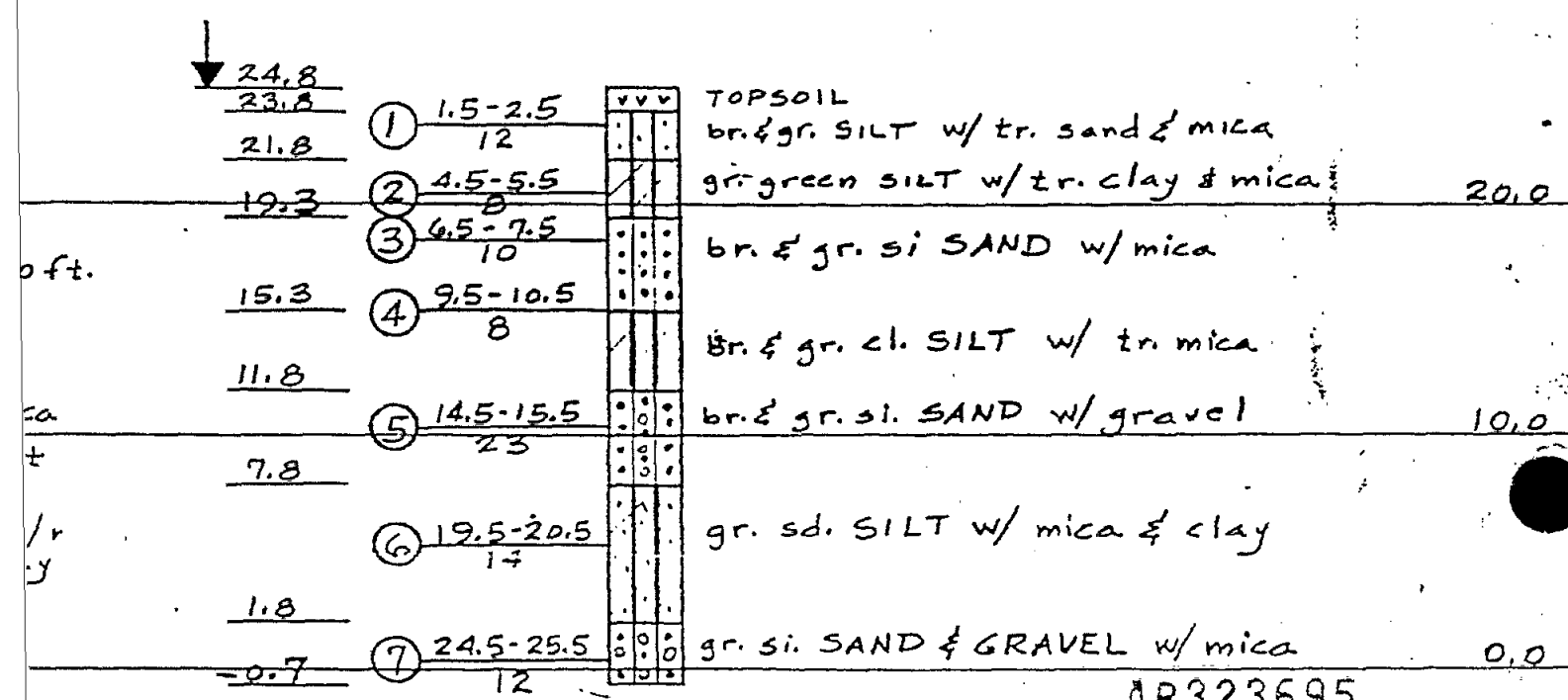

WALTON CORPORATION
Drilling Contractor

P. O. BOX 1097, NEWARK, DELAWARE 19711

BORING LOG

NAME DuPont Company PROJECT NO.

Newport, Delaware SUPERVISOR G. Vroman

N214 E075

BORING NO.	DRILLER	DATE
B-85	J. Godek	4-3-74
WEATHER	**SURFACE ELEVATION**	**DATUM**
Sunny & Warm	12.3	Plant

Sample No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials	*Blows A		
			0	0.5	Black Top			
1	2.0	3.5	0.5		Misc. Fill(Silt,Sand,Stones,etc.)	3	2	2
2	4.0	5.5		5.5	Same as above	2	2	3
3	6.5	8.0	5.5	7.5	Gray Silty Clay w/Tr. Organics	2	1	3
					(Moist)			
			7.5	8.5	Gray Silty F/M Sand			
4	9.0	10.5	8.5	12.5	Gray Silt & Very Fine Sand	3	4	5
5	14.0	15.5	12.5	14.5	Brn. M/C Sand & Gravel	30	19	19
			14.5	15.5	Reddish Brn. F/M Sand w/Tr. Silt			
					W/L 7.3 in Auger @ completion			

BLOWS ON CASING B
0- 1
1- 2
2- 3
3- 4
4- 5
5- 6
6- 7
7- 8
8- 9
9-10
10-11
11-12
12-13
13-14
14-15
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47-48
48-49
49-50
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51-52
52-53
53-54
54-55
55-56
56-57
57-58
58-59
59-60

A Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three in. increments.

B Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in. casing 12 inches. —

REMARKS: .....

GROUND WATER

5.4	@ completion

AR323696

LOGS USED TO CONSTRUCT MARSH DEPOSIT ISOPACH THICKNESS MAP

RIB-21

LOG of BORING No. B-21

DATE 10/15/90 SURFACE ELEVATION 20.0 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0		12*	SS	Brown, orange-brown, light olive-brown, tan, gray, orange laminations and mottling, interbedded FINE SANDY SILT and MEDIUM TO FINE SANDY CLAYEY SILT, little mica, trace fine gravel to coarse sand	
		50*	SS		
		35*	SS		
5		37*	SS		
		24*	SS	Orange-brown, light gray to light brown, interbedded MEDIUM TO FINE SAND AND FINE SANDY SILTY CLAY, micaceous, trace vegetative matter	12.5
10		75*	SS	Brown, SILTY MEDIUM TO FINE SAND, trace coarse sand	10.0
		23*	SS	13.0 (FILL)	7.0
		23*	SS	Orange becoming dark brown, ORGANIC SILTY CLAY TO CLAY, little to some vegetative matter, little micaceous ~4' thick	
15		30*	SS	17.0 (OTHER QUATERNARY)	3.0
				Gray, COARSE TO MEDIUM QUARTZ SAND, little gravel and silt, micaceous, trace clay lenses	
20		37*	SS		
				Gray, FINE SANDY CLAY	-1.0
				Gray, COARSE TO MEDIUM SAND AND GRAVEL	-1.4
25					
		43*	SS	Gray FINE SANDY CLAY	-6.0
				Orange COARSE TO FINE SAND AND GRAVEL, little silt (COLUMBIA)	-6.5
30				Orange and white, MEDIUM TO FINE SAND, little clay, with thin gray, yellow, and red clay lenses, quartzose	-10.0
		41*	SS	(POTOMAC)	-14.0
35					
40					

Notes:
1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.
2) Surface elevation is estimated from the Newport Landfill topographic map (5/87) supplied by DuPont.

Completion Depth: 34.0 ft.

Water Depth: 10.9 ft.

Project No.: 88C2076-4S

Project Name: Du Pont Newport Site

Drilling Method: 3.25" I.D. H.S.A.

Woodward-Clyde Consultants

AR323698

RIB-22

LOG of BORING No. B-22

DATE 10/17/90 SURFACE ELEVATION 14.0 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0		29*	SS	Light brown-gray with orange mottling, FINE SANDY SILTY CLAY, trace coarse sand and gravel, roots, and organic odor, silty medium to fine sand 1.5 to 2.5 feet	
		26*	SS	- silty medium to fine sand 3.2 to 3.5 feet	
5		22*	SS	-Becoming dark olive-brown, micaceous	
		27*	SS		
		24*	SS		
10		168/9"*	SS	- No recovery in split-spoons from 10.0 to 14.0, magnetic tape and debris on hollow-stem auger flights	
15		43*	SS	Olive gray with orange mottling, interbedded FINE SANDY CLAY AND SILTY COARSE TO FINE SAND, debris and magnetic tape, micaceous	-1.0
		32*	SS	-Sand lens at 18.7'	
20		37*	SS		
		36*	SS		
		19*	SS	Very stiff, orange then olive-gray, CLAY, little to trace fine sand (FILL)	-9.0
25					
		25*	SS	Orange, COARSE TO FINE SAND AND GRAVEL, little clay (COLUMBIA)	-14.2
30				Yellow, orange, red, and gray, MEDIUM TO FINE SANDY CLAY (POTOMAC)	-16.7 / -17.0
35					
40					

23' 25' thick 28.0'

Notes:
1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.
2) Surface elevation is estimated from the Newport Landfill topographic map (5/87) supplied by DuPont.

Completion Depth: 31.0 ft. Water Depth: ft. ft.

Project No.: 88C2076-4S

Project Name: Du Pont Newport Site

Drilling Method: 3.25" I.D. H.S.A.

Woodward-Clyde Consultants

AR323699

Drilling Contractor

P. O. BOX 1097, NEWARK, DELAWARE 19711

BORING LOG
SM-2

Pont Company ..... PROJECT NO. .....

Newport, Del. ..... SUPERVISOR .....

NG NO.	DRILLER	DATE
SM-2	S. Williams	7-21-75
HER: Clear, Hot, Humid	SURFACE ELEVATION	DATUM

ple	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials	*Blows A		
			0	7.0	Brn. Silt			
			7.0		Gray Clayey Silt 10.5' thick			
-1	8.0	10.0		9.0	Top: Gray Clayey Silt		SHELBY	
			9.0	10.5	Brn. & Lt. Brn. Micaceous Silt			
-2	10.0	12.0	10.5	13.0	Brn. & Dk. Brn. M/C Sand w/some			
					Gravel & Micaceous Silt (Wet)			
	14.0	16.0	13.0	17.5	Brn. & Dk. Brn. M/C Sand &			
					Gravel w/Some Silt			
	19.0	21.0	17.5	22.5	Brn. Micaceous Silt w/Layer of			
					Coarse Sand & Gravel (Wet)			
	24.0	25.0	22.5	24.5	Brn. M/C Sand & Gravel w/Some			
					Silt (Wet)			
			24.5	25.0	Gray Silt w/Layer of Fine Sand			

CASING B: 0-1, 1-2, 2-3, 3-4, 4-5, 5-6, 6-7, 7-8, 8-9, 9-10, 10-11, 11-12, 12-13, 13-14, 14-15, 15-16, 16-17, 17-18, 18-19, 19-20, 20-21, 21-22, 22-23, 23-24, 24-25, 25-26, 26-27, 27-28, 28-29, 29-30, 30-31, 31-32, 32-33, 33-34, 34-35, 35-36, 36-37, 37-38, 38-39, 39-40, 40-41, 41-42, 42-43, 43-44, 44-45, 45-46, 46-47, 47-48, 48-49, 49-50, 50-51, 51-52, 52-53, 53-54, 54-55, 55-56, 56-57, 57-58, 58-59, 59-60, 60-61

Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three n. increments.

* Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in. casing 12 inches.

MARKS: Wet on Rod @ 11.0 DNE

Sc[illegible]n: 2"x4' Sch. 80 P.V.C. .010 Slot 21.0-25.0 1004182

Fi[illegible]l Pack: Morie #2 19.0-25.0

Grout: Bentonite Pellets 17.0-19.0

Cement 0 - 17.0

GROUND WATER

AR323700

WALTON CORPORATION
Drilling Contractor

P. O. BOX 1097, NEWARK, DELAWARE 19711

BORING LOG

E ..DuPont.Company..... PROJECT NO. .....

.Newport.Plant..... SUPERVISOR Mr..Sherman

RING NO.	DRILLER	DATE
SM-3	G. Truver	3-22-76
EATHER	SURFACE ELEVATION	DATUM
Clear & Cool, Slight Breeze	25.0 (from Topo)	

Sample No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials	*Blows A		
			0		Sand, Cinders, Gravel, Silt (Fill)			
1	9.0	10.5			Sand, Silt, Cinders & Undentified Fill	3	3	4
2	14.0	15.5		18.5	Same as above	2	3	3
3	19.0	20.5	18.5		Unidentified Blk. Substance(Wet) Fill	2	1	2
4	21.0	22.5		22.2	Same as above	2	2	6
			22.2	23.0	Dk. Gray & Greenish Silt(Very Compact)			
	23.0	24.5	23.0	24.5	Gray Clayey Silt w/Tr. Gravel	2	1	5
6	25.0	26.5	24.5		Brn. & Gray Med. to Coarse Sand & Gravel w/some Silt (Wet)	8	13	14
	Marsh Deposit			7.8'				
7	27.0	28.5		27.5	Same	3	20	33
			27.5		Unidentified Black Substance(Fill)			
8	29.0	30.5		30.0	Same ← "Sluff" from 18.5 to 22.2	5	13	13
			30.0	30.5	Brn. Med. Silty Sand w/Some Gray interval (Wet)			
9	31.0	32.5	30.5	33.0	Brn. & Gray Med. to C Sand & Gravel w/Some Silt & Traces of Fill (Wet)	11	7	6
10	33.0	34.5	33.0	34.5	Brn. & Gray Med. to C Sand & Gravel Some Silt(Wet)	15	15	15
			34.5	35.0	Augered to 35.0 or -10 MSL			

Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

* B Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in. casing 12 inches.

MARKS: ..Point.Set.@..35.0..1:30.P.M..-..4:00..P.M..Installation.of.Point

.. Drilling.Water.First.Used.@..29.0.....

..Materials.on.next.Page.....

DNE 1004183

GROUND WATER

BLOWS ON CASING B
0- 1
1- 2
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AR323701

WALTON CORE DRILLING
Drilling Contractor
P. O. BOX 1097, NEWARK, DELAWARE 19711

BORING LOG

(DM-2) → reclassified because screen in Columbia so now called SM-4

E[redacted]uPont Company ..... PROJECT NO. .....

New Port, Delaware ..... SUPERVISOR .....

BORING NO.	DRILLER	DATE
~~DM-2~~ SM-4	T. Dickson	7-23-75
WEATHER	**SURFACE ELEVATION**	**DATUM**
Clear, Hot & Humid		

Sample No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials	*Blows A		
S-1	0	2.0	0		Gray Silty Clay w/Organic	[illegible]		
					Rec. 2.0			
S-2	2.0	4.0			Same as above (Rec. 1.3)	Shelby		
1	4.0	6.0			Same as above Stiff			
2	9.0	11.0		10.5	Same as above			
			10.5		Brn. Peat w/Some Silty Clay			
3	14.0	16.0		15.5	" " " " " "			
			15.5	19.0	Gray Silty Clay (Wet)			
4	19.0	21.0	19.0	22.5	Gray Sandy Silt w/Fine & Some Clay			
					Layer of Coarse White Sand (Wet)			
5	24.0	26.0	22.5	25.0	Fine to Med. Variegated Silty			
					Sand (Wet)			
			25.0	29.0	Red Clay (Stiff)			
6	29.0	31.0	29.0	33.0	Variegated Silty Sand (Wet)			
7	34.0	36.0	33.0	39.5	Variegated Clayey Sand (Wet)			
8	39.0	41.0	39.5	44.0	Variegated Silty Sand w/Some Clay (Wet)			
9	44.0	46.0	44.0	49.0	Tight Silty Clay			
10	49.0	51.0	49.0	50.5	Variegated Silty Sand (Wet)			
			50.5	51.0	Brn. Silt w/Gr. Gravel			

BLOWS ON CASING B
0- 1
1- 2
2- 3
3- 4
4- 5
5- 6
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Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three in. increments.

* Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in. casing 12 inches.

MA[redacted]S: Screen: 2"x5' Sch. 80 P.V.C. .010 Slot 20.0-25.0

[redacted] Pack: Morie #2 18.0-25.0

[redacted]rout: Bentonite Pellets 16.0-18.0

Cement: 0 - 16.0

UNF 1004185

GROUND WATER

AR323702

WALTON CORPORATION
Drilling Contractor

P. O. BOX 1097, NEWARK, DELAWARE 19711

BORING LOG

N. DuPont Company ..... PROJECT NO. .....
Newport, Delaware ..... SUPERVISOR .....

BORING NO.	DRILLER	DATE
TB#1 (D-1)	G. Truver	4-26-80
WEATHER	**SURFACE ELEVATION**	**DATUM**
Cloudy		

Sample No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials	*Blows A		
			0		Gray & Brn. Silt w/Some Sand &			
					Vegetation			
1	1.0	2.5		3.0	Gray & Brn. Silt w/Some Sand &	3	4	3
					Vegetation			
2	4.0	5.5			Gray & Brn. Silt w/Some Sand &	1	1	1
					Vegetation			
3	9.0	10.5		10.0	Gray & Brn. Silt w/Some Sand &	2	1	2
					Vegetation.			
			10.0		Gray Silt w/Vegetation			
					& Sand			
4	14.0	15.5	10'		Gray Silt w/Vegetation &	2	2	3
					Sand [Shelby Tube 15.7'-15.9']			
5	19.0	20.5		20.0	Gray Silt w/Vegetation &	2	2	9
					Sand			
			20.0	22.5	Brn. M Sand & Silt &			
					Gravel			
6	24.0	25.5	22.5		C Sand & Gravel & pieces of	9	25	48
					Rock w/Gravel & Tr. Silt &			
					Mica			
7	29.0	30.5			C Sand & Gravel & Pieces of	24	32	34
					Rock w/Tr. Gravel & Tr. Silt			
					& Mica			

BLOWS ON CASING B
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1- 2
2- 3
3- 4
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*A Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

* B Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in. casing 12 inches.

REMARKS: Wet on Spoon 24.0

GROUND WATER

DNE 1000079

AR323703

WALTON CORPORATION
Drilling Contractor
P. O. BOX 1097, NEWARK, DELAWARE 19711

BORING LOG

NA Dupont Company ..... PROJECT NO. .....
Newport, DE. ..... SUPERVISOR .....

BORING NO.	DRILLER	DATE
TB#1 (D-1) Continued	G. Truver	5-10-80
WEATHER	**SURFACE ELEVATION**	**DATUM**
Hot		

Sample No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials	*Blows A		
				32.5				
8	34.0	35.5	32.5	37.0	Variegated Sandy Clay w/Tr. Gray	3	5	6
9	39.0	40.5	37.0	42.5	White Silty Sand w/Clay Potomac Fm.	4	10	9
10	44.0	45.5	42.5		Variegated Silty Clay w/Sand	8	13	12
11	49.0	50.5		53.5	Same	10	15	16
12	54.0	55.5	53.0	58.0	White Clayey Sand w/Tr. Silt	13	13	19
13	59.0	60.5	58.0	60.5	Variegated Silty Clay w/Sand	8	12	13
					W/L @ completion			

A Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three in. increments.

B Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in. casing 12 inches.

REMARKS: .....*Wash Water Used.....Water Samples @ 40.0, 50.0, & 60.0

GROUND WATER

BLOWS ON CASING B

0-1, 1-2, 2-3, 3-4, 4-5, 5-6, 6-7, 7-8, 8-9, 9-10, 10-11, 11-12, 12-13, 13-14, 14-15, 15-16, 16-17, 17-18, 18-19, 19-20, 20-21, 21-22, 22-23, 23-24, 24-25, 25-26, 26-27, 27-28, 28-29, 29-30, 30-31, 31-32, 32-33, 33-34, 34-35, 35-36, 36-37, 37-38, 38-39, 39-40, 40-41, 41-42, 42-43, 43-44, 44-45, 45-46, 46-47, 47-48, 48-49, 49-50, 50-51, 51-52, 52-53, 53-54, 54-55, 55-56, 56-57, 57-58, 58-59, 59-60, 60-61

DNE 1000080

AR323704

12' feet = 6 spoons
= 36 sample

No Waste

WALTON CORPORATION
Drilling Contractor

P. O. BOX 1097, NEWARK, DELAWARE 19711

BORING LOG

NAME: DuPont Company
Newport Plant

PROJECT NO.

SUPERVISOR

BORING NO. TB#2 (D-2)

DRILLER: W. Patterson

DATE: 4-25-80

WEATHER: Cloudy & Cool

SURFACE ELEVATION

DATUM

Sample No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials	*Blows A		
			0		Brn. & Gray Silt w/Sand & Veg.			
1	1.0	2.5			Same	3	3	2
2	4.0	5.5		4.5	Same	1	3	4
			4.5	9.0	Brn. & Gray Silt w/Veg. & Tr.			
					Fine Sand			
3	9.0	10.5	9.0	13.0	Brn. & Gray Silt w/Sand, Veg. Mica	1	1	2
4	14.0	15.0	13.0	6.5'	Gray Silt w/Veg. & Tr. F Sand &	1	2	2
					Clay [Shelby Tube 11.4'-11.5']			
5	19.0	20.5		19.5	Same	WH	WH	1
			19.5		Brn. & Gray F/M Sand & Tr. w/Tr Veg.			
6	24.0	25.5			No Rec. Heave in Auger 0.9			
7	29.0	30.5			Brn. & Gray M/C Sand, Grave, & Tr.	11	50	50/
					Mica			
8	34.0	35.5			No Rec. Heave in auger 1.5			
9	31.0	40.5			" " " " " 1.2			
10	44.0	45.5			" " " " " 1.5			
11	49.0	50.5			" " " " " 1.4			
12	54.0	55.5			" " " " " 2.0			
13	59.0	60.5			No Recovery Heave in Auger 5.0			
14	64.0	65.5			No Recovery " " " 5.0			
15	69.0	70.5		69.0	No Rec. heave in Augers			

BLOWS ON CASING B
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1- 2
2- 3
3- 4
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*A Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

* B Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in. casing 12 inches.

REMARKS: Wet on Spoon...*.Wash...out
Water level after 24 hrws. 4/26/ - 8.5

GROUND WATER

DNF 1000081

AR323705

No Waste

WALTON CORPORATION
Drilling Contractor
P. O. BOX 1097, NEWARK, DELAWARE 19711

BORING LOG

NAME DuPont Comapny PROJECT NO.
Newport, Delaware SUPERVISOR

BORING NO. TB#3 (D-3) DRILLER W. Patterson DATE 4-24-80
WEATHER Sunny & Cool SURFACE ELEVATION DATUM

Sample No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials	*Blows A		
			0		Brn. & Gray Silt w/Sand & Tr. Mica			
1	1.0	2.5			Same	1	1	2
2	4.0	5.5			Same	1	1	1
3	9.0	10.5		9.5	Same	WH	1	3
			9.5	13.0	Gray Silt w/Some Clay & Tr. F Sand			
4	14.0	15.5	13.0	19.0	Brn. & Gray Silt w/Sand,Veg.	WH	1	2
5	19.0	20.5	19.0	23.0	Brn. F/M Sandy Silt w/Tr. Veg.	WH	1	2
					& Mica			
6	24.0	25.5	23.0	28.5	Brn. M/C Sand,Silt & Grav.	39	50/	3
7	29.0	30.5	28.5	34.0	Reddish Clayey Sand w/Some Silt	11	20	18
* 8	34.0	35.5	31.0		Lt. Brn. M/C Sand w/Reddish Clay	7	11	24
					& Silt			
9	39.0	40.5		40.0	Same	11	10	14
			40.0		Var. Clayey F/M Sand & Silt	6	8	12
* 10	45.0	45.5			Same	6	9	12
11	49.0	50.5			Same	7	9	14
12	54.0	55.5		54.5	Same	2	4	8
			54.5		Variegated M Sand & Silt w/Some			
					Clay			
13	59.0	60.5			Same	3	6	9
14	64.0	65.5			Same	7	9	14
15	69.0	70.5		69.5	Same	16	23	39

69.5 70.5 Lt. Brn. F/M Sand & Silt

*A Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

* B Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in. casing 12 inches.

REMARKS: Wet on Spoon 23.0 * Wash Out
Water Level after 24 hrs. 11.8 Hole heaved in augers 53.0 - 4/25

GROUND WATER

BLOWS ON CASING B

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1- 2
2- 3
3- 4
4- 5
5- 6
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DNE 1000082

AR323706

No Waste

WALTON CORPORATION
Drilling Contractor
P. O. BOX 1097, NEWARK, DELAWARE 19711

BORING LOG

ME DuPont Company PROJECT NO.
Newport Plant SUPERVISOR

BORING NO. TB#4 (D-4) DRILLER W. Patterson DATE 4-23-80
WEATHER Sunny & Cool SURFACE ELEVATION DATUM

Sample No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials	*Blows A		
			0		Brn. & Gray Silty M Sand & Veg.			
1	1.0	2.5		3.0	Same	4	3	4
2	4.0	5.5	3.0		Br. & Gray Silt w/Sand & Veg.	2	2	2
3	9.0	10.5		10.0	Same	WH	WH	WH
			10.0		Gray Silt w/Veg. & Tr. F Sand			
4	14.0	15.5		8'	Same [Shelby Tube 16.1'-16.3']	1	2	3
5	19.0	20.5	18.0		Brn. & Gray Silty Sand & Veg.	1	7	9
				24.0	Brn. & Gray Silt F/M Sand & Grav.			
					Tr. Veg. & Mica			
6	24.0	25.5	24.0	26.5	C Sand & Grav. w/Tr. Silty	7	50/.1	
			26.5	28.0	Reddish Brn. Clay w/Sand Tr. Silt			
7	29.0	30.5	28.0	30.0	Var. M Sand & Silt w/Tr. Clay	11	13	16
8	34.0	35.5	30.0	36.0	Lt. Brn. M/C Sand & Grav.w/Silt	10	14	16
9	39.0	40.5	36.0	41.0	Reddish Brn. & Gr.Clayey Silt	7	12	12
					w/F/M Sand			
			41.0	44.0	Lt. Brn. Silty F/M Sand w/Tr. Clay			
10	44.0	45.5	44.0	49.0	Variegated Clayey F/M Sand w/Tr	1	2	3
					Silt			
11	49.0	50.5	49.0	54.0	Same	3	5	10
12	54.0	55.5	54.0		Lt. Brn. F/M Sand & Silt	3	6	6
13	59.0	60.5		59.5	Same	9	23	23
			59.5		Reddish Brn. & Lt. Gray F/M Sand & Silt w/Tr. Clay			

*A Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

* B Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in. casing 12 inches.

REMARKS:

GROUND WATER

BLOWS ON CASING B
0- 1
1- 2
2- 3
3- 4
4- 5
5- 6
6- 7
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AR323707

WALTON CORPORATION
Drilling Contractor
P. O. BOX 1097, NEWARK, DELAWARE 19711

BORING LOG

AM: DuPont Company
Newport Plant (D-4)
PROJECT NO.
SUPERVISOR

BORING NO.	DRILLER	DATE
TB#4 Continued	W. Patterson	4-23-80
WEATHER	**SURFACE ELEVATION**	**DATUM**
Sunny & Cool		

Sample No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials	*Blows A		
14	64.0	65.5			No Recovery Heave in augers	3.0		
15	69.0	70.5		69.0	No Recovery Heave in augers	5.0		

BLOWS ON CASING B
0- 1
1- 2
2- 3
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A Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three in. increments.

B Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in. casing 12 inches.

REMARKS: .....

GROUND WATER

DNE 1000084

AR323708

No Waste

WALTON CORPORATION

Drilling Contractor

P. O. BOX 1097, NEWARK, DELAWARE 19711

BORING LOG

NAME DuPont Company PROJECT NO.

Newport Plant SUPERVISOR

BORING NO.	DRILLER	DATE
TB#6 (D-6)	G. Truver	4-12-80
WEATHER	**SURFACE ELEVATION**	**DATUM**
Sunny & Cool		

Sample No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials	*Blows A		
			0		Br. & Gray Silt w/Veg. & Tr.			
					Sand			
1	1.0	2.5			Same	1	2	2
2	4.0	5.5			Same	2	1	2
3	9.0	10.5		12.0	Same	WH	WH	2
4	14.0	15.5	12.0	17.5	Gray Silt w/Tr. Clay, Mica F Sand	2	2	2
					& Vegetation			
5	19.0	20.5	17.5		Gray Silt w/Sand Lenses & Tr.	WH	1	2
					Mica			
6	24.0	25.5		29.0	Same	WH	1	2
7	29.0	30.5	29.0	32.0	Gray F/C Sand & Grav. w/Tr. Silt	10	17	14
* 8	34.0	35.5	32.0	38.0	Gray MC Sand w/Tr. Grav. &	17	21	25
					Pieces of Rock			
* 9	39.0	40.5	38.0		Brn. Silty F/M Sand	8	11	12
* 10	44.0	45.0		49.0	Heave in Auger Counln't recover	Sample		
* 11	49.0	50.5	49.0	53.0	Var. Silty Clay w/Tr. Sand	9	9	13
12	54.0	55.5	53.0		Variegated Clayey M/C Sand	7	9	12
* 13	59.0	60.5		62.0	Same	10	17	16
* 14	64.0	65.5	62.0		Variegated Silty F Sand w/Clay	8	9	12
					layer w/Tr. Clay			
15	69.0	70.5		70.5	Same	12	19	20

Berm

19'

*A Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

* B Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in. casing 12 inches.

REMARKS: Wet on Spoon 23.5

*Washout

Water Level 8.0

GROUND WATER

DNE 1000086

AR323709

BLOWS ON CASING B

0- 1
1- 2
2- 3
3- 4
4- 5
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WALTON CORPORATION
Drilling Contractor
P. O. BOX 1097, NEWARK, DELAWARE 19711

BORING LOG

E.I. DuPont De Nemours & Company ..... PROJECT NO. .....
Newport Plant, Newport, DE. ..... SUPERVISOR .....

NG NO.	DRILLER	DATE
DM-7	G. Truyer	9-8-81
HER	SURFACE ELEVATION	DATUM
Cloudy		

ple	Sample Depth - Feet		Depth Strata Feet		Driller's Description of Materials	*Blows A		
	From	To	From	To				
			0	2.0	Gray Silt w/Some Clay			
			2.0	4.0	Gray Silty Clay w/Tr. Veg.			
	4.0	5.5	4.0		Gray Silty Clay w/Veg.	1	1	2
	9.0	10.5		12.5	Same	1	1	2
	14.0	15.5	12.5		Gray Silty Clay w/Sand Lenses & Tr.	1	1	2
				Marsh Deposit	Vegetation			
	19.0	20.5			Same	1	1/1	0
	24.0	25.5		24.5	Same	WH	1	1
			24.5	27.5	Gray F/M Sand w/Mica & Tr. Silt			
	.0	30.5	27.5	32.5	Gray F/C Sand w/Clay Lenses, Veg. &	1	1	1
				Columbia	Tr. Gravel			
	34.0	35.5	32.5	37.0	Gray F/C Sand & Gravel	14	53	19
	39.0	40.5	37.0	42.0	Red F/M Sandy Clay w/Tr. Gravel	16	8	9
	44.0	45.5	42.0		Var. Clayey F/C Sand w/Tr. Silt & Grav	4	3	4
0	49.0	50.5		Potomac	No Recovery (2 attempts)	3	2	1
1	54.0	55.5			Red F Sand w/Tr. Gravel	WR/1.5		
2	59.0	60.5			Same (Tr. Silt)	4	3	2
3	64.0	65.5		65.2	Same (Tr. Silt)	8	8	6
			65.2		Red F Sandy Clay w/Tr. Silt			
14	69.0	70.5			Same	5	9	13
15	74.0	75.5		75.2	Same	9	12	18
			75.2		Var. Clayey F Sand w/Tr. Silt			

Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three n. increments.

Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in. casing 12 inches.

MARKS: ..... * Wet on Rods @ 17.5 ..... DNE 1004197
+Wash Water Used .....
@ Washed ahead of auger's .....

GROUND WATER

BLOWS ON CASING B
0- 1
1- 2
2- 3
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DMV-7 40' 50' soil

AR323710

Drilling Contractor

P. O. BOX 1097, NEWARK, DELAWARE 19711

BORING LOG

E.I. DuPont De Demours & Company ..... PROJECT NO. .....

Newport plant, Newport, DE ..... SUPERVISOR .....

BORING NO.	DRILLER	DATE
DM-7 Cont		
WEATHER	**SURFACE ELEVATION**	**DATUM**
		-

Sample No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials	*Blows A		
			75.2		Var. Clayey F Sand w/Tr. Silt			
16	79.0	80.5		80.0	Same	8	12	15
			80.0		White Silty Clay w/Tr. F Sand			
			80	81.0	White Silty Clay w/Tr. F Sand			
17	84.0	85.5	81.0	86.5	Var. Clayey F/C Sand w/Tr. Silt	7	10	11
18	89.0	90.5	86.5		Red & White Silty Clay	4	8	12
19	94.0	95.5		94.2	Same	6	8	9
			94.2	96.5	White Clayey F/M Sand w/Tr. Silt			
20	99.0	100.5	96.5		Var. Silty Clay w/Tr. F Sand	8	11	15
21	104.0	105.5		107.0	Same	5	10	13
22	109.0	110.5	107.0	112.0	Gray Silty Clay w/Tr. Veg.	7	15	20
23	114.0	115.5	112.0	117.0	Light Gray F/M Sand w/Veg. Tr. Clay	23	22	30
24	119.0	120.5	117.0	122.5	Gray Clayey F/M Sand w/Veg.	6	11	20
25	124.0	125.5	122.5		Dk. Gray Organic Clay w/Silt	20	25	43
26	129.0	130.35		133.5	Same & Wood	29	50	100/0
27	134.0	135.5	133.5	137.0	Var Clayey F/M Sandw/Silt	13	18	22
28	139.0	140.5	137.0		Var. Silty Sand w/Mica	11	16	23
29	144.0	145.5			Same	15	24	45
30	149.0	150.5			Same	17	27	40
31	154.0	155.5		155.5	Same	16	26	66

BLOWS ON CASING B
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1- 2
2- 3
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DM

*A Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

*B Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in. casing 12 inches.

REMARKS: X Decomposed Rock ..... DNE 1004198

GROUND WATER

AR323711

EA Engineering, Science, and Technology, Inc.

LOG OF SOIL BORING

Job. No.	12352.13
Client	DELDOT Basin Rd.
Location	Newport, DE
Drilling Method:	8-80 HSA
Boring No.	EA-10
Sampling Method:	24-in O.D. split spoon driven by 140-lb hammer falling 30-in
Sheet	1 of 2

Coordinates:
Surface Elevation:
Casing Above Surface:
Reference Elevation: Gound Surface
Reference Description:

Water Lev.					
Time					
Date					
Reference					

Drilling	Start	Finish
	14May93	15May93
	1335	0645
	1400	0805

Surface Conditions: Grass

Sample Type	Inches Drvn/In. Recvrd	Dpth. Csg.	Samp. # /samp. depth	PID (ppm) HNu	Blows per 6 in.	Depth in Feet	USCS Log	
SS	24 / 14		EA10-0-4			0	ML	3" Brown, dry, organic silt, trace fine sand.
							SW	11" Orange, dry, medium to course sand, some fine gravel.
						1		
SS	24 / 14					2	SM	8" Brown/red, dry, silt, some fine to medium sand.
							CL	1" Gray, dry, clay, trace silt.
						3	SM	5" Orange, dry, silt, some fine to medium sand.
SS	24 / 14		EA10-4-8			4	CL	14" Orange/gray, dry, silty clay, trace fine sand.
						5		
SS	24 / 14					6	SM	8" Orange/brown, dry, silt, trace fine sand.
							CL	2" Gray, dry, clay, trace silt.
						7	SM	4" Brown, dry, silt, trace fine sand.
SS	24 / 14		EA10-8-12			8	CL	8" Gray, dry, clay, trace silt.
							SW	6" Orange, wet, well graded sand, trace gravel.
						9		
	24 / 14					10	CL	2" Gray, moist, clay, some silt
							SW	12" Orange, wet, well graded sand, trace fine gravel.
						11		
SS	24 / 16		EA10-12-16			12	SW	10" Orange, wet, well graded sand, trace fine gravel.
							SW	6" Orange/ black stained , wet, well graded sand, trace fine gravel.
						13		
SS	24 / 24					14	SW	24" Orange/brown/black stained, wet, well graded sand, trace fine gravel.
						15		
SS	24 / 24		EA10-16-20			16	SW	24" Orange/brown black stained, wet, well graded sand, trace fine gravel.
						17		
SS	24 / 20					18	SW	24" Orange/brown/black stained, wet, well graded sand, trace fine gravel.
						19		
SS	24					20		

Logged by: David A. Blough Date: 15 May 93

Drilling Contractor: Hardin-Huber, Inc. Driller: Charles Coffindaffer

AR323712

EA Engineering, Science, and Technology, Inc.

LOG OF SOIL BORING

Job. No.	12352.13
Client	DELDOT Basin Rd.
Location	Newport, DE
Drilling Method:	B-80 HSA
Boring No.	EA-10
Sampling Method:	24-in O.D. split spoon driven by 140-lb hammer falling 30-in
Sheet	2 of 2

'inates:
ce Elevation:
Casing Above Surface:
Reference Elevation: Gound Surface
Reference Description:

Water Lev.				
Time				
Date				
Reference				

Drilling Start	Drilling Finish
14May93	15May93
1335	0645
1400	0805

Sample Type	Inches Drvn/In. Recvrd	Dpth. Csg.	Samp. # /samp. depth	PID (ppm) HNu	Blows per 6 in.	Depth in Feet	USCS Log	Surface Conditions: Grass
SS	24 / 24		EA10-20-24			20	SW	24" *Orange/black stained, wet, well graded sand, trace fine gravel.*
						21		
SS	24 / 24					22	SW	12" Orange/black stained, wet, well graded sand, trace fine gravel.
							OL	12" Brown, moist, clay, some organic silt.
						23		
						24		

Logged by: David A. Blough Date: 15 May 93

Drilling Contractor: Hardin-Huber, Inc. Driller: Charles Coffindaffer

AR323713

rvo waste encountere

EA Engineering, Science, and Technology, Inc.

LOG OF SOIL BORING

Coordinates:	
Surface Elevation:	
Casing Above Surface:	
Reference Elevation:	Gound Surface
Reference Description:	

Job. No.	Client	Location
12352.13	DELDOT Basin Rd.	Newport, DE

Drilling Method: B-80 HSA

Boring No. EA-12

Sampling Method: 24-in O.D. split spoon driven by 140-lb hammer falling 30-in

Sheet 1 of 1

Water Lev.					Drilling Start	Drilling Finish
Time					15May93 1015	15May93 1130
Date						
Reference						

Surface Conditions: Grass

Sample Type	Inches Drvn/In. Recvrd	Dpth. Csg.	Samp. # /samp. depth	PID (ppm) HNu	Blows per 6 in.	Depth in Feet	USCS Log	
SS	24 / 14		EA12-0-4			0	SM	2" Gray, dry, fine sand, some silt, trace gravel.
							SW	8" Orange, dry, well graded sand, trace gravel.
						1	SM	4" Brown, dry, silt, some fine sand.
SS	24 / 14					2	SM	14" Orange, dry to moist, densely compacted, silt, some meduim sand.
						3	MARSH	
SS	24 / 14		EA12-4-8			4	SM	14" Orange, dry to moist, densely compacted, silt, some meduim sand.
						5		
SS	24 / 18					6	SM	18" Orange, dry to moist, densely compacted, silt, some fine to medium sand.
						7		
SS	24 / 18		EA12-8-12			8	SM	15" Orange, dry to moist, densely compacted, silt, some fine to medium sand.
							SW	3" Orange, moist, well graded sand, trace fine gravel.
						9		
	24 / 14					10	SM	3" Gray, dry, silt, some fine sand.
							SW	11" Orange, wet, well graded sand.
						11		
SS	24 / 14		EA12-12-16			12	SW	14" Orange, wet, well graded sand, some fine gravel.
						13		
SS	24 / 12					14	SM	3" Brown, moist, fine sand, some silt.
							SW	9" Orange, wet, well graded sand.
						15		
SS	24 / 24		EA12-16-18			16	SW	24" Orange/black stained, wet, well graded sand.
						17		
SS	24					18		
						19		
						20		

Logged by: David A. Blough Date: 15 May 93

Drilling Contractor: Hardin-Huber, Inc. Driller: Charles Coffindaffer

AR323714

LOG of BORING No. MW-18A/18B

DATE 9/26-10/4/88 SURFACE ELEVATION 10.64 LOCATION FIGURE 1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0			MW-18A					
		29	Gray-brown and orange-brown silty coarse to fine angular gravel					
			becomes light brown with a trace of gravel					
5		28		2.64				
			Orange-brown and light gray mottled fine sand and clay	0.64				
10		17	Orange silty medium to fine sand ?					
			becomes saturated and brown, trace silt	- 2.86				
15		2	Based on EA logs, EA-15, EA-11 and EA-4 this interval is the black chemical fill					
		2						
20		2	(FILL)	-10.36				
		4	Soft dark gray organic clay					
25		5	(MARSH DEPOSITS)	-17.86				
30		35	Brown coarse to fine sand and well rounded gravel, trace mica					
35		42	(COLUMBIA FORMATION)	-27.86				
40		14	Yellow-brown and light gray mottled clayey fine sand, trace coarse sand	-32.86				
45		10	Stiff to firm red-brown, yellow-brown, and light gray mottled silty clay, highly plastic, trace fine sand	-34.86				

Continued on next page

Completion Depth 90.5 Feet Water Depth ~ 13 Feet Date 9/26/88

Project Name DuPont, Newport; Phase II RI Project Number 88C2076-4C

Woodward-Clyde Consultants

LOG of BORING No. MW-18A/18B

DATE 9/26-10/4/88 SURFACE ELEVATION 10.64' LOCATION FIGURE 1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45			(See previous page for soil description)	-37.86				
50		15	Yellow-brown, red-brown and light gray mottled fine sand and silty clay	-41.36				
55		40	Yellow-brown to olive medium to fine sand, trace silt and vugs of light gray clay	-45.36				
60		15	Stiff to firm olive-brown, red, and light gray mottled silty clay, trace fine sand, highly plastic	-51.36				
65		56	Light gray, yellow-brown, and pale olive banded medium to fine sand, trace silt					
70		43	with 6 inches of coarse to fine sand in a light gray kaolinitic clay matrix becomes orange, then light brown	-62.86				
75		26	Light gray and yellow-brown coarse to fine sand, trace silt	-67.86				
80		36	Yellow-brown medium to fine sand, trace silt with 3 inches of white clayey coarse quartz sand (POTOMAC FORMATION)	-72.86				
85		21	Olive-brown and light gray completely weathered gniess					
90		32	(BEDROCK)	-79.36				

Completion Depth 90.5 Feet Water Depth ~ 13 Feet Date 9/26/88

Project Name DuPont, Newport Site; Phase II RI Project Number 88C2076-4C

Woodward-Clyde Consultants

LOG of BORING No. MW-23A

DATE 9/18/90 SURFACE ELEVATION 7.8 LOCATION See Figure #2

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0		11	SS	Topsoil	7.3
		10	SS	Orange-brown, SILTY MEDIUM TO FINE SAND, little coarse sand and fine gravel, trace debris -Light orange-brown silty clay lens, trace medium sand	
		12	SS	(FILL)	3.8
5		9	SS	Brown, COARSE TO FINE SAND AND GRAVEL, little silt, angular to sub-round, poorly-sorted, micaceous, black opaque minerals	
		3	SS	-Becoming coarser with depth	
10		5	SS		
		3	SS	DOT Fill	
15		4	SS		
		13	SS		
		3	SS		
20		3	SS	Dark brown-gray, SILTY MEDIUM TO FINE SAND, micaceous and black mineral grains	-12.2
		13	SS	MARSH DEPOSIT	
				Orange-brown, red-brown, and gray, FINE SANDY SILTY CLAY	-15
		50	SS	(OTHER QUATERNARY)	-16.2
25				Gray, SILTY MEDIUM TO FINE SAND	-18.2
		34	SS	Brown, COARSE TO FINE SAND AND GRAVEL, little silt, subangular to subround, micaceous	
		22	SS		
30		9	SS	(COLUMBIA)	-23.7
		14	SS	Light gray, MEDIUM SAND, trace clay	-24.2
				Yellow-brown, red, and gray, MEDIUM TO FINE SANDY CLAY interbedded with CLAYEY MEDIUM TO FINE SAND	
35				(POTOMAC)	-26.2
40					

Note:
1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.

Completion Depth: 34.0 ft.

Water Depth: 5.0 ft.

Project No.: 88C2076-4S

Project Name: Du Pont Newport Site

Drilling Method: 6.25" I.D. H.S.A.

Woodward-Clyde Consultants

AR323717

LOG of BORING No. MW-24A

DATE 9/19/90 SURFACE ELEVATION 3.9 LOCATION See Figure #2

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0		10	SS	Topsoil	3.6
				Brown-gray with orange mottles, FINE SANDY SILT	1.9
		7	SS	Black, CLAY, little sand	
				- Becoming red-brown, SILT	-0.1
		3	SS	Brown, MEDIUM TO FINE SAND	-1.1
5				Orange-brown and olive-gray, CLAYEY MEDIUM TO FINE SAND, micaceous	
		1	SS		
		9	SS	Marsh	
10		5	SS	-With gray, fine sandy clay lens	
				(OTHER QUATERNARY)	-8.1
		26	SS	Brown, dark brown, orange-brown COARSE TO FINE SAND AND GRAVEL, little silt, quartzose and micaceous, angular to sub-round	
		18	SS		
15		24A			
		8	SS		
		12	SS		
				(COLUMBIA)	-16.1
20		14	SS	Orange-brown FINE SANDY CLAY	-16.7
				White, CLAY AND FINE SANDY CLAY interbedded with CLAYEY FINE SAND TO FINE SAND, little coarse to medium sand seams, quartzose	
		8	SS		
				(POTOMAC)	-20.1
25					
30					
35					
40					

Note:
1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.

Completion Depth: 24.0 ft. Water Depth: 5.0 ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 6.25" I.D. H.S.A.

Woodward-Clyde Consultants

AR323718

LOG of BORING No. MW-25A

DATE 9/17/90 SURFACE ELEVATION 6.4 LOCATION See Figure #2

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0		4	SS	Topsoil	6.1
				Brown, orange-brown, FINE SANDY SILT, little clay trace organics (OTHER QUATERNARY)	4.4
		8	SS	Dark brown, little orange brown, poorly-sorted, COARSE TO FINE SAND AND GRAVEL, little silt, micaceous, quartzose, black mineral grains, angular to sub-round	
		16	SS		
5		18	SS		
		22	SS		
10		15	SS		
	25A	30	SS		
		13	SS	-Becoming orange-brown (COLUMBIA)	-9.5
15		10	SS	Orange-brown becoming dark gray, CLAY TO SILTY CLAY, little fine sand, micaceous	
				-Becoming white, with red and orange mottles, with trace medium sand lenses	
		5	SS		
20		7	SS	-Becoming fine sandy clay	
		5	SS	White, MEDIUM TO FINE SAND, little silt/clay, little micaceous and black mineral grains (POTOMAC)	-17.6
25					
30					
35					
40					

Note:
1) Standard penetration resistance results indicated by (*) are blows required to drive a 3 I.D. split-spoon through 1-foot with a 140-pound hammer free-falling 30-inches.

Completion Depth: 24.0 ft.

Water Depth: 2.7 ft.

Project No.: 88C2076-4S

Project Name: Du Pont Newport Site

Drilling Method: 6.25" I.D. H.S.A.

Woodward-Clyde Consultants

AR323719

RIB-11

LOG of BORING No. B-11

DATE 7/16/90 SURFACE ELEVATION 18.5 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0				Asphalt Pavement	18.3
				Re-inforced Concrete	16.5
		10*	SS	Dark brown with blue tint, MEDIUM TO FINE SANDY SILT, little coarse sand and gravel	14.5
5		11	SS	Light blue-gray with orange mottles, FINE SANDY SILTY CLAY TO FINE SANDY CLAY, micaceous	
		13	SS	(FILL)	10.5
		12*	SS	Orange, FINE SANDY SILT, little clay, trace medium sand and dark brown decomposed organics	
10				-Becoming orange-brown, SILTY COARSE TO FINE SAND, micaceous	
15		12*	SS	Light brown to light olive-brown, FINE SANDY CLAYEY SILT, micaceous (15.0; ≈5' thick)	3.5
				20.0 (OTHER QUATERNARY)	-1.5
20		6*	SS	Orange, SILTY MEDIUM TO FINE SAND, little coarse sand and fine gravel	
25		19*	SS	-Becoming yellow, light gray, red (COLUMBIA)	-8.5
				Red and white, MEDIUM TO FINE SANDY CLAY	-9.3
				White and orange, SILTY COARSE TO FINE SAND, some medium to fine sandy clay lenses	
30		7*	SS		
		18	SS	Red with light gray and yellow, FINE SANDY CLAY TO CLAY with little to trace fine to medium sand (POTOMAC)	-15.0
35					-17.5
40					

Note:
1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.
2) Surface elevation is estimated from the Newport Landfill topographic map (5/87) supplied by DuPont.

Completion Depth: 36.0 ft.

Water Depth: 10.0 ft.

Project No.: 88C2076-4S

Project Name: Du Pont Newport Site

Drilling Method: 4.25" I.D. H.S.A.

Woodward-Clyde Consultants

AR323720

(KIB-13)

LOG of BORING No. B-13

DATE 7/18/90 SURFACE ELEVATION 17.5 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEV.
0				Brown and gray, orange mottled, SILTY COARSE TO FINE SAND AND GRAVEL, little debris, asphalt pavement and concrete fragments	
		25*	SS		
		5	SS		
5		6	SS		
		20*	SS	8.0 (FILL)	9.5
				Dark gray, ORGANIC CLAYEY SILT, micaceous, little fine sand becoming orange with increasing fine sand content	8.0
10				Orange, SILTY MEDIUM TO FINE SAND, micaceous, little coarse sand	
		no sample		~9' thick	
		18*	SS		
15				Very soft to soft, light brown, SILTY CLAY	2.5
				17.0 (OTHER QUATERNARY)	0.5
				Brown, orange, and white, SILTY MEDIUM TO FINE SAND, little coarse sand and fine gravel, quartzose and micaceous	
20		20*	SS		
				-Becomes gravelly	
25		25*	SS		
30				(COLUMBIA)	-15.0
		36*	SS	Stiff, red, yellow, orange, and white mottled, MEDIUM TO FINE SANDY CLAY (POTOMAC)	-16.5
35					
40					

Notes:
1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.
2) Refusal of hollow-stem augers at 8.0 feet. Offset boring approximately 2.0 feet north and 10.0 feet west. Remainder of boring completed at offset location.
3) Surface elevation is estimated from the Newport Landfill topographic map (5/87) supplied by DuPont.

Completion Depth: 34.0 ft. Water Depth: 6.0 ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 4.25" I.D. H.S.A>

Woodward-Clyde Consultants

AR323721

RIB-14

LOG of BORING No. B-14

DATE 7/18/90 SURFACE ELEVATION 18.5 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0		60	SS	Asphalt Pavement (4")	18.2
				Brown to gray, SILTY GRAVELLY COARSE TO FINE SAND, little debris and clinker	16.5
		17*	SS	Orange-brown, SILTY FINE GRAVEL COARSE TO FINE SAND, very micaceous	
		18	SS		
5		67	SS		
		55*	SS	- with coarse to fine gravel at 8.0 feet	
				10.0 (FILL)	8.5
10		17	SS	Orange and light olive-gray with dark brown blebs, SILTY MEDIUM TO FINE SAND, little gravel, similar lithology as above, but with higher degree of sorting and decomposed organics	
		27	SS	~5' thick	
		36*	SS	15.0' (OTHER QUATERNARY)	4.0
15				Brown, orange-brown, and white, COARSE TO MEDIUM SAND AND FINE GRAVEL, trace coarse gravel, fine sand, and silt, quartzose and little mica, sub-angular to sub-round	
					-1.5
20		12*	SS	Brown, tan, gray, and white, SILTY MEDIUM TO FINE SAND, trace coarse sand and gravel, micaceous	
25		78*	SS	- becoming dark red-brown and coarser	
					-8.5
				Very dense, red-brown to orange-brown, COARSE TO MEDIUM SAND AND FINE GRAVEL, trace fine sand and silt	
30				(COLUMBIA)	-13.5
		47*	SS	Brown, red, and yellow, SILTY MEDIUM TO FINE SAND, trace coarse sand and clay	-14.5
		31	SS	Stiff to firm, red to yellow-brown, MEDIUM TO FINE SANDY CLAY, trace coarse sand and fine gravel	
35					-19.5
		40*	SS	Red with white and yellow mottling, SILTY CLAY TO CLAY, trace medium to fine sand (POTOMAC)	-21.5
40					

Notes:
1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.
2) Surface elevation is estimated from the Newport Landfill topographic map (5/87) supplied by DuPont.

Completion Depth: 40.0 ft.

Water Depth: 8.0 ft.

Project No.: 88C2076-4S

Project Name: Du Pont Newport Site

Drilling Method: 3.25" I.D. H.S.A.

Woodward-Clyde Consultants

AR323722

KIB-16

LOG of BORING No. B-16

DATE 7/30/90 SURFACE ELEVATION 18.0 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEV.
0				Light gray-brown with dark orange mottling, SILT TO CLAYEY SILT, little fine sand, micaceous	
		44*	SS		
5		12	SS	-Increasing clay content, grading to silty clay with little sand	
		26	SS	-Becoming clayey silt	
				Orange-brown SILTY MEDIUM TO FINE SAND, micaceous 8.0	11.0
		12*	SS	Orange-brown, CLAYEY COARSE TO FINE SAND, little fine gravel, micaceous 4' thick (FILL)	10.0
10		9	SS	Gray, ORGANIC MEDIUM TO FINE SANDY CLAY, little vegetative matter, micaceous 12.0 (OTHER QUATERNARY)	8.5
				Orange-brown, SILTY MEDIUM TO FINE SAND, becoming SILTY COARSE TO FINE SAND	6.5
15		25*	SS	- Clay bed 15.5 to 15.7 feet, micaceous	
20		21*	SS	-Becoming gravelly	
25		91*	SS	(COLUMBIA)	-9.5
				Firm, white with brown-yellow mottles, FINE SANDY CLAY (POTOMAC)	-10.0
30				Notes: 1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications. 2) Surface elevation is estimated from the Newport Landfill topographic map (5/87) supplied by DuPont.	
35					
40					

Completion Depth: 28.0 ft.

Water Depth: 7.0 ft.

Project No.: 88C2076-4S

Project Name: Du Pont Newport Site

Drilling Method: 3.25" I.D. H.S.A.

Woodward-Clyde Consultants

AR323723

RJB-17

LOG of BORING No. B-17

DATE 7/25/90 SURFACE ELEVATION 18.5 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0				Asphalt Pavement	18.3
		37*	SS	Brown, SILTY SAND AND GRAVEL (FILL)	15.5
		22	SS	Brown, orange, and gray mottled, SILTY CLAY Becoming CLAYEY SILT, little fine sand, micaceous	
5		34	SS	-Trace coarse quarts sand and fine quarts gravel	
		18*	SS	-Increasing fine sand, some thin beds of clayey fine sand	
10					
		12*	SS	Dark, orange-brown, SILTY COARSE TO FINE SAND, micaceous 15.0'	4.0
15				Dark brown-gray, ORGANIC SILTY CLAY, little vegetative matter, micaceous	3.5
				6' thick	
20		23*	SS	21.0' (OTHER QUATERNARY)	-2.5
				Gray, COARSE TO FINE SAND, little fine gravel and silt, quartzose and little micaceous	
25		12*	SS	-increasing mica content	
30					
		37*	SS	(COLUMBIA)	-14.5
				Stiff to very stiff, red, yellow, and orange-brown mottled, MEDIUM TO FINE SANDY CLAY (POTOMAC)	-15.5
35					
40					

Notes:
1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.
2) Surface elevation is estimated from the Newport Landfill topographic map (5/87) supplied by DuPont.

Completion Depth: 34.0 ft.

Water Depth: 9.0 ft.

Project No.: 88C2076-4S

Project Name: Du Pont Newport Site

Drilling Method: 4.25" I.D. H.S.A.

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AR323724

LOG of BORING No. TB-29

DATE 9/14/90 SURFACE ELEVATION 22.5 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0		17	SS	Black to orange-yellow, SILTY COARSE TO FINE SAND	
					21.0
		17*	SS	Soft, gray-yellow to black-orange, GRAVELLY CLAYEY SILT, trace sand, micaceous	
		4	SS	- Becoming SILTY CLAY	
5					
					16.5
		7	SS	Orange yellow, SILTY COARSE TO FINE SAND AND GRAVEL	16.2
		27*	SS	Soft to firm, gray with orange mottling, CLAYEY SILT TO FINE SANDY SILTY CLAY, little vegetative matter, micaceous	
10		24	SS		
		30	SS	(FILL)	10.0
				Orange-brown to tan, SILTY COARSE TO FINE SAND	
		24*	SS		
15					
		6	SS	16.5'	5.7
				Soft, gray to black, CLAYEY SILT/SILTY CLAY AND FINE SAND, micaceous	
		12	SS	5.5' thick	
20		14*	SS	- Becoming ORGANIC CLAYEY SILT	
				(OTHER QUATERNARY) 22'	0.5
				Medium dense to dense, yellow-brown to orange, COARSE TO FINE SAND AND GRAVEL, trace silt/clay seams, sub-angular to sub-round clasts	
25					
		30*	SS		
		MW-29A (A)			
30					
				(COLUMBIA)	-10.0
		45*	SS	Stiff, red with orange-yellow mottling, SILTY CLAY, trace fine sand	
35					
					-15.5
		50*	SS	Light gray to white with pink mottling, well-sorted, CLAYEY MEDIUM TO FINE SAND	
40					
					-20.5
				Continued on Page 2 of 4	

Completion Depth: 145.0 ft. Water Depth: 15.0 ft.

Project No.: 88C2076-4S

Project Name: Du Pont Newport Site

Drilling Method: 3.5" Mud Rotary

Woodward-Clyde Consultants

AR323725

LOG of BORING No. TB-29

DATE 9/14/90 SURFACE ELEVATION 22.5 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
45		24	SS	Very stiff, red with gray mottling, SILTY CLAY TO CLAYEY SILT, trace fine sand	
50		19	SS	- with olive-gray to white mottling, trace organics	
55		37	SS	Light gray, CLAYEY COARSE TO FINE SAND becomes yellow-brown with some well-rounded fine quartz gravel at 55.3 feet	-32.5
60	MW-29B	29	SS	Light gray and yellow-brown, FINE SAND with silty clay seams	-37.5
				Light gray, MEDIUM TO FINE SAND, trace coarse sand and gravel	-37.9
				Yellow-brown, MEDIUM TO FINE SAND interbedded with stiff, red clay lens	-40.5
65		32	SS	Red, orange, yellow, gray mottled, CLAYEY MEDIUM TO FINE SAND TO SANDY CLAY, little mica	-43.0
70		19	SS	- becoming light gray, clayey fine sand	
75		45	SS	Stiff, red, COARSE TO MEDIUM SANDY SILTY CLAY	-52.5
80		35	SS	Very firm to stiff, red-brown with tan mottling, CLAYEY SILT, trace fine sand with olive-brown medium to fine sand seam 80.3 to 80.5 feet	-57.5
				Hard to stiff, red with olive-brown mottling, SILTY CLAY TO CLAYEY SILT, trace angular quartz sand and gravel	-58.0
85		45	SS		
				Continued on Page 3 of 4	-65.5

Completion Depth: 145.0 ft. Water Depth: 15.0 ft.

Project No.: 88C2076-4S

Project Name: Du Pont Newport Site

Drilling Method: 3.5" Mud Rotary

Woodward-Clyde Consultants

AR323726

LOG of BORING No. TB-29

DATE 9/14/90 SURFACE ELEVATION 22.5 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEV.
90		23	SS	- with little fine sand	
95		30	SS		
				Light blue-gray, MEDIUM TO FINE SANDY CLAY	-74.5
100		55	SS	Hard, light olive-brown to light blue-gray, SILTY CLAY TO FINE SANDY CLAY, trace organics	-77.9
105		62	SS	Light olive-brown, CLAYEY MEDIUM TO FINE SAND	-82.5
				Hard to very stiff, blue-gray with red, orange and violet mottling, MEDIUM TO FINE SANDY CLAY	-83.0
110		58	SS	Hard, brown and gray mottled, CLAY, trace silt	-86.5
115		65	SS		
120		75	SS	- becoming light gray with olive-brown mottling	
125		64	SS	- with trace fine sandy clay lenses	
130		119	SS	Yellow-brown with trace red mottling, CLAYEY MEDIUM TO FINE SAND (POTOMAC)	-107.5
				Lithology description on Page 4 of 4	-109.0

MW-29C

Completion Depth: 145.0 ft. Water Depth: 15.0 ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 3.5" Mud Rotary

Woodward-Clyde Consultants

AR323727

LOG of BORING No. TB-29

DATE 9/14/90 SURFACE ELEVATION 22.5 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
135		188/10"	SS	Brown, red, orange, yellow, and olive, SANDY SILTY CLAY TO CLAYEY MEDIUM TO FINE QUARTZ SAND, schistose foliations, angular clasts, trace quartz fine gravel	
		MW-28L			
140					
				(WEATHERED BEDROCK)	
145					-122.5
150					
155					
160					
165					
170					
175					

Notes:
1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.
2) Boring advanced to 32.0 feet with hollow-stem augers and split-spoon sampler lost down hole. Driller is unable to retrieve tool. Location is abandoned and offset 5.0 feet west, then continued from 32.0

Completion Depth: 145.0 ft. Water Depth: 15.0 ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 3.5" Mud Rotary

Woodward-Clyde Consultants

AR323728

LOG of BORING No. MW-29A(F)

DATE 6/26/90 SURFACE ELEVATION 24.0 LOCATION See Figure #2

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0		76	SS	Gray becoming orange, SILTY COARSE TO FINE SAND AND GRAVEL, natural material mixed with crushed stone fill, little to trace clay	
		81	SS		
					20.1
5		14	SS	Orange-brown and gray with orange mottles, CLAYEY SILT, little to some fine sand, micaceous	
		25	SS	-Becoming silt, little clay and fine sand	
		**	SS		
10				(FILL)	10.0
15		18*	SS	Dark orange-brown, SILTY MEDIUM TO FINE SAND, micaceous and quartzose	8.5
				Orange becoming dark brown, ORGANIC SILTY CLAY	
20		40*	SS	Blue-gray to olive- and orange-brown, CLAY, little silt and fine sand, micaceous (OTHER QUATERNARY)	4.0
					2.0
25					
30					
35					
40					

MW-29A(F)

Notes:
1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.
2) (**) indicates a 3-inch spoon, no blows recorded.

Completion Depth: 22.0 ft.

Water Depth: 12.0 ft.

Project No.: 88C2076-4S

Project Name: Du Pont Newport Site

Drilling Method: 6.25" I.D. H.S.A.

Woodward-Clyde Consultants

AR323729

LOG of BORING No. TB-34

DATE 9/11/90 SURFACE ELEVATION 14.5 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
45				Orange and white, MEDIUM TO FINE SAND TO CLAYEY MEDIUM TO FINE SAND	
		28	SS	-becoming light gray	
				White with yellow and orange mottling, CLAYEY COARSE TO FINE QUARTZ SAND, trace coarse gravel, sub-angular to sub-round	-33.5
50					
		26	SS	Light gray becoming gray with orange mottling, dark gray streaks, CLAYEY MEDIUM TO FINE SAND grading to stiff, MEDIUM TO FINE SANDY CLAY	-37.5
		MW-3B			
55					
		31	SS		-43.4
				Light gray to white, COARSE TO FINE QUARTZ SAND with trace clay and fine gravel, angular to sub-angular	
60					
		40	SS	- with decomposed gneiss fragment at 62.8 feet	
		64'		(POTOMAC)	-49.1
		22	SS	Orange-brown, light gray, and white with orange and black stipples, CLAY, trace coarse to fine quartz sand, gneissic banding	
65					
70					
74				(WEATHERED BEDROCK)	-60.0
75					
80					
85					

Note:
1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.
2) Top 22.0 feet represents location B-34B, approximately 10 feet east of TB-34. Sample depths of B-34B have been corrected for elevation to TB-34.

Completion Depth: 74.5 ft. Water Depth: 11.5 ft.

Project No.: 88C2076-4S

Project Name: Du Pont Newport Site

Drilling Method: 3.25" I.D. H.S.A.

Woodward-Clyde Consultants

LOG of BORING No. TB-34

DATE 9/11/90 SURFACE ELEVATION 14.5 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
45				Orange and white, MEDIUM TO FINE SAND TO CLAYEY MEDIUM TO FINE SAND	
		28	SS	-becoming light gray	-33.5
				White with yellow and orange mottling, CLAYEY COARSE TO FINE QUARTZ SAND, trace coarse gravel, sub-angular to sub-round	
50					
		26	SS	Light gray becoming gray with orange mottling, dark gray streaks, CLAYEY MEDIUM TO FINE SAND grading to stiff, MEDIUM TO FINE SANDY CLAY	-37.5
		MW-34B			
55					
		31	SS		-43.4
				Light gray to white, COARSE TO FINE QUARTZ SAND with trace clay and fine gravel, angular to sub-angular	
60					
		40	SS	- with decomposed gneiss fragment at 62.8 feet	
		64'		(POTOMAC)	-49.1
		22	SS	Orange-brown, light gray, and white with orange and black stipples, CLAY, trace coarse to fine quartz sand, gneissic banding	
65					
70					
				(WEATHERED BEDROCK)	-60.0
75					
80					
85					

Note:
1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.
2) Top 22.0 feet represents location B-34B, approximately 10 feet east of TB-34. Sample depths of B-34B have been corrected for elevation to TB-34.

Completion Depth: 74.5 ft.

Water Depth: 11.5 ft.

Project No.: 88C2076-4S

Project Name: Du Pont Newport Site

Drilling Method: 3.25" I.D. H.S.A.

Woodward-Clyde Consultants

AR323731

LOG of BORING No. MW-36A

DATE 9/21/90 SURFACE ELEVATION 15.4 LOCATION See Figure #2

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0		4	SS	Topsoil	14.9
		13	SS	Brown and gray with orange mottling, CLAYEY SILT grading to SILTY CLAY, little fine sand, little mica, occasional sand seam	
5		7	SS	Marsh	
		9	SS		
		2	SS		6.4
10		3	SS	Gray, MEDIUM TO FINE SANDY CLAY, trace coarse sand, little organics, occasional sand seam, micaceous	4.4
				Dark brown, ORGANIC SILTY CLAY	3.3
		6	SS	Gray, CLAYEY MEDIUM TO FINE SAND	
		8	SS		
15		15	SS	Orange-brown, poorly-sorted, COARSE TO FINE SAND AND GRAVEL, little silt/clay, angular to sub-round, occasional clay lens, micaceous and quartzose	-0.1
		11	SS		
20		17	SS		
		15	SS	Gray-brown, ORGANIC CLAYEY SILT, little fine sand (OTHER QUATERNARY)	-6.6 -6.9
25		17	SS	Light orange- to olive-brown and brown with trace red mottles, MEDIUM TO FINE SAND AND GRAVEL, little fine sand and silt, sub-angular to subround	
		14	SS	(COLUMBIA)	-11.9
				Red, MEDIUM TO FINE SANDY CLAY (POTOMAC)	-12.1
30					
35					
40					

MW-36A

Note:
1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.

Completion Depth: 27.5 ft. Water Depth: 16.0 ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 6.25" I.D. H.S.A.

Woodward-Clyde Consultants

AR323732

LOG of BORING No. MW-37A

DATE 9/28/90 SURFACE ELEVATION 15.4 LOCATION See Figure #2

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0		14	SS	Topsoil	15.1
		16	SS	Brown and gray with orange mottles, CLAYEY SILT TO MEDIUM TO FINE SANDY SILT, occasional medium to fine sand lens, micaceous, trace root fragments (FILL)	11.4
5		5	SS	Brown-gray to orange becoming dark gray, ORGANIC SILTY CLAY, little fine sand, micaceous, little vegetative matter	
		4	SS		
		5	SS		
10		5	SS	-Becoming soft (OTHER QUATERNARY)	3.4
		6	SS	Gray becoming orange, well-sorted, MEDIUM TO FINE SAND, little silt/clay	2.4
		5	SS	Light orange-brown, poorly-sorted, SILTY COARSE TO FINE SAND AND GRAVEL, sub-angular to sub-round, micaceous and quartzose	
15		8	SS		
		20	SS		
20		17	SS		
		16	SS	(COLUMBIA)	-8.6
25		6	SS	Red, gray, white, yellow, and orange, CLAYEY MEDIUM TO FINE SAND AND MEDIUM TO FINE SANDY CLAY, trace coarse sand, quartzose and micaceous	
		7	SS	(POTOMAC)	-11.6
30					
35					
40					

Note:
1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.

Completion Depth: 27.0 ft. Water Depth: 13.0 ft.

Project No.: 88C2076-4S

Project Name: Du Pont Newport Site

Drilling Method: 6.25" I.D. H.S.A.

Woodward-Clyde Consultants

AR323733

(KIB-1)

LOG of BORING No. B-1

DATE 7/26/90 SURFACE ELEVATION 21.0 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0				Asphalt Pavement and Crushed Stone Sub-base	
	1	100/6"*	SS	SILTY SAND AND GRAVEL, wood pieces	19.0
				Concrete pad	18.5
				4.0	17.0
5		7*	SS	Soft to firm, dark gray to gray with trace brown to black mottling, FINE SANDY SILTY CLAY TO CLAYEY SILT, micaceous	
		8	SS		
		15*	SS	Marsh Deposit ~8.0' thick	
10		6	SS		
				- with 1-inch lens of medium to fine quartz sand 12.0	9.0
		14	SS	Interbedded orange-brown, COARSE TO FINE SAND, little silt, and gray with slight orange mottling, CLAYEY SILT, trace fine gravel (FILL)	7.2
15		16*	SS	Gray and orange-brown, MEDIUM TO FINE MICACEOUS SAND, trace fine gravel, coarse sand, and silt	
20		30*	SS		
25				(OTHER QUATERNARY)	-5.0
		47*	SS	Orange-brown, well-graded, SILTY COARSE TO FINE SAND AND GRAVEL, well-rounded, micaceous	
30				(COLUMBIA)	-11.0
		40*	SS	Brown, red, light gray, and yellow mottled, CLAYEY COARSE TO FINE SAND becoming COARSE TO FINE SANDY CLAY (POTOMAC)	-13.0
35					
40					

Note:
1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.
2) Surface elevation is estimated from the Newport Landfill topographic map (5/87) supplied by DuPont.

Completion Depth: 34.0 ft. Water Depth: 15.5 ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 3.25" I.D. H.S.A.

Woodward-Clyde Consultants

AR323734

LOG of BORING No. B-3

DATE 7/26/90 SURFACE ELEVATION 26.0 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0				Brown to orange-brown with white mottling, CLAYEY COARSE TO FINE SAND AND GRAVEL, trace silt	
		14*	SS		
					22.5
				Concrete	22.0
5		50	SS	Olive-gray, SILTY COARSE TO FINE SAND AND GRAVEL, crushed stone fill	
		16	SS	Orange-brown, SILTY FINE SAND	20.0
					18.0
		32*	SS	Orange-brown, stiff, FINE SANDY CLAY, very micaceous (FILL)	17.0
10				Orange-brown with dark brown mottles, SILTY COARSE TO FINE SAND, little fine gravel, micaceous	
		29*	SS	Black, ORGANIC SILTY CLAY	12.0
15				Orange-yellow, SILTY COARSE TO FINE SAND, little to trace gravel	11.0
				no sample	
				180? @5.0' thick	
20		4*	SS		
				Black to gray, MEDIUM TO FINE SANDY SILTY CLAY (OTHER QUATERNARY)	4.5
				22.0	4.0
				Orange-brown to yellow-brown, COARSE TO FINE SAND AND GRAVEL	
25		17*	SS		
30					
		28*	SS		
				Predominantly white, COARSE TO FINE QUARTZ GRAVEL	-7.0
				Orange-brown to yellow-brown COARSE TO FINE SAND AND GRAVEL, micaceous	-8.0
35					
		23*	SS	(COLUMBIA)	
					-13.3
40				Red and yellow, CLAYEY MEDIUM TO FINE SAND becoming stiff MEDIUM TO FINE SANDY CLAY (POTOMAC)	-14.0
					-17.0
				Notes on Page 2 of 2	

Completion Depth: 43.5 ft. Water Depth: 15.0 ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 4.25" I.D. H.S.A.

Woodward-Clyde Consultants

AR323735

(KID-3)

LOG of BORING No. B-3

DATE 7/26/90 SURFACE ELEVATION 26.0 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
45				Notes: 1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications. 2) Refusal of hollow-stem augers at 3.5 feet, offset location 5 feet northeast and advance hollow-stem auger to 4.0 feet. Subsequent split-barrel samples at offset location. 3) Surface elevation is estimated from the Newport Landfill topographic map (5/87) supplied by DuPont.	
50					
55					
60					
65					
70					
75					
80					
85					

Completion Depth: 43.5 ft. Water Depth: 15.0 ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 4.25" I.D. H.S.A.

Woodward-Clyde Consultants

AR323736

RIB-5

LOG of BORING No. B-5

DATE 7/27/90 SURFACE ELEVATION 23.0 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0		21	SS	Brown, olive-gray, orange-brown, and black mottled, CLAYEY SILT, little fine sand, trace coarse sand, micaceous	
		27*	SS		
					19.5
				Concrete	18.5
		80	SS	White, CLAYEY COARSE TO FINE SAND AND FINE GRAVEL	18.0
5				Light brown with orange mottles, CLAYEY SILT, little fine sand, micaceous, black mottles at 5.5'	
		51*	SS	(FILL)	14.0
10				Orange-brown, SILTY COARSE TO FINE SAND, micaceous, black stain at 9.5'	
		13*	SS		8.5
15				Brown with orange mottles becoming gray, MEDIUM TO FINE SANDY CLAY little mica, brown mottles at 15.5' (15.0; 5' thick; 20.0) (OTHER QUATERNARY)	3.0
20		38*	SS	Light olive-brown, orange, and black, SILTY COARSE TO FINE SAND, very micaceous	
25					
		58*	SS	-with little gravel, decreasing silt content	
30				(COLUMBIA)	-9.0
		15*	SS	Orange, yellow, light gray, and white, CLAYEY MEDIUM TO FINE SAND with fine sandy clay layer, becoming CLAYEY COARSE TO FINE SAND	
35		12	SS		
					-13.5
				Gray, yellow, red, and white, CLAYEY MEDIUM TO FINE SAND TO MEDIUM TO FINE SANDY CLAY, trace coarse sand (POTOMAC)	-13.9
40					

Notes:
1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.
2) Refusal on concrete at 3.5 ft. Offset boring 5.0 ft south. Encounter concrete at 3.5 ft and advance hollow-stem auger through to 4.5 ft. Subsequent split-barrel samples are from offset location.
3) Surface elevation is estimated from the Newport Landfill topographic map (5/87) supplied by DuPont.

Completion Depth: 37.0 ft. Water Depth: 5.5 ft.

Project No.: 88C2076-4S

Project Name: Du Pont Newport Site

Drilling Method: 4.25" I.D. H.S.A.

Woodward-Clyde Consultants

AR323737

(RIB-6)

LOG of BORING No. B-6

DATE 7/27/90 SURFACE ELEVATION 25.0 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0				Brown to orange-brown, SILTY FINE SAND, micaceous	
		17*	SS		
				-Dark brown, organic silt 3.5'	21.5
5		9	SS	Brown, MEDIUM SANDY CLAY becoming FINE SANDY CLAY with little silt, micaceous	21.0
		18	SS	Orange-brown, CLAYEY COARSE TO FINE SAND AND FINE GRAVEL, highly micaceous, sub-round to round	19.0
		28*	SS	(FILL)	
10				-Orange-brown, COARSE TO FINE SAND AND FINE GRAVEL, subround to round with black staining at 9.5'	15.0
		25*	SS		
15				-Becoming dark brown with oily sheen 15.0	9.5
				Orange-brown to brown, FINE SANDY CLAY, little silt, micaceous 25' thick 20' (OTHER QUATERNARY)	
20		40*	SS	Dark orange and brown mottled, SILTY COARSE TO FINE SAND, little clay	4.5
				Light gray, CLAYEY MEDIUM QUARTZ SAND, little fine sand	3.5
25					-1.0
		23*	SS	Orange, SILTY COARSE TO FINE SAND, little to trace fine gravel, little micaceous	
30					
		38*	SS	-Becoming finer sands	
35					
		65*	SS	(COLUMBIA)	-14.0
40		26	SS	Red, yellow, and orange, SILTY FINE SAND, little clay, red fine sandy clay lenses, black stain at 39.5' (POTOMAC)	-17.0
				Notes on Page 2 of 2	

Completion Depth: 42.0 ft. Water Depth: ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 4.25" I.D. H.S.A.

Woodward-Clyde Consultants

AR323738

LOG of BORING No. B-6

DATE 7/27/90 SURFACE ELEVATION 25.0 LOCATION See Figure #1

DEPTH, ft. / SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
45			Notes: 1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications. 2) Surface elevation is estimated from the Newport Landfill topographic map (5/87) supplied by DuPont.	
50				
55				
60				
65				
70				
75				
80				
85				

Completion Depth: 42.0 ft. Water Depth: ft.

Project No.: 88C2076-4S ft

Project Name: Du Pont Newport Site

Drilling Method: 4.25" I.D. H.S.A.

Woodward-Clyde Consultants

RIB-7

LOG of BORING No. B-7

Sheet 1 of 1

DATE 7/20/90 SURFACE ELEVATION 22.5 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0				Black SILT	
		11*	SS		19.0
		6	SS	Olive-brown becoming orange-brown, CLAYEY SILT TO SILT, trace to little fine sand, slightly micaceous	
5		11	SS		
		22*	SS	-Trace coarse to medium sand (FILL)	13.0
10				Dark orange-brown, SILTY COARSE TO FINE SAND, little fine gravel, trace clay, micaceous	
		22*	SS	Gray becoming orange, SILTY CLAY, little to trace medium to fine sand, micaceous	8.5
15				Olive-gray to orange, SILTY MEDIUM TO FINE SAND, micaceous	7.0
				no sample! 19' 2 @ 7' thick	
20		32*	SS	Dark brown, organic SILTY CLAY	2.5
				Orange SILTY CLAY, trace fine sand, micaceous 21.0 (OTHER QUATERNARY)	2.0 / 1.5
				Orange-brown with white coarse fraction, COARSE TO FINE QUARTZ SAND AND GRAVEL, little silt, sub-round to round	
25		28*	SS	(COLUMBIA)	-4.5
				Stiff to very stiff, red with yellow mottles, MEDIUM TO FINE SANDY CLAY, little micaceous (POTOMAC)	-5.5
30					
35					
40					

Note:
1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.
2) Surface elevation is estimated from the Newport Landfill topographic map (5/87) supplied by DuPont.

Completion Depth: 28.0 ft. Water Depth: 14.0 ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 3.25" I.D. H.S.A.

Woodward-Clyde Consultants

AR323740

(RFB-8)

LOG of BORING No. B-8

DATE 7/24/90 SURFACE ELEVATION 21.5 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRAT. ELEV.
0				Very soft to soft, dark gray, ORGANIC CLAYEY SILT becoming interbedded with gray, silty fine sand from 4.0 to 6.0 feet, wood fragments	
		3*	SS		
		WOH	SS		
5		6	SS	-Becoming mottled with light green-yellow, light orange, and white	
		10*	SS	9.0' (FILL)	12.5
10		17	SS	Orange-brown, SILTY CLAY, little coarse to fine sand, trace micaceous -Brown stain at 11.5'	
		32*	SS	Orange-brown to light olive-brown, SILTY MEDIUM TO FINE SAND, micaceous	7.5
15				no sample CB thick	
20		32*	SS	Stiff, orange, CLAYEY MEDIUM TO FINE SAND grading to MEDIUM TO FINE SANDY CLAY	
				Dark gray, ORGANIC SILTY CLAY, little fine sand to medium sand, micaceous 22' (OTHER QUATERNARY)	-1.0
				Dark orange-brown, CLAYEY COARSE TO FINE SAND	
25		107*	SS	Dark orange-brown, COARSE TO FINE SAND AND GRAVEL, little silt, quartzose and micaceous (COLUMBIA)	-8.5
30				Stiff, yellow, red, and white mottled, MEDIUM TO FINE SANDY CLAY, little mica	
		44*	SS	White, CLAYEY MEDIUM SAND, trace coarse quartz sand and fine gravel (POTOMAC)	-11.0 -12.5
35					
40					

Note:
1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.
2) Surface elevation is estimated from the Newport Landfill topographic map (5/87) supplied by DuPont.

Completion Depth: 34.0 ft.

Water Depth: 15.0 ft.

Project No.: 88C2076-4S

Project Name: Du Pont Newport Site

Drilling Method: 3.25" I.D. H.S.A.

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AR323741

RIB-9

LOG of BORING No. B-9

DATE 7/19/90 SURFACE ELEVATION 20.5 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0				Asphalt Pavement	20.3
		62*	SS	Light brown to light gray-brown with orange mottling, SILTY COARSE TO FINE SAND AND GRAVEL, orange silty clay lens, brick and wood fragments, white product	
		25	SS		
5		16	SS	Orange COARSE TO FINE SANDY SILT	14.5
				Light pink-gray SILTY COARSE TO FINE SAND	13.5
		19*	SS	Black to brown with white speckles, SILTY COARSE TO FINE SAND, little clay, oily sheen	12.5
10		11	SS	White, COARSE TO FINE SAND- AND GRAVEL-SIZE product becoming blue-black, FINE SANDY CLAYEY SILT	10.5
		30	SS	Blue-back SILTY COARSE TO FINE SAND AND GRAVEL	8.5
		24*	SS	15.0 (FILL)	
15				Orange, gray mottled, MEDIUM TO FINE SANDY CLAY, little silt, micaceous ~5' thick Marsh Deposit 20.0	5.5
20		17*	SS	Orange with little dark red and olive mottling, CLAYEY MEDIUM TO FINE SAND, micaceous	0.5
25				(COLUMBIA)	-5.5
		32*	SS	Red becoming yellow with white mottles, MEDIUM TO FINE SANDY CLAY	-7.0
				Orange, MEDIUM TO FINE SAND with little clay (POTOMAC)	-7.5
30					
35					
40					

Note:
1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.
2) Surface elevation is estimated from the Newport Landfill topographic map (5/87) supplied by DuPont.

Completion Depth: 28.0 ft. Water Depth: 9.0 ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 3.25" I.D. H.S.A.

Woodward-Clyde Consultants

AR323742

RIB-10

LOG of BORING No. B-10

DATE 7/19/90 SURFACE ELEVATION 20.5 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEV.
0		20	SS	Orange brown, SILTY COARSE TO FINE SAND	19.5
		117/9"*	SS	Dark brown and black, SANDY SILTY CLAY, little gravel, clinker, concrete and asphalt pavement fragments	
5		47	SS	-Becoming red-brown	
		17	SS		
		43*	SS	Light gray and orange mottled, CLAYEY SILT/SILTY CLAY, little fine sand, micaceous (FILL)	12.5
10				Black with dark brown mottles, SILTY COARSE TO FINE SAND, little clay	11.0
15		24*	SS	Brown to tan, MEDIUM TO FINE SANDY CLAY, trace silt, orange-brown, silty medium to fine sand lens 15.5' to 15.8'	6.5
				Brown, poorly-sorted CLAYEY COARSE SAND AND GRAVEL, rounded	4.7
20		16*	SS	Orange to olive-brown, CLAYEY SILT TO FINE SANDY CLAYEY SILT, trace medium to coarse sand, micaceous (20.0)	0.5
				Black, ORGANIC SILTY CLAY/CLAYEY SILT, little micaceous (~7.5' thick)	
25		34*	SS	Orange-brown, CLAYEY MEDIUM TO FINE SAND	-5.5
				Black organic silty clay, micaceous (27.5) (OTHER QUATERNARY)	-6.5 / -7.0
30				Poorly-sorted, COARSE SAND AND GRAVEL (COLUMBIA)	-11.5
		25*	SS	Orange, yellow with dark brown and red mottles, MEDIUM TO FINE SANDY CLAY, little coarse sand and fine gravel (POTOMAC)	-13.5
35					
40					

Notes:
1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.
2) Note refusal of split-barrel sampler at 3.25 feet on Portland Cement Concrete. Offset location 2 feet north by 4 feet west and advance hollow-stem augers to 4 feet. Subsequent samples from the offset.
3) Surface elevation is estimated from the Newport Landfill topographic map (5/87) supplied by DuPont.

Completion Depth: 34.0 ft.
Water Depth: 10.0 ft.
Project No.: 88C2076-4S
Project Name: Du Pont Newport Site
Drilling Method: 4.25" I.D. H.S.A.

Woodward-Clyde Consultants

AR323743

(RIB-18)

LOG of BORING No. B-18

DATE 7/30/90 SURFACE ELEVATION 19.5 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0				Brown with orange-brown mottles and gray coarse fraction, CLAYEY FINE SANDY SILT TO FINE SANDY CLAYEY SILT, trace coarse to medium sand and fine gravel	
		34*	SS		
		43*	SS		
5		39*	SS		
				(FILL)	11.4
		26*	SS	Brown and orange-brown, well-sorted, SILTY MEDIUM TO FINE SAND, trace coarse sand, thinly bedded, subangular to subround, micaceous	
10		14*	SS		
				no sample 13.0' @ ≈5' thick	
15		11*	SS		2.8
				Brown to dark brown, ORGANIC CLAYEY SILT TO SILTY CLAY with some vegetative matter 18.6' (OTHER QUATERNARY)	1.6
				Gray, GRAVEL AND COARSE TO FINE SAND, little to trace silt	
20		10*	SS	-Gray-brown silty clay lens	
25					
		13*	SS	(COLUMBIA)	-9.4
30				Light gray to white, CLAYEY MEDIUM TO FINE SAND, little coarse sand and fine gravel, subangular to subround (POTOMAC)	-10.5
35					
40					

Notes:
1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.
2) Surface elevation is estimated from the Newport Landfill topographic map (5/87) supplied by DuPont.

Completion Depth: 30.0 ft.

Water Depth: 8.0 ft. ft.

Project No.: 88C2076-4S

Project Name: Du Pont Newport Site

Drilling Method: 4.25" I.D. H.S.A.

Woodward-Clyde Consultants

AR323744

RIB-19

LOG of BORING No. B-19

DATE 7/31/90 SURFACE ELEVATION 22.5 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0				Brown, tan, orange mottled, FINE SANDY CLAYEY SILT, micaceous, trace coarse to medium sand	
		25*	SS		
		12	SS	Orange-brown, SILTY COARSE TO FINE SAND	18.5
5					17.0
		12	SS	Light brown with little orange mottling, CLAYEY SILT TO SILTY CLAY, little fine sand, micaceous	
		27*	SS	-Trace fine gravel (FILL)	13.5
10				Orange to gray, SILTY MEDIUM TO FINE SAND, little coarse sand, micaceous	
		11*	SS	-Becoming medium to fine sand, trace silt	
15				Black ORGANIC CLAYEY SILT, decomposed organic matter (15.0; 5.5' thick)	7.5
				Brown to tan, SILTY COARSE TO MEDIUM SAND, with organic clayey silt lens (20.5')	3.5
20		35*	SS	Dark gray, CLAYEY COARSE TO MEDIUM SAND AND FINE GRAVEL, trace organics	2.0
				Orange, COARSE TO MEDIUM SAND, little fine sand and silt	
25				-Becoming coarser with little fine gravel	
		19*	SS	Dark brown and dark gray, FINE SAND AND CLAY, little medium sand and silt, trace organics (OTHER QUATERNARY)	-4.0 / -4.5
				Yellow, orange, and white, COARSE TO MEDIUM SAND AND GRAVEL, little to trace fine sand and silt, micaceous	
30					
		57*	SS	(COLUMBIA)	-10.5
				Stiff to hard, red, purple, orange, yellow, gray mottled, MEDIUM TO FINE SANDY CLAY (POTOMAC)	-11.5
35					
40					

Notes:
1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.
2) Surface elevation is estimated from the Newport Landfill topographic map (5/87) supplied by DuPont.

Completion Depth: 34.0 ft.

Water Depth: 10.0 ft.

Project No.: 88C2076-4S

Project Name: Du Pont Newport Site

Drilling Method: 3.25" I.D. H.S.A.

Woodward-Clyde Consultants

AR323745

RIB-20

LOG of BORING No. B-20

DATE 10/16/90 SURFACE ELEVATION 23.0 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0		64*	SS	Orange, CLAYEY MEDIUM TO FINE SAND	21.5
		41*	SS	Brown, olive-brown, orange brown with orange mottling, interbedded FINE SANDY SILTY CLAY and becoming FINE SANDY CLAYEY SILT, trace to little coarse to medium sand and gravel	
		30*	SS		
5		22*	SS	-Medium to fine sand 6.5 to 6.8 feet	15.0
		17*	SS	Orange SILTY CLAY, little fine sand	14.0
				Gray MEDIUM TO FINE SANDY CLAY	12.5
10		20*	SS	Orange-brown and gray, SILTY COARSE TO FINE SAND with sandy clay lenses, micaceous	
		26*	SS		
				14.0 (FILL)	9.0
		20*	SS	Dark brown, ORGANIC SILT, little fine sand and clay, vegetative matter 4.5	7.0
15		20*	SS	Dark gray to dark olive gray, FINE SANDY CLAY, little silt, micaceous, little organic matter	
		25*	SS	18.5' (OTHER QUATERNARY)	4.5
				Olive-gray, gray, orange-brown, MEDIUM TO FINE SAND, little silt, trace clay lenses micaceous, becoming coarser with trace gravel	
20		22*	SS		
25					-3.0
		78*	SS	Brown, FINE GRAVELLY COARSE TO MEDIUM QUARTZ SAND, little fine sand and silt	
30					
		42*	SS	(COLUMBIA)	-10.0
				Stiff, red with yellow and gray mottled, FINE SANDY CLAY, trace medium to coarse sand (POTOMAC)	-11.0
35					
40					

Notes:
1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.
2) Surface elevation is estimated from the Newport Landfill topographic map (5/87) supplied by DuPont.

Completion Depth: 34.0 ft. Water Depth: 10.0 ft.

Project No.: 88C2076-4S

Project Name: Du Pont Newport Site

Drilling Method: 3.75" I.D. H.S.A.

Woodward-Clyde Consultants

AR323746

Drilling Contractor

P. O. BOX 1097, NEWARK, DELAWARE 19711

BORING LOG

E.I. DuPont de Nemours & Company ..... PROJECT NO. .....

Newport Plant, Newport, DE. ..... SUPERVISOR .....

NG NO.	DRILLER	DATE
DM-8	G. Truver	9-11-81
THER	SURFACE ELEVATION	DATUM
Sunny & Warm		

ple	Sample Depth - Feet		Depth Strata Feet		Driller's Description of Materials	*Blows A		
o.	From	To	From	To				
			0	0.1	Gravel Fill			
			0.1	0.3	Fill (F/M Sand)			
			0.3	4.0	Brn. Silt w/Tr. F Sand			
	4.0	5.5	4.0	4.5	Brn. Silty F/M Sand w/Gravel	5	2	3
			4.5	6.0	Brn. Silt w/Tr. Clay & Mica			
	9.0	10.5	8.0	12.5	Brn. Silty F/C Sand w/Gravel & Mica	7	16	17
	14.0	15.5	12.5	17.0	Brn. Silty F Sand w/Mica & Tr. Gravel	2	4	2
	19.0	20.5	17.0	19.4	Blk. Micaceous Silt w/Clay & Tr. F Sand	6	9	9
			19.4	22.0	Var. F/C Sand w/Clay & Tr. Gravel			
	.0	25.5	22.0	28.0	Var. Clayey F Sand w/Silt	7	2	5
	29.0	30.5	28.0	29.2	Red Sandy Clay w/Silt	4	3	3
			29.2	31.5	Variegated Silty F Sand w/Tr. Clay			
	34.0	35.5	31.5	37.0	Variegated F Sandy Clay w/Silt	4	4	7
	39.0	40.5	37.0	42.0	Var. Clayey F/M Sand w/Silt	5	4	6
	44.0	45.5	42.0	47.0	Var. F Sandy Clay w/Silt	3	6	6
0	49.0	50.5	47.0	52.0	Brn. F/M Sand w/Silt	7	8	10
1	54.0	55.5	52.0		Variegated Clayey F/C Sand w/Tr. Silt & Gravel	5	12	13
2	59.0	60.5		63.5	Same	10	14	20
3	64.0	65.5	63.5	65.2	Var. Sandy Clay w/Silt	15	15	12
			65/2	67.0	Dk. Gray F Sandy Silt w/Tr. Clay			

DM 8

umber of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three increments.

Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in. casing 12 inches.

ARKS: ...* Wet on Spoon @ 14.0

+ Wash Water Used

⊠ Washed ahead of augers

GROUND WATER

BLOWS ON CASING B

0- 1
1- 2
2- 3
3- 4
4- 5
5- 6
6- 7
7- 8
8- 9
9-10
10-11
11-12
12-13
13-14
14-15
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59-60
60-61

DNE 1001200

AR323747

WALTON CORPORATION

Drilling Contractor

P. O. BOX 1097, NEWARK, DELAWARE 19711

BORING LOG

I. DuPont de Nemours & Company ..... PROJECT NO. .....

Newport Plant, Newport, DE. ..... SUPERVISOR .....

G NO.	DRILLER	DATE
DM-8 Continued	G. Truver	9-11-81
ER	SURFACE ELEVATION	DATUM

e	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials	*Blows A		
	69.0	70.5	67.0		Var. Silty Clay w/F Sand	4	6	8
	74.0	75.5			Same	7	7	11
	79.0	80.5			Var. Silty Clay w/F Sand	7	9	10
	84.0	85.5			" " " " " "	7	9	11
	89.0	90.5			" " " " " "	9	14	20
	94.0	95.5			" " " " " "	7	9	11
	99.0	100.5			" " " " " "	13	15	19
	104.0	105.5			" " " " " "	17	24	30
	[illegible]	110.5			" " " " " "	11	16	19
	[illegible]	115.5			" " " " " "	15	18	22
	119.0	120.5			" " " " " "	19	21	23
	124.0	125.5		125.5	" " " " " "	18	21	29

BLOWS ON CASING B
0- 1
1- 2
2- 3
3- 4
4- 5
5- 6
6- 7
7- 8
8- 9
9-10
10-11
11-12
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50-51
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58-59
59-60
60-61

ber of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three crements.

ber of blows of 300 lb. hammer dropped 18 in. required to drive ..... in. casing 12 inches.

ks: ** Decomposed Rock ..... DNE 1004801

GROUND WATER

AR323748

LOG of BORING No. TB-2

DATE 6/19-27/87 SURFACE ELEVATION 16.98 LOCATION

D. ft.	SAMPLES	DESCRIPTION	ELEVATION
0		Light brown silty fine SAND └ becomes light gray-brown with coarse sand	
		5.0'	12.0
5		Gray-green micaceous silty CLAY └ becomes light orange-yellow with terra cotta chips	
10	MW-2AF	becomes gray-green, then gray and orange mottled, then red-brown Marsh Deposit ~11.5' thick	
15		becomes gray to orange, then dark gray 16.5'	0.7
		Orange and red slightly micaceous coarse to fine quartz SAND and GRAVEL	
20		Gray-orange silty CLAY	-3.0 -3.7
	MW-2MA	Yellow-brown and red-brown coarse to fine quartz SAND and GRAVEL	
25		slightly micaceous	
30		becomes brown-orange	-13.5
		Light gray gravelly coarse to fine quartz SAND and silty CLAY becomes mottled with yellow-brown and red-brown	
35		Yellow-brown clayey fine SAND to red-brown sandy CLAY	-18.0
40		becomes red and yellow-brown mottled becomes yellow to light yellow clayey fine sand	
45			

Completion Depth 152.0 Feet Water Depth - Feet Date 8/11/87

Project Name Du Pont Newport Project Number 87C2665-1A

Woodward-Clyde Consultants

LOG of BORING No. TB-2

DATE 6/19-27/87 SURFACE ELEVATION 16.98 LOCATION

DEPTH, ft.	SAMPLES	DESCRIPTION	ELEVATION
45			
			-33.0
50		Yellow-brown medium to fine quartz SAND	
			-38.0
55		Red-brown slightly micaceous clayey coarse to fine SAND and GRAVEL - becomes yellow-brown with light yellow-white vugs of clay	
60		- becomes light gray, yellow-brown, and red-brown mottled with some clay lenses - becomes light gray medium to fine sand with black minerals and some iron staining	
65	MW-28	- becomes yellow to yellow-white clayey coarse to fine sand and gravel with clay lenses - becomes medium to fine sand - becomes yellow-brown coarse to fine sand and gravel with light gray streakes of clay	
70		- becomes light gray interbedded with black minerals, no gravel	
75		- interbedded with light gray clay	
80		- becomes medium to fine sand with bands of black minerals	-63.2
		Red-brown to yellow-brown CLAY ⇓ Potomac	
85		- becomes dark red, red-brown, red, and light gray mottled	
			-73.0
90		Light yellow medium to fine SAND mottled with red and light gray clay streaks	

Completion Depth 152.0 Feet Water Depth - Feet Date 8/11/87

Project Name Du Pont Newport Project Number 87C2665-1A

Woodward-Clyde Consultants

AR323750

LOG of BORING No. TB-2

DATE 6/19-27/87 SURFACE ELEVATION 16.98 LOCATION

DEPTH, ft. / SAMPLES	DESCRIPTION	ELEVATION
90		
	becomes light gray	
95	becomes yellow, to yellow-brown, and light gray with 0.2 ft. of coarse sand and pink mottling	
100	becomes light gray coarse to medium sand	
	becomes orange-red to tan and clayey	
	becomes light yellow to light gray medium to fine sand	
	becomes light yellow gravelly coarse sand	
105	becomes yellow-orange with light gray clay lenes	-88.0
		-88.8
	Black peat with quartz grains	
	Light gray clayey quartz SAND	-93.0
110	Red-brown stiff CLAY with coarse quartz sand	
		-98.0
115	DECOMPOSED METAMORPHIC BEDROCK	
	Light green foliated weathered schist with mica, quartz, and kaolinite and red bending	
120		
125		
130	with increasing mica content	
135		

MW-2L

Completion Depth 152.0 Feet Water Depth - Feet Date 8/11/87

Project Name Du Pont Newport Project Number 87C2665-1A

Woodward-Clyde Consultants

AR323751

LOG of BORING No. TB-2

DATE 6/19-27/87 SURFACE ELEVATION 16.98 LOCATION

DEPTH, ft.	SAMPLES	DESCRIPTION	ELEVATION
135			
140		foliations nearly vertical	
145			–
150			
			-135.0

Completion Depth 152.0 Feet Water Depth – Feet Date 8/11/87

Project Name Du Pont Newport Project Number 87C2665-1A

Woodward-Clyde Consultants

AR323752

LOG of BORING No. TB-3

North side of [illegible]

DATE 7/9-13/87 SURFACE ELEVATION 10.27 LOCATION

DEPTH, ft.	SAMPLES	DESCRIPTION	ELEVATION
0		Yellow-brown silty SAND	
5	MW-3A	becomes yellow-brown to gray and micaceous	
10		Gray mecaceous CLAY (10')	0.3
		becomes gray-green and sandy, mottled with iron stains	-1.1
		Gray-green micaceous medium to fine SAND with black staining at 11.6 feet (~6')	-4.7
15		Gray to gray-green micaceous sandy CLAY mottled with iron staining (16')	-5.4
		Brown-orange stained micaceous quartz coarse to fine SAND and GRAVEL, no gravel	
20		becomes sand and gravel	-11.2
		Yellow-brown micaceous sand, CLAY	-14.7
25		Light gray and yellow-brown clayey coarse to fine SAND and GRAVEL	-15.9
		Yellow-brown and red CLAY	-19.7
30		Yellow-brown and light gray clayey coarse to fine SAND and GRAVEL with vugs of clay	
35		becomes medium to fine sand returns to clayey sand and gravel with limonite	
40		Yellow-brown and red fine sandy CLAY with quartz gravel	-29.7 -30.0
		Light gray clayey coarse to fine SAND and quartz GRAVEL with black minerals throughout	-30.7
45		Red, yellow-brown and light gray mottled sandy CLAY	

Completion Depth 147.0 Feet Water Depth - Feet Date 7/22/87

Project Name Du Pont Newport Project Number 87C2665-1A

Woodward-Clyde Consultants

AR323753

DATE 7/9-13/87 SURFACE ELEVATION 10.27 LOCATION

DEPTH, ft.	SAMPLES	DESCRIPTION (Potomac?)	ELEVATION
		Red, yellow-brown, and light gray mottled sandy CLAY	
50		becomes red, brown, and light gray mottled	
			-44.7
55		Yellow-brown, light gray, and red-brown medium to fine quartz SAND grades to a red-brown and light gray clayey SAND to sandy CLAY	-46.7
			-49.7
60		Red and red-brown medium to fine quartz SAND with coarse sand and clay lenses	
65		becomes red-brown and yellow-brown with fractured quartz coarse sand, yellow-brown clay vugs, and mica	
		becomes clayey coarse to fine sand including red clay lenses	
75		yellow-brown and red mottled	-65.33
		Red and yellow-brown mottled CLAY	
			-69.7
80	MW-3B	Yellow-brown and red mottled clayey medium to fine SAND with clay vugs and limonite	
85		becomes yellow-brown, light gray, and brown with coarse sand	
90		becomes micaceous with black mineral rich bands	

Completion Depth 147.0 Feet Water Depth - Feet Date 7/22/87

Project Name Du Pont Newport Project Number 87C2665-1A

Woodward-Clyde Consultants

DATE 7/9-13/87 SURFACE ELEVATION 10.27 LOCATION

DEPTH, ft.	SAMPLES	DESCRIPTION	ELEVATION
90			
			-84.7
95		Yellow-brown and light gray sandy CLAY 0.5 ft. of clayey medium to fine sand becomes red-purple and light gray sandy clay	
100		becomes yellow-brown and light gray	-89.9
		Yellow-brown clayey medium to fine SAND	-91.4
		Purple CLAY	
			-94.7
105		Yellow-brown medium to fine SAND with lenses of light brown and pink clay lenses	
			-99.7
110		Yellow-brown and red-brown medium to fine SAND interbedded with yellow-brown, red, and light brown mottled clayey SAND becomes yellow-brown to olive quartz sand	
	MW-3C	becomes light brown clayey sand with white and red-white mottled clay lenses	
			-109.7
120		Yellow-brown medium to fine SAND with vugs of white clay	
			-114.7
125		Interbedded yellow-brown coarse to fine SAND, light brown to light olive and yellow-brown and red mottled sandy CLAY, and yellow-brown medium to fine SAND	
130		becomes yellow-brown, red, and light gray coarse to fine sand interbedded with light gray and red clay lenses	-121.3
135		Olive coarse to fine SAND with clay lenses	

Completion Depth 147.0 Feet Water Depth - Feet Date 7/22/87

Project Name Du Pont Newport Project Number 87C2665-1A

Woodward-Clyde Consultants

AR323755

LOG of BORING No. TB-3

DATE 7/9-13/87 SURFACE ELEVATION 10.27 LOCATION

DEPTH ft. / SAMPLES		DESCRIPTION	ELEVATION	
135		Olive coarse to fine SAND with clay lenses	-129.7	
140		DECOMPOSED METAMORPHIC BEDROCK Gray-green to brown-green foliated schist including quartz sand, mica, and clay	-136.7	
145				
150				

Completion Depth 147.0 Feet Water Depth - Feet Date 7/22/87

Project Name Du Pont Newport Project Number 87C2665-1A

Woodward-Clyde Consultants

LOG of BORING No. MW-27A

DATE 9/20/90 SURFACE ELEVATION 6.2 LOCATION See Figure #2

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0		3	SS	Topsoil	5.7
				Brown, FINE SANDY SILT, trace gravel	4.2
		8	SS	Orange-brown, olive-brown, SILTY MEDIUM TO FINE SAND, little coarse sand, little mica	
		2	SS	Very soft to soft, dark olive-brown to dark gray, ORGANIC SILTY CLAY TO CLAY, little fine sand and vegetative matter, micaceous	1.7
5		WOH	SS	-Medium quartz sand seam at 7.0 feet	
		WOH	SS		
10		WOH	SS		
		1	SS	Dark brown MEDIUM TO FINE SANDY CLAY	-5.3
		5	SS	-Becoming medium to fine sandy organic clay	
15				(OTHER QUATERNARY)	-9.3
		10	SS	Light orange-yellow, CLAYEY MEDIUM TO FINE SAND	
		8	SS	Light orange-yellow to white, COARSE TO FINE SAND AND FINE GRAVEL, little silt/clay	-11.8
20		4	SS	(COLUMBIA)	-14.8
		5	SS	Light gray, red, orange, and yellow, MEDIUM TO FINE SANDY CLAY with seams of clayey medium to fine sand	
25		6	SS	(POTOMAC)	-19.8
30				Note: 1) Standard penetration resistance results indicated by (*) are blows required to drive a 3-inch O.D. split-spoon using ASTM D 1587 specifications.	
35					
40					

Completion Depth: 26.0 ft. Water Depth: 3.0 ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 6.25" I.D. H.S.A.

Woodward-Clyde Consultants

AR323757

LOG of BORING No. TB-28

DATE 7/24/90 SURFACE ELEVATION 23.8 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
0				Gravel Fill	23.3
		8	SS	Firm, dark brown to gray-brown with orange mottling, FINE SANDY CLAYEY SILT	
		27	SS		20.3
5		20*	SS	Firm, gray with orange mottles, FINE SANDY CLAY INTERBEDDED WITH OCCASSIONAL SILTY CLAY AND FINE SANDY SILT BEDS, trace mica	
		29	SS		
		22*	SS	- trace organics	14.3
10		10	SS	Olive-brown, FINE SANDY SILTY CLAY	13.8
				Dark brown, ORGANIC SILTY CLAY, roots and decomposed matter	12.8
		23	SS	Gray SILTY CLAY (FILL)	11.8
		19*	SS	Dark brown to light gray, SILTY MEDIUM TO FINE SAND grading to COARSE TO FINE SAND, trace gravel, quartzose and micaceous	
15				16.0	8.3
				Gray becoming dark brown, SILTY CLAY, trace fine sand and organics, micaceous	
				Marsh Deposit 5' left	
20		51*	SS	(OTHER QUATERNARY) 21.0'	2.8
				Dense, gray, SILTY MEDIUM TO FINE SAND, little to trace sub-round fine gravel and coarse sand, quartzose and micaceous	
25					-2.2
		17*	SS	Dense, gray to gray-brown with predominantly white and yellow coarse fraction, MEDIUM TO FINE SAND AND FINE GRAVEL, little silt and fine sand, trace coarse gravel, quartzose and micaceous, clay seam at 27.5 feet	
30				MW28A	
		76*	SS		-9.2
				Orange, well-sorted, FINE SAND	
35				(COLUMBIA)	-12.2
				Very stiff to stiff, red, orange, gray, and white, FINE SANDY CLAY, trace medium sand to fine gravel Pm	
		36*	SS		
40					-19.1
				Continued on Page 2 Of 4	

Completion Depth: 147.0 ft. Water Depth: ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 3.5" Mud Rotary

Woodward-Clyde Consultants

AR323758

LOG of BORING No. TB-28

DATE 7/24/90 SURFACE ELEVATION 23.8 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
45		34	SS	Same as above with brown and purple mottling	
50		26	SS	Red, orange, yellow, gray, purple, and brown, CLAYEY MEDIUM TO FINE SAND	-26.2
55		35	SS	Brown, CLAYEY COARSE TO FINE SAND AND FINE GRAVEL, quartzose	-31.2
60		39	SS	Orange, SILTY FINE SAND	-36.7
				Firm, orange, pink, light gray, and white, COARSE TO FINE SANDY CLAY	-37.7
65		23	SS	Orange and red, CLAYEY MEDIUM TO FINE SAND	-42.2
70	MW28B	23	SS	Light brown, red, orange, yellow, gray, MEDIUM TO FINE SANDY CLAY becoming FINE SANDY CLAY, trace coarse sand	-47.2
75		41	SS	Light orange, yellow, and white, MEDIUM TO FINE SAND, trace clay and occasional red clay stringers	-51.2
80		18	SS	Very stiff to stiff, red with gray mottling, FINE SANDY CLAY TO CLAY	-56.2
85		46	SS	Light brown, orange, yellow and white, CLAYEY MEDIUM TO FINE SAND	-61.2
					-63.2

Continued on Page 3 of 4

Completion Depth: 147.0 ft. Water Depth: ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 3.5" Mud Rotary

Woodward-Clyde Consultants

LOG of BORING No. TB-28

DATE 7/24/90 SURFACE ELEVATION 23.8 LOCATION See Figure #1

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION
90		43	SS	Orange CLAYEY COARSE TO FINE SAND with occasional clay stringer or lens	
95		18	SS	Very stiff to stiff, Light brown, red, and gray with purple mottling, MEDIUM TO FINE SANDY CLAY	-71.2
100		58	SS	Hard, brown, red, and gray with olive mottling, CLAY, trace fine sand	-76.2
105		32	SS	- with violet	
110		41	SS		
115		140/9"	SS	Firm becoming hard, brown, red, olive-gray, and gray, MEDIUM TO FINE SANDY CLAY, dark red gravel at 116.2	-91.2
120		97	SS	Light brown, red, orange-yellow, gray, and white, CLAYEY COARSE TO FINE SAND	-98.2
125		63	SS	- With fine gravel and clay lenses	
130		64	SS	Light brown MEDIUM TO FINE SAND	-108.2
				Lithology description on Page 4 of 4	-109.2

Completion Depth: 147.0 ft. Water Depth: ft.

Project No.: 88C2076-4S ft.

Project Name: Du Pont Newport Site

Drilling Method: 3.5" Mud Rotary

Woodward-Clyde Consultants

AR323760

Appendix D

SINGLE BOREHOLE CONDUCTIVITY TESTING RESULTS FOR COLUMBIA AQUIFER WELLS

Calculation of Hydraulic Conductivity, K
(Hvorslev Method)

SM-3

$$K = \frac{r^2 \ln (L / R)}{2LT_0}$$

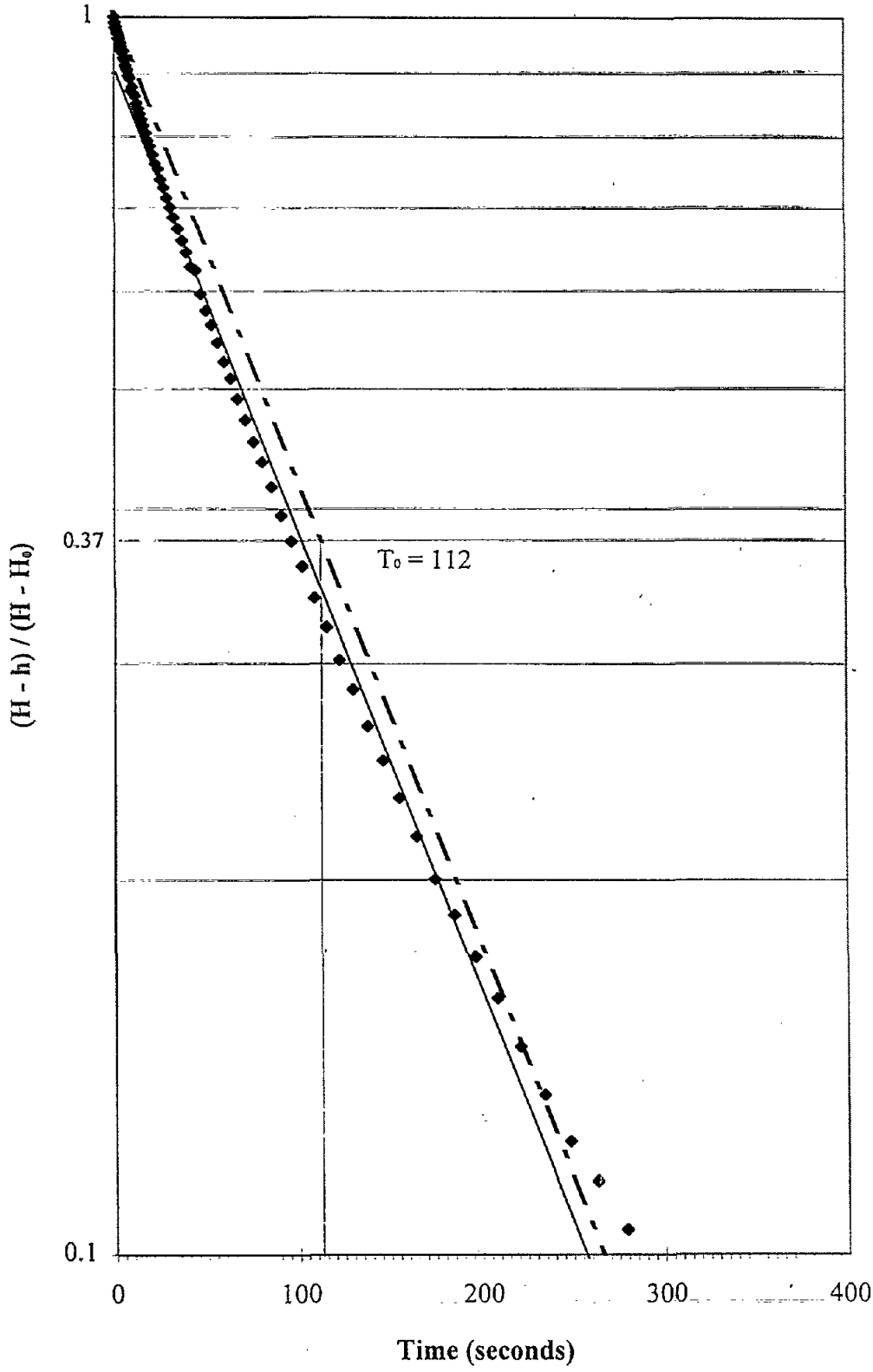
INPUT PARAMETERS		VALUES FOR WELL	
r	radius of screen (ft)	r_c	.08
L	screen length (ft)	L	4
R	radial distance of screen plus gravel pack (ft)	R	.225
T_0	Obtained from from plot of $(H-h) / (H-H_0)$ vs. T (sec)	T_0	112

Hydraulic Conductivity

$$K = 2.06 \times 10^{-5} \text{ ft/sec}$$

Newport Superfund Site
Slug Test Data, 5/96
Hvorslev Method
Rising Head Test

SM-3



AR323763

Calculation of Hydraulic Conductivity, K
(Hvorslev Method)

SM-3C

$$K = \frac{r^2 \ln (L / R)}{2LT_0}$$

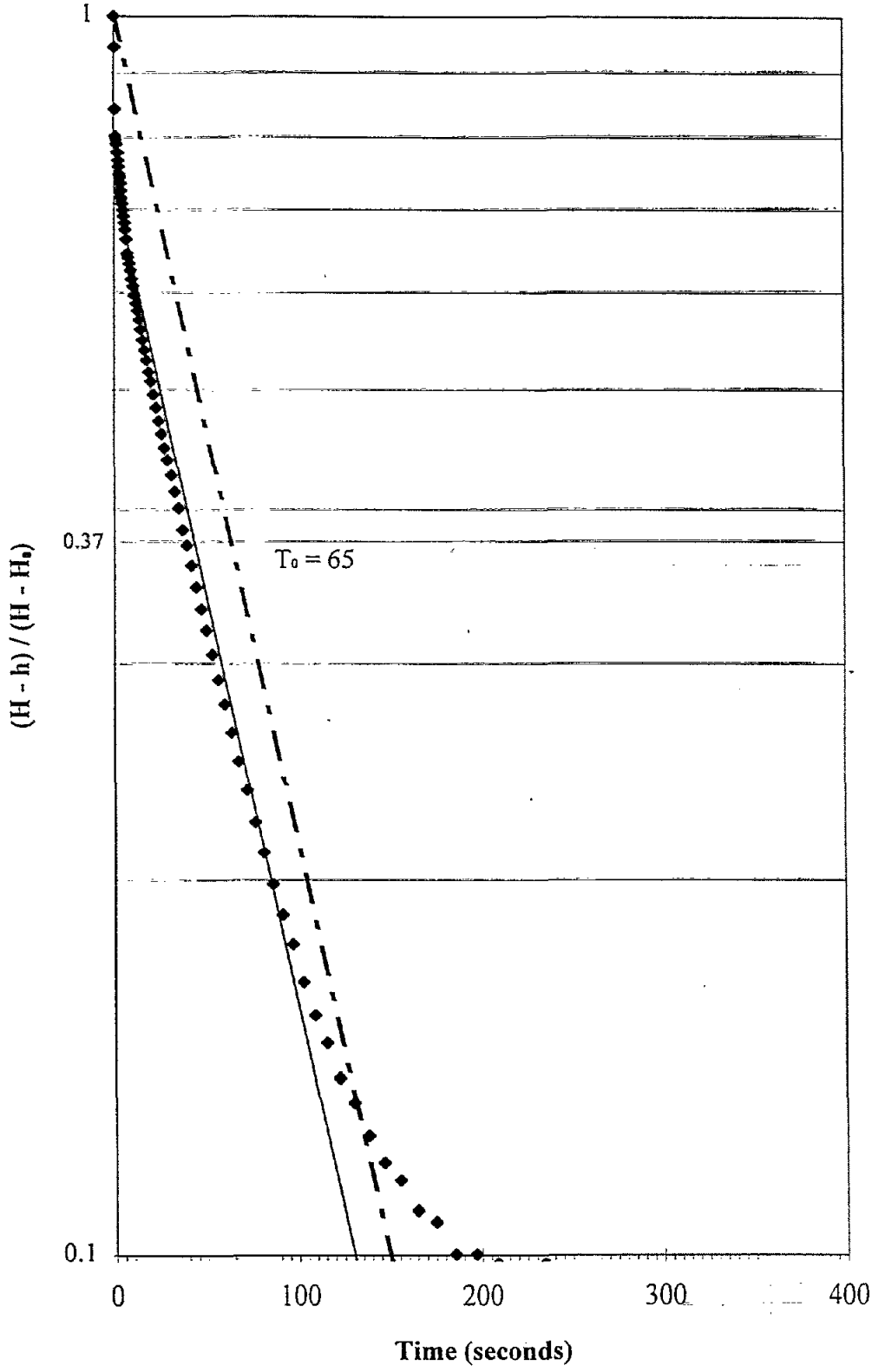
INPUT PARAMETERS		VALUES FOR WELL	
r	radius of screen (ft)	r_c	.08
L	screen length (ft)	L	21
R	radial distance of screen plus gravel pack (ft)	R	.233
T_0	Obtained from from plot of $(H-h) / (H-H_0)$ vs. T (sec)	T_0	65

Hydraulic Conductivity

$K = 1.05 \times 10^{-5}$ ft/sec

Newport Superfund Site
Slug Test Data, 5/96
Hvorslev Method
Rising Head Test

SM-3C



AR323765

Calculation of Hydraulic Conductivity, K
(Hvorslev Method)

MW-1B

$$K = \frac{r^2 \ln (L / R)}{2LT_0}$$

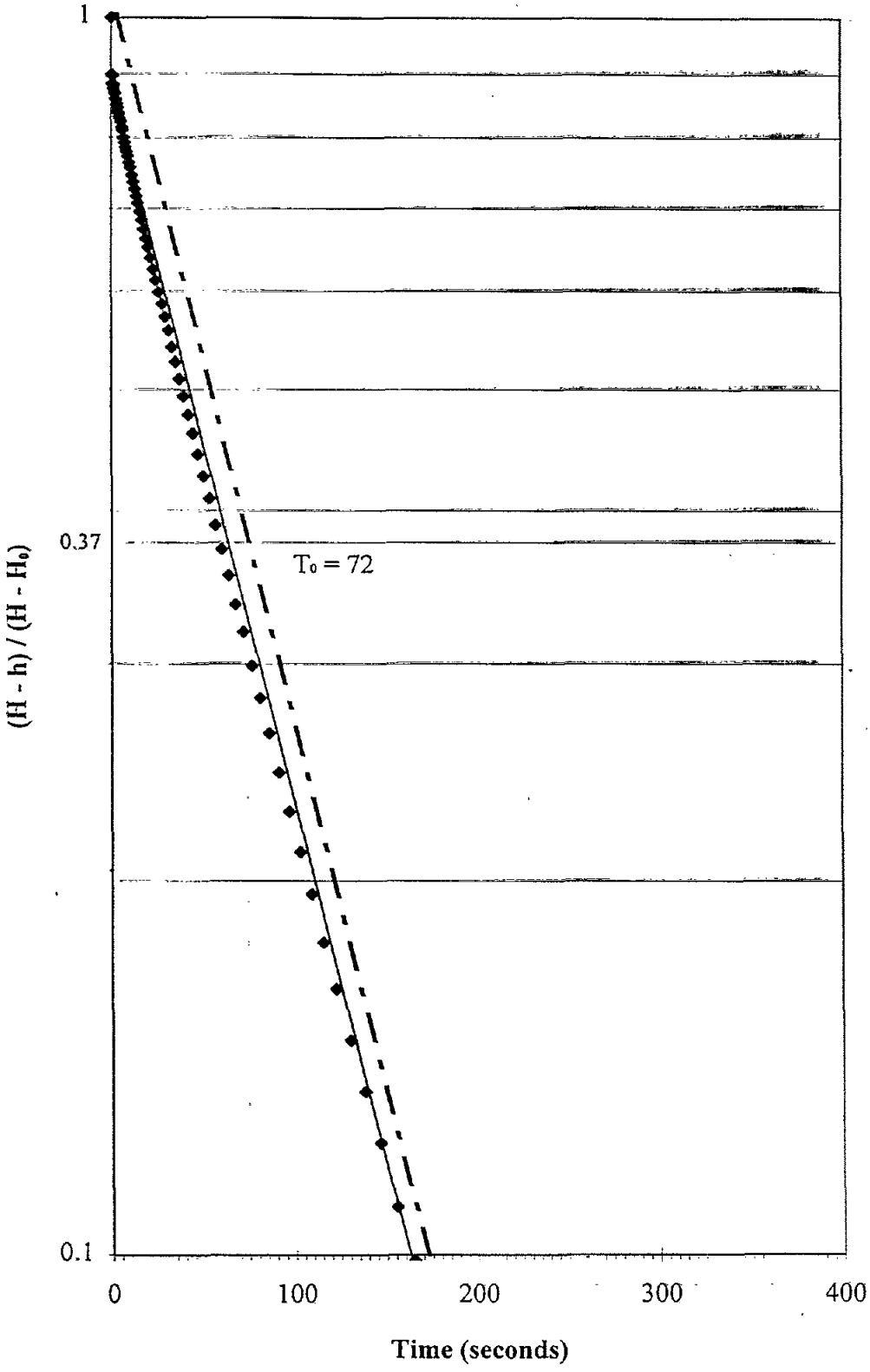
INPUT PARAMETERS		VALUES FOR WELL	
r	radius of screen (ft)	r_c	.16
L	screen length (ft)	L	17.5
R	radial distance of screen plus gravel pack (ft)	R	.425
T_0	Obtained from from plot of $(H-h) / (H-H_0)$ vs. T (sec)	T_0	72

Hydraulic Conductivity

$K = 3.78 \times 10^{-5}$ ft/sec

Newport Superfund Site
Slug Test Data, 5/96
Hvorslev Method
Rising Head Test

MW-1B



AR323767

Calculation of Hydraulic Conductivity, K
(Hvorslev Method)

MW-2B

$$K = \frac{r^2 \ln (L / R)}{2LT_0}$$

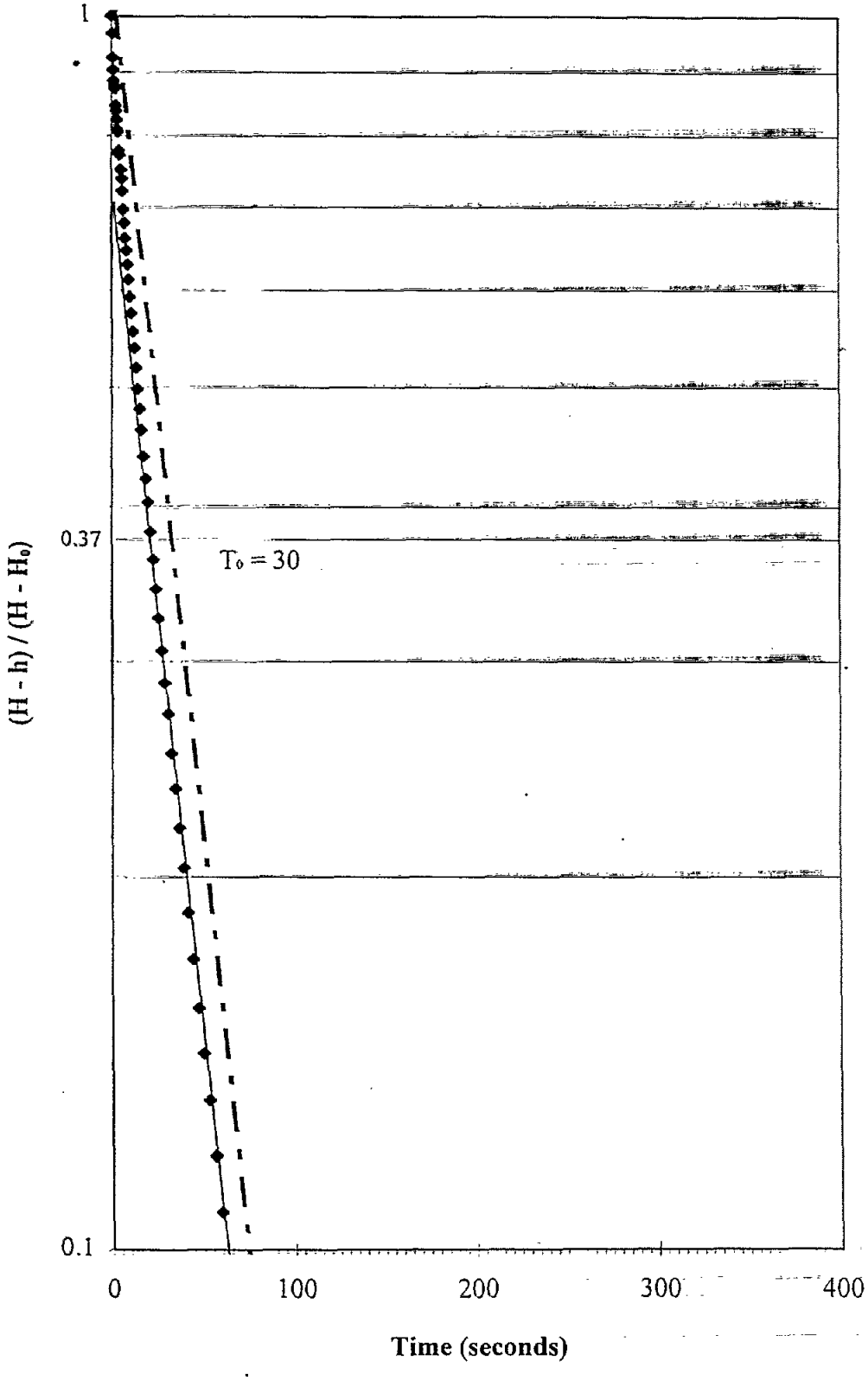
INPUT PARAMETERS		VALUES FOR WELL	
r	radius of screen (ft)	r_c	.16
L	screen length (ft)	L	15.5
R	radial distance of screen plus gravel pack (ft)	R	.425
T_0	Obtained from from plot of $(H-h) / (H-H_0)$ vs. T (sec)	T_0	30

Hydraulic Conductivity

$K = 9.90 \times 10^{-5}$ ft/sec

Newport Superfund Site
Slug Test Data, 5/96
Hvorslev Method
Rising Head Test

MW-2B



AR323769

Calculation of Hydraulic Conductivity, K
(Hvorslev Method)

MW-33B

$$K = \frac{r^2 \ln (L / R)}{2LT_0}$$

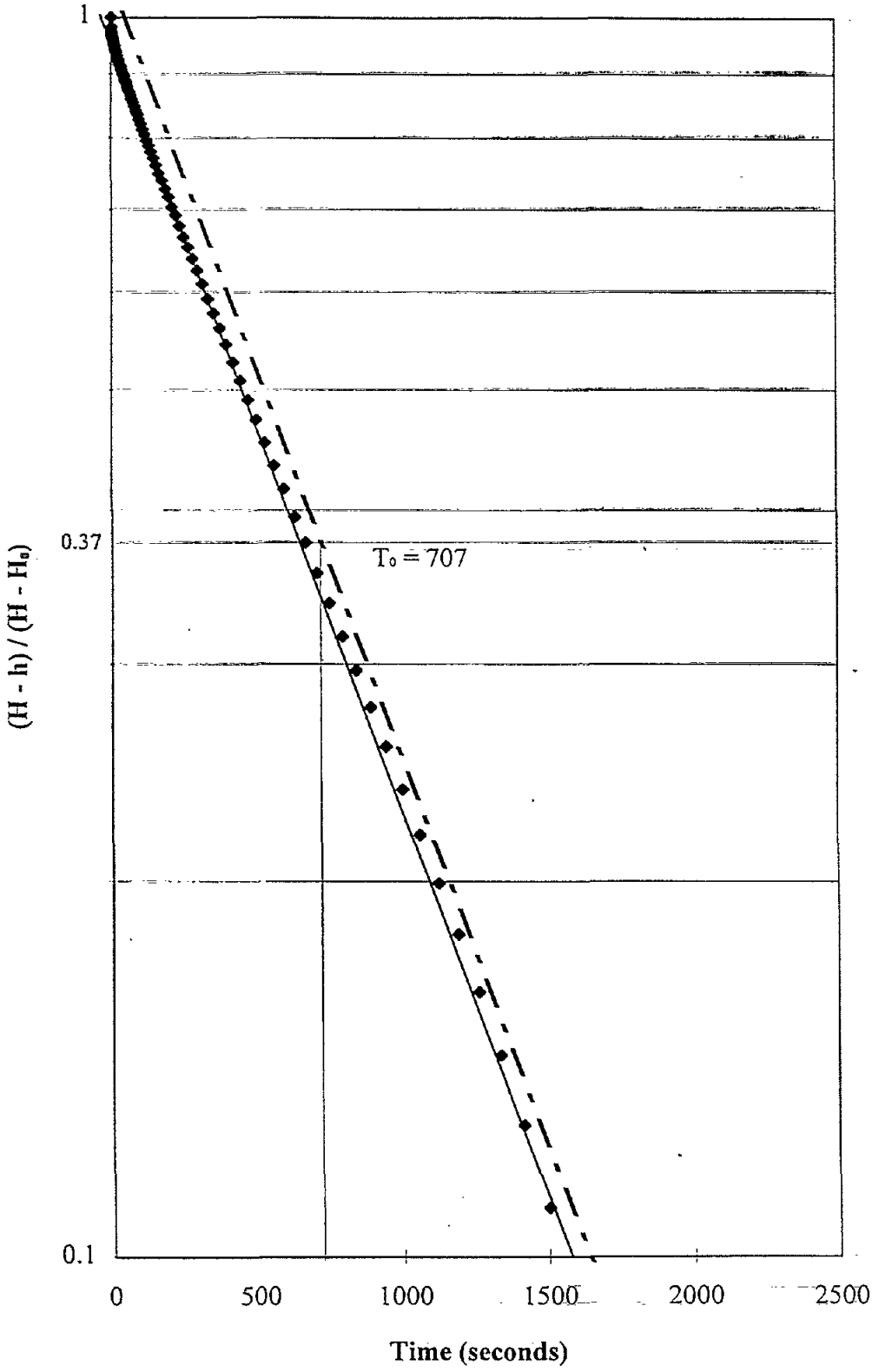
INPUT PARAMETERS		VALUES FOR WELL	
r	radius of screen (ft)	r_c	.16
L	screen length (ft)	L	9.8
R	radial distance of screen plus gravel pack (ft)	R	.425
T_0	Obtained from from plot of $(H-h) / (H-H_0)$ vs. T (sec)	T_0	707

Hydraulic Conductivity

$$K = 5.80 \times 10^{-6} \text{ ft/sec}$$

Newport Superfund Site
Slug Test Data, 5/96
Hvorslev Method
Rising Head Test

MW-33B



AR323771

Calculation of Hydraulic Conductivity, K
(Hvorslev Method)

MW-33C

$$K = \frac{r^2 \ln (L / R)}{2LT_0}$$

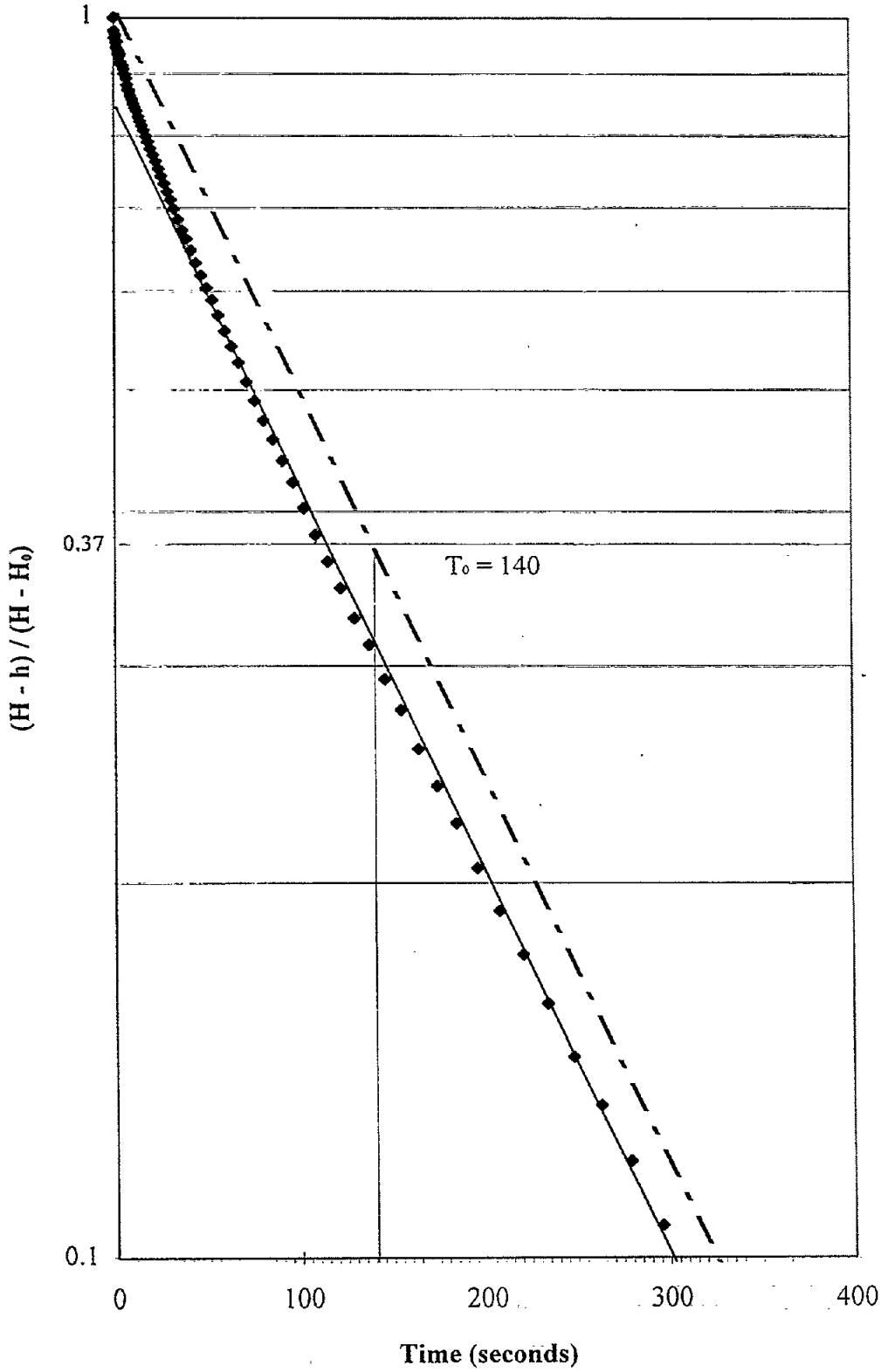
INPUT PARAMETERS		VALUES FOR WELL	
r	radius of screen (ft)	r_c	.16
L	screen length (ft)	L	9.7
R	radial distance of screen plus gravel pack (ft)	R	.425
T_0	Obtained from from plot of $(H-h) / (H-H_0)$ vs. T (sec)	T_0	140

Hydraulic Conductivity

$$K = 2.15 \times 10^{-4} \text{ ft/sec}$$

Newport Superfund Site
Slug Test Data, 5/96
Hvorslev Method
Rising Head Test

MW-33C



AR323773

Appendix E

LABORATORY DATA REPORT FORMS

Location: NEWPORT
Project Name: SLF GW SAMPLING-MAR96
Sample Source: NPT-SM-3(C)-1
Sample Name: NPT-SM-3(C)-1
Date Sampled: March 20, 1996
Lab Sample ID: 2480917-1 Analysis Lab: LANCAS

Method Number: 6010A Prep Method: 3010A

Analyte/Parameter	Dilution	Result		MDL	PQL	Unit	Date Analyzed
BARIUM	1	.43		.0025	0.1	MG/L	Mar 26, 1996
CADMIUM	1	.166		.0026	0.01	MG/L	Mar 26, 1996
CHROMIUM	1	< .0073		.0073	0.03	MG/L	Mar 26, 1996
COBALT	1	.117		.0047	0.05	MG/L	Mar 26, 1996
COPPER	1	.0160	J	.0042	0.025	MG/L	Mar 26, 1996
MAGNESIUM	1	9.41		.049	0.1	MG/L	Mar 26, 1996
NICKEL	1	.136		.011	0.05	MG/L	Mar 26, 1996
VANADIUM	1	< .0052		.0052	0.015	MG/L	Mar 26, 1996
ZINC	1	30.4		.0064	0.025	MG/L	Mar 26, 1996

Method Number: 7060A Prep Method: 7060A

Analyte/Parameter	Dilution	Result		MDL	PQL	Unit	Date Analyzed
ARSENIC	1	< .0023		.0023	0.01	MG/L	Mar 25, 1996

Method Number: 7421 Prep Method: 3020A

Analyte/Parameter	Dilution	Result		MDL	PQL	Unit	Date Analyzed
LEAD	1	.0028	J	.0017	0.003	MG/L	Mar 28, 1996

Method Number: 7470A Prep Method: 7470A

Analyte/Parameter	Dilution	Result		MDL	PQL	Unit	Date Analyzed
MERCURY	1	< .000032		.000032	0.0002	MG/L	Mar 25, 1996

Method Number: 8240B

Analyte/Parameter	Dilution	Result		MDL	PQL	Unit	Date Analyzed
TETRACHLOROETHENE	1	6.		1.	5	UG/L	Mar 27, 1996
TRICHLOROETHENE	1	2.	J	1.	5	UG/L	Mar 27, 1996
VINYL CHLORIDE	1	< 2.		2.	5	UG/L	Mar 27, 1996

Surrogates:

Analyte/Parameter	Dilution	RPR	Date Analyzed
1,2-DICHLOROETHANE-D4		83.0	Mar 27, 1996
BROMOFLUOROBENZENE		94.0	Mar 27, 1996
TOLUENE-D8		91.0	Mar 27, 1996

Location: NEWPORT
Project Name: SLF GW SAMPLING-MAR96
Sample Source: NPT-SM-3(C)-1-DIS
Sample Name: NPT-SM-3(C)-1-DIS
Date Sampled: March 20, 1996
Lab Sample ID: 2480918-1 Analysis Lab: LANCAS

Method Number: 6010A Prep Method: 3010A

Analyte/Parameter	Dilution	Result		MDL	PQL	Unit	Date Analyzed
BARIUM	1	.0843	J	.0025	0.1	MG/L	Mar 25, 1996
CADMIUM	1	.156		.0026	0.01	MG/L	Mar 25, 1996
CHROMIUM	1	< .0073		.0073	0.03	MG/L	Mar 25, 1996
COBALT	1	.118		.0047	0.05	MG/L	Mar 25, 1996
COPPER	1	.0128	J	.0042	0.025	MG/L	Mar 25, 1996
MAGNESIUM	1	9.65		.049	0.1	MG/L	Mar 25, 1996
NICKEL	1	.134		.011	0.05	MG/L	Mar 25, 1996
VANADIUM	1	< .0052		.0052	0.015	MG/L	Mar 25, 1996
ZINC	1	30.4		.0064	0.025	MG/L	Mar 25, 1996

Method Number: 7060A Prep Method: 7060A

Analyte/Parameter	Dilution	Result	MDL	PQL	Unit	Date Analyzed
ARSENIC	1	< .0023	.0023	0.01	MG/L	Mar 25, 1996

Method Number: 7421 Prep Method: 3020A

Analyte/Parameter	Dilution	Result	MDL	PQL	Unit	Date Analyzed
LEAD	1	< .0017	.0017	0.003	MG/L	Mar 27, 1996

Method Number: 7470A Prep Method: 7470A

Analyte/Parameter	Dilution	Result	MDL	PQL	Unit	Date Analyzed
MERCURY	1	< .000032	.000032	0.0002	MG/L	Mar 25, 1996

Location: NEWPORT
Project Name: SLF GW SAMPLING-MAR96
Sample Source: NPT-MW-33B
Sample Name: NPT-MW-33B
Date Sampled: March 20, 1996
Lab Sample ID: 2480909-1 Analysis Lab: LANCAS

Method Number: 6010A Prep Method: 3010A

Analyte/Parameter	Dilution	Result		MDL	PQL	Unit	Date Analyzed
BARIUM	1	.14		.0025	0.1	MG/L	Mar 26, 1996
CADMIUM	1	.441		.0026	0.01	MG/L	Mar 26, 1996
CHROMIUM	1	.058		.0073	0.03	MG/L	Mar 26, 1996
COBALT	1	.0305	J	.0047	0.05	MG/L	Mar 26, 1996
COPPER	1	.0059	J	.0042	0.025	MG/L	Mar 26, 1996
MAGNESIUM	1	4.66		.049	0.1	MG/L	Mar 26, 1996
NICKEL	1	.146		.011	0.05	MG/L	Mar 26, 1996
VANADIUM	1	< .0052		.0052	0.015	MG/L	Mar 26, 1996
ZINC	1	26.3		.0064	0.025	MG/L	Mar 26, 1996

Method Number: 7060A Prep Method: 7060A

Analyte/Parameter	Dilution	Result	MDL	PQL	Unit	Date Analyzed
ARSENIC	1	< .0023	.0023	0.01	MG/L	Mar 25, 1996

Method Number: 7421 Prep Method: 3020A

Analyte/Parameter	Dilution	Result	MDL	PQL	Unit	Date Analyzed
LEAD	1	< .0017	.0017	0.003	MG/L	Mar 28, 1996

Method Number: 7470A Prep Method: 7470A

Analyte/Parameter	Dilution	Result	MDL	PQL	Unit	Date Analyzed
MERCURY	1	< .000032	.000032	0.0002	MG/L	Mar 25, 1996

Method Number: 8240B

Analyte/Parameter	Dilution	Result	MDL	PQL	Unit	Date Analyzed
TETRACHLOROETHENE	1	38.	1.	5	UG/L	Mar 26, 1996
TRICHLOROETHENE	1	8.	1.	5	UG/L	Mar 26, 1996
VINYL CHLORIDE	1	< 2.	2.	5	UG/L	Mar 26, 1996

Surrogates:

Analyte/Parameter	Dilution	RPR	Date Analyzed
1,2-DICHLOROETHANE-D4		100.0	Mar 26, 1996
BROMOFLUOROBENZENE		95.0	Mar 26, 1996
TOLUENE-D8		94.0	Mar 26, 1996

Location: NEWPORT
Project Name: SLF GW SAMPLING-MAR96
Sample Source: NPT-MW-33B-DIS
Sample Name: NPT-MW-33B-DIS
Date Sampled: March 20, 1996
Lab Sample ID: 2480910-1 Analysis Lab: LANCAS

Method Number: 6010A Prep Method: 3010A

Analyte/Parameter	Dilution	Result		MDL	PQL	Unit	Date Analyzed
BARIUM	1	.0516	J	.0025	0.1	MG/L	Mar 25, 1996
CADMIUM	1	.421		.0026	0.01	MG/L	Mar 25, 1996
CHROMIUM	1	.0111	J	.0073	0.03	MG/L	Mar 25, 1996
COBALT	1	.0296	J	.0047	0.05	MG/L	Mar 25, 1996
COPPER	1	.0065	J	.0042	0.025	MG/L	Mar 25, 1996
MAGNESIUM	1	4.61		.049	0.1	MG/L	Mar 25, 1996
NICKEL	1	.139		.011	0.05	MG/L	Mar 25, 1996
VANADIUM	1	< .0052		.0052	0.015	MG/L	Mar 25, 1996
ZINC	1	25.6		.0064	0.025	MG/L	Mar 25, 1996

Method Number: 7060A Prep Method: 7060A

Analyte/Parameter	Dilution	Result	MDL	PQL	Unit	Date Analyzed
ARSENIC	1	< .0023	.0023	0.01	MG/L	Mar 25, 1996

Method Number: 7421 Prep Method: 3020A

Analyte/Parameter	Dilution	Result	MDL	PQL	Unit	Date Analyzed
LEAD	1	< .0017	.0017	0.003	MG/L	Mar 27, 1996

Method Number: 7470A Prep Method: 7470A

Analyte/Parameter	Dilution	Result	MDL	PQL	Unit	Date Analyzed
MERCURY	1	< .000032	.000032	0.0002	MG/L	Mar 25, 1996

AR323779

04/29/90 PHASE III INTERMEDIATE GROUNDWATER - POSITIVE ANALYTICAL RESULTS 10:01:23
DUPONT-NEWPORT SITE

Lab Sample Number:		383432			383451			383462			384093		
Locator :		MW-32B			MW-32B			MW-32B			MW-33B		
Collect Date:		21-NOV-90			21-NOV-90			21-NOV-90			27-NOV-90		
	UNITS	VALUE	QUAL	DL	VALUE	QUAL	DL	VALUE	QUAL	DL	VALUE	QUAL	DL
Metals													
minum, Total	ug/l	-			128	B P N *		-			-		
imony, Total	ug/l	-			-	ND P		30	-		-		
enic, Total	ug/l	-			-	ND F		3	-		-		
ium, Total	ug/l	-			44.5	B P N *		-			-		
yllium, Total	ug/l	-			-	ND P		1	-		-		
mium, Total	ug/l	-			143	P		-			-		
lcium, Total	ug/l	-			11300	P		-			-		
romium, Total	ug/l	-			-	ND P		5	-		-		
balt, Total	ug/l	-			17.7	B P		-			-		
pper, Total	ug/l	-			25.1	P		-			-		
on, Total	ug/l	-			61.79	B P N *		-			-		
ad, Total	ug/l	-			-	ND F W N		3	-		-		
gnesium, Total	ug/l	-			3960	B P		-			-		
nganese, Total	ug/l	-			554	P		-			-		
ckel, Total	ug/l	-			21.4	B P		-			-		
tassium, Total	ug/l	-			2190	B P		-			-		
dium, Total	ug/l	-			8060	P		-			-		
nadium, Total	ug/l	-			-	ND P		5	-		-		
inc, Total	ug/l	-			10400	P		-			-		
solved Metals													
luminum, Dissolved	ug/l	-			-			76.8	B		-		
arium, Dissolved	ug/l	-			-			46.4	B		-		
eryllium, Dissolved	ug/l	-			-			-	ND	1	-		
admium, Dissolved	ug/l	-			-			162			-		
alcium, Dissolved	ug/l	-			-			12300			-		
hromium, Dissolved	ug/l	-			-			-	ND	5	-		
obalt, Dissolved	ug/l	-			-			21.7	B		-		
opper, Dissolved	ug/l	-			-			22.3	B		-		
ron, Dissolved	ug/l	-			-			-	ND	10	-		
ead, Dissolved	ug/l	-			-			-	ND	3	-		
agnesium, Dissolved	ug/l	-			-			4390	B		-		
anganese, Dissolved	ug/l	-			-			609			-		
ickel, Dissolved	ug/l	-			-			28.2	B		-		
otassium, Dissolved	ug/l	-			-			1750	B		-		
odium, Dissolved	ug/l	-			-			8850			-		
inc, Dissolved	ug/l	-			-			11900			-		
latile Organics													
1,2-Dichloroethane	ug/l	-	ND	5	-			-			-	ND	5
1,2-Dichloroethylene, Total	ug/l	-	ND	5	-			-			1	J	
Acetone	ug/l	4	J		-			-			-	ND	10
Benzene	ug/l	-	ND	5	-			-			-	ND	5
Carbon tetrachloride	ug/l	2	J		-			-			3	J	
Chlorobenzene	ug/l	-	ND	5	-			-			-	ND	5
	ug/l	5			-			-			-	ND	5
								-			56		

04/29/90 PHASE III INTERMEDIATE GROUNDWATER - POSITIVE ANALYTICAL RESULTS 10:01:23
DUPONT-NEWPORT SITE

Lab Sample Number:		383432			383451			383462			384093		
Locator :		MW-32B			MW-32B			MW-32B			MW-33B		
Collect Date:		21-NOV-90			21-NOV-90			21-NOV-90			27-NOV-90		
	UNITS	VALUE	QUAL	DL	VALUE	QUAL	DL	VALUE	QUAL	DL	VALUE	QUAL	DL
Trichloroethene	ug/l	3	J		-			-			12		
Xylenes, Total	ug/l	-	ND	5	-			-			-	ND	5
mi-volatile Organics													
Benzyl alcohol	ug/l	-	ND	10	-			-			-	ND	12
Butyl Benzyl Phthalate	ug/l	-	ND	10	-			-			-	ND	12
bis(2-Ethylhexyl)phthalate	ug/l	6	B J		-			-			9	J	
sticides													
Dieldrin	ug/l	-	ND	.1	-			-			-	ND	.1

- Non-detect
* Not analyzed unless qualified with an ND

AR323780

AR323781

04/29/90 PHASE III INTERMEDIATE GROUNDWATER - POSITIVE ANALYTICAL RESULTS 10:01:23
DUPONT-NEWPORT SITE

Lab Sample Number:		384113			384100			384542			384554		
Locator :		MW-33B			MW-33B			MW-34B			MW-34B		
Collect Date:		27-NOV-90			27-NOV-90			28-NOV-90			28-NOV-90		
	UNITS	VALUE	QUAL	DL	VALUE	QUAL	DL	VALUE	QUAL	DL	VALUE	QUAL	DL
Total Metals													
Aluminum, Total	ug/l	153	B P		-			-			128	B P	
Antimony, Total	ug/l	-	ND P	30	-			-			-	ND P	30
Arsenic, Total	ug/l	3.9	B F		-			-			-	ND F	3
Barium, Total	ug/l	153	B P		-			-			25.79	B P	
Beryllium, Total	ug/l	-	ND P	1	-			-			-	ND P	1
Cadmium, Total	ug/l	378	P		-			-			-	ND P	3
Calcium, Total	ug/l	16700	P		-			-			5030	P	
Chromium, Total	ug/l	-	ND P	5	-			-			-	ND P	5
Cobalt, Total	ug/l	33.4	B P		-			-			10.5	B P	
Copper, Total	ug/l	7.2	B P		-			-			28.2	P	
Iron, Total	ug/l	249	P *		-			-			59.59	B P *	
Lead, Total	ug/l	-	ND F W	3	-			-			9.3	F	
Magnesium, Total	ug/l	6130	P		-			-			1580	B P	
Manganese, Total	ug/l	1720	P		-			-			35.2	P	
Nickel, Total	ug/l	83	P		-			-			15.4	B P	
Potassium, Total	ug/l	2310	B P		-			-			2090	B P	
Sodium, Total	ug/l	14200	P		-			-			7740	P	
Vanadium, Total	ug/l	-	ND P	5	-			-			-	ND P	5
Zinc, Total	ug/l	26100	P		-			-			49.2	P	
Dissolved Metals													
Aluminum, Dissolved	ug/l	-			80.9	B		-			-		
Barium, Dissolved	ug/l	-			79.5	B		-			-		
Beryllium, Dissolved	ug/l	-			-	ND	1	-			-		
Cadmium, Dissolved	ug/l	-			396			-			-		
Calcium, Dissolved	ug/l	-			17200			-			-		
Chromium, Dissolved	ug/l	-			-	ND	5	-			-		
Cobalt, Dissolved	ug/l	-			35.8	B		-			-		
Copper, Dissolved	ug/l	-			-	ND	4	-			-		
Iron, Dissolved	ug/l	-			71.8	B		-			-		
Lead, Dissolved	ug/l	-			-	ND	3	-			-		
Magnesium, Dissolved	ug/l	-			6340			-			-		
Manganese, Dissolved	ug/l	-			1770			-			-		
Nickel, Dissolved	ug/l	-			84.3			-			-		
Potassium, Dissolved	ug/l	-			1940	B		-			-		
Sodium, Dissolved	ug/l	-			14400			-			-		
Zinc, Dissolved	ug/l	-			27700			-			-		
Volatile Organics													
1,2-Dichloroethane	ug/l	-			-			-	ND	5	-		
1,2-Dichloroethylene, Total	ug/l	-			-			-	ND	5	-		
Acetone	ug/l	-			-			-	ND	10	-		
Benzene	ug/l	-			-			-	ND	5	-		
Carbon tetrachloride	ug/l	-			-			-	ND	5	-		
Chlorobenzene	ug/l	-			-			-	ND	5	-		
Chloroform	ug/l	-			-			4	B J		-		
Methylene chloride	ug/l	-			-			-	ND	5	-		
Tetrachloroethene	ug/l	-			-			-	ND	5	-		
Trichloroethene	ug/l	-			-			-	ND	5	-		

Location: NEWPORT
Project Name: SLF GW SAMPLING-MAR96
Sample Source: NPT-MW-33C
Sample Name: NPT-MW-33C
Date Sampled: March 20, 1996
Lab Sample ID: 2480911-1 Analysis Lab: LANCAS

Method Number: 6010A Prep Method: 3010A

Analyte/Parameter	Dilution	Result		MDL	PQL	Unit	Date Analyzed
BARIUM	1	.0930	J	.0025	0.1	MG/L	Mar 26, 1996
CADMIUM	1	.272		.0026	0.01	MG/L	Mar 26, 1996
CHROMIUM	1	< .0073		.0073	0.03	MG/L	Mar 26, 1996
COBALT	1	.0276	J	.0047	0.05	MG/L	Mar 26, 1996
COPPER	1	.0082	J	.0042	0.025	MG/L	Mar 26, 1996
MAGNESIUM	1	4.36		.049	0.1	MG/L	Mar 26, 1996
NICKEL	1	.067		.011	0.05	MG/L	Mar 26, 1996
VANADIUM	1	< .0052		.0052	0.015	MG/L	Mar 26, 1996
ZINC	1	15.4		.0064	0.025	MG/L	Mar 26, 1996

Method Number: 7060A Prep Method: 7060A

Analyte/Parameter	Dilution	Result	MDL	PQL	Unit	Date Analyzed
ARSENIC	1	< .0023	.0023	0.01	MG/L	Mar 25, 1996

Method Number: 7421 Prep Method: 3020A

Analyte/Parameter	Dilution	Result		MDL	PQL	Unit	Date Analyzed
LEAD	1	.0021	J	.0017	0.003	MG/L	Mar 28, 1996

Method Number: 7470A Prep Method: 7470A

Analyte/Parameter	Dilution	Result	MDL	PQL	Unit	Date Analyz
MERCURY	1	< .000032	.000032	0.0002	MG/L	Mar 25, 1996

Method Number: 8240B

Analyte/Parameter	Dilution	Result		MDL	PQL	Unit	Date Analyzed
TETRACHLOROETHENE	1	14.		1.	5	UG/L	Mar 26, 1996
TRICHLOROETHENE	1	4.	J	1.	5	UG/L	Mar 26, 1996
VINYL CHLORIDE	1	< 2.		2.	5	UG/L	Mar 26, 1996

Surrogates:

Analyte/Parameter	Dilution	RPR	Date Analyzed
1,2-DICHLOROETHANE-D4		101.0	Mar 26, 1996
BROMOFLUOROBENZENE		94.0	Mar 26, 1996
TOLUENE-D8		92.0	Mar 26, 1996

Location: NEWPORT
Project Name: SLF GW SAMPLING-MAR96
Sample Source: NPT-MW-33C-DIS
Sample Name: NPT-MW-33C-DIS
Date Sampled: March 20, 1996
Lab Sample ID: 2480912-1 Analysis Lab: LANCAS

Method Number: 6010A Prep Method: 3010A

Analyte/Parameter	Dilution	Result		MDL	PQL	Unit	Date Analyzed
BARIUM	1	.0532	J	.0025	0.1	MG/L	Mar 25, 1996
CADMIUM	1	.247		.0026	0.01	MG/L	Mar 25, 1996
CHROMIUM	1	< .0073		.0073	0.03	MG/L	Mar 25, 1996
COBALT	1	.0259	J	.0047	0.05	MG/L	Mar 25, 1996
COPPER	1	.0081	J	.0042	0.025	MG/L	Mar 25, 1996
MAGNESIUM	1	4.24		.049	0.1	MG/L	Mar 25, 1996
NICKEL	1	.062		.011	0.05	MG/L	Mar 25, 1996
VANADIUM	1	< .0052		.0052	0.015	MG/L	Mar 25, 1996
ZINC	1	14.7		.0064	0.025	MG/L	Mar 25, 1996

Method Number: 7060A Prep Method: 7060A

Analyte/Parameter	Dilution	Result	MDL	PQL	Unit	Date Analyzed
ARSENIC	1	< .0023	.0023	0.01	MG/L	Mar 25, 1996

Method Number: 7421 Prep Method: 3020A

Analyte/Parameter	Dilution	Result	MDL	PQL	Unit	Date Analyzed
LEAD	1	< .0017	.0017	0.003	MG/L	Mar 27, 1996

Method Number: 7470A Prep Method: 7470A

Analyte/Parameter	Dilution	Result	MDL	PQL	Unit	Date Analyzed
MERCURY	1	< .000032	.000032	0.0002	MG/L	Mar 25, 1996

AR323784

04/29/90 PHASE III DEEP GROUNDWATER - POSITIVE ANALYTICAL RESULTS 07:04:35
DUPONT-NEWPORT SITE

Lab Sample Number:	382249			382250			382251			383713		
Locator :	MW-2C			MW-2C			MW-2C			MW-33C		
Collect Date:	15-NOV-90			15-NOV-90			15-NOV-90			25-NOV-90		
	UNITS	VALUE	QUAL	DL	VALUE	QUAL	DL	VALUE	QUAL	DL	VALUE	QUAL	DL
tal Metals													
luminum, Total	ug/l				207	P		-			-		
arium, Total	ug/l				117	B P		-			-		
admium, Total	ug/l				249	P		-			-		
alcium, Total	ug/l				18000	P		-			-		
hromium, Total	ug/l				-	ND P	5	-			-		
obalt, Total	ug/l				80.9	P		-			-		
opper, Total	ug/l				155	P		-			-		
ron, Total	ug/l				136	P		-			-		
ead, Total	ug/l				11.6	F S N *		-			-		
agnesium, Total	ug/l				4890	B P		-			-		
anganese, Total	ug/l				2660	P		-			-		
ickel, Total	ug/l				59.9	P		-			-		
otassium, Total	ug/l				5820	P		-			-		
odium, Total	ug/l				7350	P		-			-		
anadium, Total	ug/l				8.5	B P		-			-		
inc, Total	ug/l				22700	P		-			-		
solved Metals													
luminum, Dissolved	ug/l				-			144	B P		-		
rsenic, Dissolved	ug/l				-			-	ND F	2	-		
arium, Dissolved	ug/l				-			42.79	B P		-		
admium, Dissolved	ug/l				-			223	P		-		
alcium, Dissolved	ug/l				-			17000	P		-		
obalt, Dissolved	ug/l				-			69.69	P		-		
opper, Dissolved	ug/l				-			75.5	P		-		
ron, Dissolved	ug/l				-			133	P		-		
ead, Dissolved	ug/l				-			-	ND W N F	3	-		
agnesium, Dissolved	ug/l				-			4360	B P		-		
anganese, Dissolved	ug/l				-			2070	P		-		
ickel, Dissolved	ug/l				-			50.4	P		-		
otassium, Dissolved	ug/l				-			5420	P		-		
elenium, Dissolved	ug/l				-			-	ND W F	3	-		
odium, Dissolved	ug/l				-			8220	P		-		
inc, Dissolved	ug/l				-			19600	P		-		
atile Organics													
cetone	ug/l	9	B J		-			-			7	B J	
arbon tetrachloride	ug/l	-	ND	5	-			-			1	J	
hloroform	ug/l	-	ND	5	-			-			-	ND	5
ethylene chloride	ug/l	31	B		-			-			-	ND	5
etrachloroethene	ug/l	22			-			-			32		
richloroethene	ug/l	2	J		-			-			10		
i-volatile Organics													
utyl Benzyl Phthalate	ug/l				-			-			4	J	
is(2-Ethylhexyl) [illegible]late	ug/l				-			-			4	B J	

Non-detect
* Not analyzed [illegible] qualified with an ND

AR323785

04/29/90 PHASE III DEEP GROUNDWATER - POSITIVE ANALYTICAL RESULTS 07:04:35
DUPONT-NEWPORT SITE

Lab Sample Number:		383725			383719			384547			384559		
Locator :		MW-33C			MW-33C			MW-35C			MW-35C		
Collect Date:		25-NOV-90			25-NOV-90			28-NOV-90			28-NOV-90		
	UNITS	VALUE	QUAL	DL	VALUE	QUAL	DL	VALUE	QUAL	DL	VALUE	QUAL	DL
Total Metals													
Aluminum, Total	ug/l	84.19	B P N *		-			-			109	B P	
Barium, Total	ug/l	45.09	B P N *		-			-			46.79	B P	
Cadmium, Total	ug/l	358	P		-			-			-	ND P	3
Calcium, Total	ug/l	12200	P		-			-			5240	P	
Chromium, Total	ug/l	-	ND P	5	-			-			-	ND P	5
Cobalt, Total	ug/l	33.7	B P		-			-			7.8	B P	
Copper, Total	ug/l	15.4	B P		-			-			55.9	P	
Iron, Total	ug/l	45.7	B P N *		-			-			29.79	B P *	
Lead, Total	ug/l	-	ND F W N	3	-			-			-	ND F	3
Magnesium, Total	ug/l	4740	B P		-			-			1650	B P	
Manganese, Total	ug/l	185	P		-			-			21.4	P	
Nickel, Total	ug/l	62.2	P		-			-			-	ND P	14
Potassium, Total	ug/l	18500	P		-			-			8570	P	
Sodium, Total	ug/l	20300	P		-			-			9070	P	
Vanadium, Total	ug/l	-	ND P	5	-			-			-	ND P	5
Zinc, Total	ug/l	22000	P		-			-			33.79	P	
Dissolved Metals													
Aluminum, Dissolved	ug/l	-			106	B		-			-		
Arsenic, Dissolved	ug/l	-			-	ND	3	-			-		
Barium, Dissolved	ug/l	-			38.2	B		-			-		
Cadmium, Dissolved	ug/l	-			398			-			-		
Calcium, Dissolved	ug/l	-			29800			-			-		
Cobalt, Dissolved	ug/l	-			49.5	B		-			-		
Copper, Dissolved	ug/l	-			9	B		-			-		
Iron, Dissolved	ug/l	-			318			-			-		
Lead, Dissolved	ug/l	-			-	ND	3	-			-		
Magnesium, Dissolved	ug/l	-			6410			-			-		
Manganese, Dissolved	ug/l	-			2200			-			-		
Nickel, Dissolved	ug/l	-			32.3	B		-			-		
Potassium, Dissolved	ug/l	-			6090			-			-		
Selenium, Dissolved	ug/l	-			-	ND	3	-			-		
Sodium, Dissolved	ug/l	-			93600			-			-		
Zinc, Dissolved	ug/l	-			23600			-			-		
Volatile Organics													
Acetone	ug/l	-			-			-	ND	10	-		
Carbon tetrachloride	ug/l	-			-			-	ND	5	-		
Chloroform	ug/l	-			-			-	ND	5	-		
Methylene chloride	ug/l	-			-			3	B J		-		
Tetrachloroethene	ug/l	-			-			2	J		-		
Trichloroethene	ug/l	-			-			-	ND	5	-		
Semi-volatile Organics													
Butyl Benzyl Phthalate	ug/l	-			-			-	ND	11	-		
bis(2-Ethylhexyl)phthalate	ug/l	-			-			-	ND	11	-		

* Non-detect

Location: NEWPORT
Project Name: SLF GW SAMPLING-MAR96
Sample Source: NPT-MW-1B
Sample Name: NPT-MW-1B
Date Sampled: March 20, 1996
Lab Sample ID: 2480913-1 Analysis Lab: LANCAS

Method Number: 6010A Prep Method: 3010A

Analyte/Parameter	Dilution	Result		MDL	PQL	Unit	Date Analyzed
BARIUM	1	.10		.0025	0.1	MG/L	Mar 26, 1996
CADMIUM	1	< .0026		.0026	0.01	MG/L	Mar 26, 1996
CHROMIUM	1	< .0073		.0073	0.03	MG/L	Mar 26, 1996
COBALT	1	< .0047		.0047	0.05	MG/L	Mar 26, 1996
COPPER	1	.0059	J	.0042	0.025	MG/L	Mar 26, 1996
MAGNESIUM	1	1.94		.049	0.1	MG/L	Mar 26, 1996
NICKEL	1	< .011		.011	0.05	MG/L	Mar 26, 1996
VANADIUM	1	< .0052		.0052	0.015	MG/L	Mar 26, 1996
ZINC	1	.028		.0064	0.025	MG/L	Mar 26, 1996

Method Number: 7060A Prep Method: 7060A

Analyte/Parameter	Dilution	Result	MDL	PQL	Unit	Date Analyzed
ARSENIC	1	< .0023	.0023	0.01	MG/L	Mar 25, 1996

Method Number: 7421 Prep Method: 3020A

Analyte/Parameter	Dilution	Result	MDL	PQL	Unit	Date Analyzed
LEAD	1	< .0017	.0017	0.003	MG/L	Mar 28, 1996

Method Number: 7470A Prep Method: 7470A

Analyte/Parameter	Dilution	Result	MDL	PQL	Unit	Date Analyzed
MERCURY	1	< .000032	.000032	0.0002	MG/L	Mar 25, 1996

Method Number: 8240B

Analyte/Parameter	Dilution	Result	MDL	PQL	Unit	Date Analyzed
TETRACHLOROETHENE	2.5	420.	1.	5	UG/L	Mar 22, 1996
TRICHLOROETHENE	1	15.	1.	5	UG/L	Mar 22, 1996
VINYL CHLORIDE	1	< 2.	2.	5	UG/L	Mar 22, 1996

Surrogates:

Analyte/Parameter	Dilution	RPR	Date Analyzed
1,2-DICHLOROETHANE-D4		85.0	Mar 22, 1996
BROMOFLUOROBENZENE		90.0	Mar 22, 1996
TOLUENE-D8		91.0	Mar 22, 1996

Location: NEWPORT
Project Name: SLF GW SAMPLING-MAR96
Sample Source: NPT-MW-1B-DIS
Sample Name: NPT-MW-1B-DIS
Date Sampled: March 20, 1996
Lab Sample ID: 2480914-1 Analysis Lab: LANCAS

Method Number: 6010A Prep Method: 3010A

Analyte/Parameter	Dilution	Result		MDL	PQL	Unit	Date Analyzed
BARIUM	1	.0758	J	.0025	0.1	MG/L	Mar 25, 1996
CADMIUM	1	< .0026		.0026	0.01	MG/L	Mar 25, 1996
CHROMIUM	1	< .0073		.0073	0.03	MG/L	Mar 25, 1996
COBALT	1	< .0047		.0047	0.05	MG/L	Mar 25, 1996
COPPER	1	.0087	J	.0042	0.025	MG/L	Mar 25, 1996
MAGNESIUM	1	1.98		.049	0.1	MG/L	Mar 25, 1996
NICKEL	1	< .011		.011	0.05	MG/L	Mar 25, 1996
VANADIUM	1	< .0052		.0052	0.015	MG/L	Mar 25, 1996
ZINC	1	.026		.0064	0.025	MG/L	Mar 25, 1996

Method Number: 7060A Prep Method: 7060A

Analyte/Parameter	Dilution	Result	MDL	PQL	Unit	Date Analyzed
ARSENIC	1	< .0023	.0023	0.01	MG/L	Mar 25, 1996

Method Number: 7421 Prep Method: 3020A

Analyte/Parameter	Dilution	Result	MDL	PQL	Unit	Date Analyzed
LEAD	1	< .0017	.0017	0.003	MG/L	Mar 27, 1996

Method Number: 7470A Prep Method: 7470A

Analyte/Parameter	Dilution	Result	MDL	PQL	Unit	Date Analyzed
MERCURY	1	< .000032	.000032	0.0002	MG/L	Mar 25, 1996

AR323788

04/29/90 PHASE III INTERMEDIATE GROUNDWATER - POSITIVE ANALYTICAL RESULTS 10:01:23
DUPONT-NEWPORT SITE

Lab Sample Number:		380465			380476			382581			382588		
Locator :		MW-19B			MW-19B			MW-1B			MW-1B		
Collect Date:		11-NOV-90			11-NOV-90			18-NOV-90			18-NOV-90		
	UNITS	VALUE	QUAL	DL	VALUE	QUAL	DL	VALUE	QUAL	DL	VALUE	QUAL	DL
al Metals													
luminum, Total	ug/l	216	P		-			-			-		
ntimony, Total	ug/l	-	ND P	30	-			-			-		
rsenic, Total	ug/l	-	ND M	3	-			-			-		
			F R										
arium, Total	ug/l	114	B P		-			-			-		
eryllium, Total	ug/l	-	ND P	1	-			-			-		
admium, Total	ug/l	3.1	B P		-			-			-		
alcium, Total	ug/l	19600	P		-			-			-		
hromium, Total	ug/l	-	ND P	5	-			-			-		
obalt, Total	ug/l	26.6	B P		-			-			-		
opper, Total	ug/l	28.5	P		-			-			-		
ron, Total	ug/l	30400	P		-			-			-		
ead, Total	ug/l	75.4	N F		-			-			-		
agnesium, Total	ug/l	8120	P		-			-			-		
anganese, Total	ug/l	507	P		-			-			-		
ickel, Total	ug/l	19.4	B P		-			-			-		
otassium, Total	ug/l	11700	P		-			-			-		
odium, Total	ug/l	24100	P		-			-			-		
anadium, Total	ug/l	-	ND P	5	-			-			-		
inc, Total	ug/l	202	P		-			-			-		
ssolved Metals													
luminum, Dissolved	ug/l				170	B P		-			210	P *	
arium, Dissolved	ug/l				124	B P		-			60.59	B P	
eryllium, Dissolved	ug/l				-	ND P	1	-			-	ND P	1
admium, Dissolved	ug/l				-	ND P	3	-			-	ND P	3
alcium, Dissolved	ug/l				21300	P		-			6660	P	
hromium, Dissolved	ug/l				-	ND P	5	-			-	ND P	5
obalt, Dissolved	ug/l				29.2	B P		-			-	ND P	5
opper, Dissolved	ug/l				29.2	P		-			7.3	B P	
ron, Dissolved	ug/l				26000	P		-			53.29	B P	
ead, Dissolved	ug/l				69	F		-			-	ND F	3
												N	
agnesium, Dissolved	ug/l				8810	P		-			2340	B P	
anganese, Dissolved	ug/l				547	P		-			9.8	B P	
ickel, Dissolved	ug/l				20.7	B P		-			-	ND P	14
otassium, Dissolved	ug/l				12700	P		-			1780	B P	
odium, Dissolved	ug/l				26200	P		-			8020	P E	
inc, Dissolved	ug/l				182	P		-			55.79	P	
olatile Organics													
1,2-Dichloroethane	ug/l				-			-	ND	5	-		
1,2-Dichloroethylene, Total	ug/l				-			-	ND	5	-		
Acetone	ug/l				-			-	ND	10	-		
Benzene	ug/l				-			1	J		-		
Carbon tetrachloride	ug/l				-			-	ND	5	-		
Chlorobenzene	ug/l				-			2	J		-		
Chloroform	ug/l				-			-	ND	5	-		
Methylene chlor	ug/l				-			8	B		-		
Tetrachloroethe	ug/l				-			3	J		-		
Trichloroethene	ug/l				-			-	ND	5	-		
	ug/l				-			-	ND	5	-		

AR323789

04/29/90 PHASE III INTERMEDIATE GROUNDWATER - POSITIVE ANALYTICAL RESULTS 10:01:23
DUPONT-NEWPORT SITE

Lab Sample Number:		382594			384082			384105			384095		
Locator :		MW-1B			MW-20B			MW-20B			MW-20B		
Collect Date:		18-NOV-90			27-NOV-90			27-NOV-90			27-NOV-90		
	UNITS	VALUE	QUAL	DL	VALUE	QUAL	DL	VALUE	QUAL	DL	VALUE	QUAL	DL
Total Metals													
Aluminum, Total	ug/l	160	B P *		-			92.09	B P N *		-		
Antimony, Total	ug/l	-	ND P	30	-			-	ND P	30	-		
Arsenic, Total	ug/l	-	ND F W	3	-			-	ND F	3	-		
Barium, Total	ug/l	64.8	B P		-			52.09	B P N *		-		
Beryllium, Total	ug/l	-	ND P	1	-			-	ND P	1	-		
Cadmium, Total	ug/l	-	ND P	3	-			-	ND P	3	-		
Calcium, Total	ug/l	6380	P		-			6330	P		-		
Chromium, Total	ug/l	-	ND P	5	-			-	ND P	5	-		
Cobalt, Total	ug/l	-	ND P	5	-			-	ND P	5	-		
Copper, Total	ug/l	10.8	B P		-			4	B P		-		
Iron, Total	ug/l	21.7	B P *		-			53.7	B P N *		-		
Lead, Total	ug/l	-	ND F N	3	-			-	ND F N	3	-		
Magnesium, Total	ug/l	2360	B P		-			2560	B P		-		
Manganese, Total	ug/l	8.3	B P		-			16.1	P		-		
Nickel, Total	ug/l	-	ND P	14	-			-	ND P	14	-		
Potassium, Total	ug/l	1660	B P		-			4150	B P		-		
Sodium, Total	ug/l	7880	P E		-			7850	P		-		
Vanadium, Total	ug/l	-	ND P	5	-			-	ND P	5	-		
Zinc, Total	ug/l	42.4	P		-			30.9	P		-		
Dissolved Metals													
Aluminum, Dissolved	ug/l	-			-			-			67.6	B	
Barium, Dissolved	ug/l	-			-			-			56.6	B	
Beryllium, Dissolved	ug/l	-			-			-			-	ND	1
Cadmium, Dissolved	ug/l	-			-			-			-	ND	3
Calcium, Dissolved	ug/l	-			-			-			7020		
Chromium, Dissolved	ug/l	-			-			-			-	ND	5
Cobalt, Dissolved	ug/l	-			-			-			-	ND	5
Copper, Dissolved	ug/l	-			-			-			-	ND	4
Iron, Dissolved	ug/l	-			-			-			16.5	B	
Lead, Dissolved	ug/l	-			-			-			-	ND	3
Magnesium, Dissolved	ug/l	-			-			-			2870	B	
Manganese, Dissolved	ug/l	-			-			-			16.3		
Nickel, Dissolved	ug/l	-			-			-			23.4	B	
Potassium, Dissolved	ug/l	-			-			-			4880	B	
Sodium, Dissolved	ug/l	-			-			-			8770		
Zinc, Dissolved	ug/l	-			-			-			9.1	B	
Volatile Organics													
1,2-Dichloroethane	ug/l	-			- ND		5	-			-		
1,2-Dichloroethylene, Total	ug/l	-			- ND		5	-			-		
Acetone	ug/l	-			- ND		10	-			-		
Benzene	ug/l	-			- ND		5	-			-		
Carbon tetrachloride	ug/l	-			- ND		5	-			-		
Chlorobenzene	ug/l	-			- ND		5	-			-		
Chloroform	ug/l	-			- ND		5	-			-		
Methylene chloride	ug/l	-			1 B J			-			-		

Location: NEWPORT
Project Name: SLF GW SAMPLING-MAR96
Sample Source: NPT-MW-2B
Sample Name: NPT-MW-2B
Date Sampled: March 20, 1996
Lab Sample ID: 2480915-1 Analysis Lab: LANCAS

Method Number: 6010A Prep Method: 3010A

Analyte/Parameter	Dilution	Result		MDL	PQL	Unit	Date Analyzed
BARIUM	1	.0570	J	.0025	0.1	MG/L	Mar 26, 1996
CADMIUM	1	.059		.0026	0.01	MG/L	Mar 26, 1996
CHROMIUM	1	< .0073		.0073	0.03	MG/L	Mar 26, 1996
COBALT	1	.0389	J	.0047	0.05	MG/L	Mar 26, 1996
COPPER	1	.034		.0042	0.025	MG/L	Mar 26, 1996
MAGNESIUM	1	3.47		.049	0.1	MG/L	Mar 26, 1996
NICKEL	1	.041	J	.011	0.05	MG/L	Mar 26, 1996
VANADIUM	1	< .0052		.0052	0.015	MG/L	Mar 26, 1996
ZINC	1	6.10		.0064	0.025	MG/L	Mar 26, 1996

Method Number: 7060A Prep Method: 7060A

Analyte/Parameter	Dilution	Result	MDL	PQL	Unit	Date Analyzed
ARSENIC	1	< .0023	.0023	0.01	MG/L	Mar 25, 1996

Method Number: 7421 Prep Method: 3020A

Analyte/Parameter	Dilution	Result	MDL	PQL	Unit	Date Analyzed
LEAD	1	< .0017	.0017	0.003	MG/L	Mar 28, 1996

Method Number: 7470A Prep Method: 7470A

Analyte/Parameter	Dilution	Result	MDL	PQL	Unit	Date Analyzed
MERCURY	1	< .000032	.000032	0.0002	MG/L	Mar 25, 1996

Method Number: 8240B

Analyte/Parameter	Dilution	Result		MDL	PQL	Unit	Date Analyzed
TETRACHLOROETHENE	1	2.	J	1.	5	UG/L	Mar 26, 1996
TRICHLOROETHENE	1	< 1.		1.	5	UG/L	Mar 26, 1996
VINYL CHLORIDE	1	< 2.		2.	5	UG/L	Mar 26, 1996

Surrogates:

Analyte/Parameter	Dilution	RPR	Date Analyzed
1,2-DICHLOROETHANE-D4		107.0	Mar 26, 1996
BROMOFLUOROBENZENE		98.0	Mar 26, 1996
TOLUENE-D8		95.0	Mar 26, 1996

Location: NEWPORT
Project Name: SLF GW SAMPLING-MAR96
Sample Source: NPT-MW-2B-DIS
Sample Name: NPT-MW-2B-DIS
Date Sampled: March 20, 1996
Lab Sample ID: 2480916-1 Analysis Lab: LANCAS

Method Number: 6010A Prep Method: 3010A

Analyte/Parameter	Dilution	Result		MDL	PQL	Unit	Date Analyzed
BARIUM	1	.0457	J	.0025	0.1	MG/L	Mar 25, 1996
CADMIUM	1	.057		.0026	0.01	MG/L	Mar 25, 1996
CHROMIUM	1	< .0073		.0073	0.03	MG/L	Mar 25, 1996
COBALT	1	.0367	J	.0047	0.05	MG/L	Mar 25, 1996
COPPER	1	.035		.0042	0.025	MG/L	Mar 25, 1996
MAGNESIUM	1	3.49		.049	0.1	MG/L	Mar 25, 1996
NICKEL	1	.042	J	.011	0.05	MG/L	Mar 25, 1996
VANADIUM	1	< .0052		.0052	0.015	MG/L	Mar 25, 1996
ZINC	1	5.99		.0064	0.025	MG/L	Mar 25, 1996

Method Number: 7060A Prep Method: 7060A

Analyte/Parameter	Dilution	Result	MDL	PQL	Unit	Date Analyzed
ARSENIC	1	< .0023	.0023	0.01	MG/L	Mar 25, 1996

Method Number: 7421 Prep Method: 3020A

Analyte/Parameter	Dilution	Result	MDL	PQL	Unit	Date Analyzed
LEAD	1	< .0017	.0017	0.003	MG/L	Mar 27, 1996

Method Number: 7470A Prep Method: 7470A

Analyte/Parameter	Dilution	Result	MDL	PQL	Unit	Date Analyzed
MERCURY	1	< .000032	.000032	0.0002	MG/L	Mar 25, 1996

AR323792

04/29/90 PHASE III INTERMEDIATE GROUNDWATER - POSITIVE ANALYTICAL RESULTS 10:01:23
DUPONT-NEWPORT SITE

Lab Sample Number:				380433			380455			380466			382264		
Locator :				MW-29B			MW-29B			MW-29B			MW-2B		
Collect Date:				11-NOV-90			11-NOV-90			11-NOV-90			15-NOV-90		
	UNITS	VALUE	QUAL	DL	VALUE	QUAL	DL	VALUE	QUAL	DL	VALUE	QUAL	DL
:al Metals													
ıluminum, Total	ug/l		-		337	P		-				-	
ıntimony, Total	ug/l		-		-	ND P	29	-				-	
ırsenic, Total	ug/l		-		-	ND F	2	-				-	
ıarium, Total	ug/l		-		60	B P		-				-	
ıeryllium, Total	ug/l		-		-	ND P	1	-				-	
:admium, Total	ug/l		-		-	ND P	5	-				-	
:alcium, Total	ug/l		-		9850	P		-				-	
:hromium, Total	ug/l		-		-	ND P	4	-				-	
:obalt, Total	ug/l		-		5.1	B P		-				-	
:opper, Total	ug/l		-		10.7	B P		-				-	
ıron, Total	ug/l		-		676	P		-				-	
.ead, Total	ug/l		-		3.6	F N *		-				-	
ıagnesium, Total	ug/l		-		2510	B P		-				-	
ıanganese, Total	ug/l		-		52.79	P		-				-	
ıickel, Total	ug/l		-		-	ND P	35	-				-	
?otassium, Total	ug/l		-		-	ND P	3160	-				-	
Sodium, Total	ug/l		-		8830	P E		-				-	
Vanadium, Total	ug/l		-		-	ND P	4	-				-	
Zinc, Total	ug/l		-		66.59	P *		-				-	
ssolved Metals													
Aluminum, Dissolved	ug/l		-		-			171	B P			-	
Barium, Dissolved	ug/l		-		-			56.59	B P			-	
Beryllium, Dissolved	ug/l		-		-			-	ND P	1		-	
Cadmium, Dissolved	ug/l		-		-			-	ND P	5		-	
Calcium, Dissolved	ug/l		-		-			9790	P			-	
Chromium, Dissolved	ug/l		-		-			-	ND P	4		-	
Cobalt, Dissolved	ug/l		-		-			4.9	B P			-	
Copper, Dissolved	ug/l		-		-			7.3	B P			-	
Iron, Dissolved	ug/l		-		-			35.9	B P			-	
Lead, Dissolved	ug/l		-		-			-	ND F	3		-	
									N				
Magnesium, Dissolved	ug/l		-		-			2620	B P			-	
Manganese, Dissolved	ug/l		-		-			57.79	P			-	
Nickel, Dissolved	ug/l		-		-			-	ND P	35		-	
Potassium, Dissolved	ug/l		-		-			-	ND P	3160		-	
Sodium, Dissolved	ug/l		-		-			9340	P E			-	
Zinc, Dissolved	ug/l		-		-			38.5	P			-	
latile Organics												- ND	5
1,2-Dichloroethane	ug/l		- ND	5	-			-				- ND	5
1,2-Dichloroethylene, Total	ug/l		- ND	5	-			-				- ND	10
Acetone	ug/l		- ND	10	-			-				- ND	5
Benzene	ug/l		- ND	5	-			-				- ND	5
Carbon tetrachloride	ug/l		- ND	5	-			-				- ND	5
Chlorobenzene	ug/l		- ND	5	-			-				- ND	5
Chloroform	ug/l		- ND	5	-			-				1 B J	
Methylene chlori[illegible]	ug/l		7 B		-			-				1 J	
Tetrachloroethe[illegible]	ug/l		- ND	5	-			-				- ND	5
Trichloroethene	ug/l		- ND	5	-			-				- ND	
Xylenes, Total	ug/l		- ND	5	-			-					

AR323793

04/29/90 PHASE III INTERMEDIATE GROUNDWATER - POSITIVE ANALYTICAL RESULTS 10:01:23
DUPONT-NEWPORT SITE

Lab Sample Number:		382265			382266			383885			383896		
Locator :		MW-2B			MW-2B			MW-30B			MW-30B		
Collect Date:		15-NOV-90			15-NOV-90			26-NOV-90			26-NOV-90		
	UNITS	VALUE	QUAL	DL	VALUE	QUAL	DL	VALUE	QUAL	DL	VALUE	QUAL	DL
otal Metals													
Aluminum, Total	ug/l	105	B P		-			-			113	B P N *	
Antimony, Total	ug/l	-	ND P	30	-			-			-	ND P	30
Arsenic, Total	ug/l	-	ND F W N	3	-			-			-	ND F W	3
Barium, Total	ug/l	46.4	B P		-			-			50.5	B P N *	
Beryllium, Total	ug/l	-	ND P	1	-			-			-	ND P	1
Cadmium, Total	ug/l	78.69	P		-			-			-	ND P	3
Calcium, Total	ug/l	11400	P		-			-			5560	P	
Chromium, Total	ug/l	-	ND P	5	-			-			-	ND P	5
Cobalt, Total	ug/l	72	P		-			-			10.9	B P	
Copper, Total	ug/l	44.79	P		-			-			21.1	B P	
Iron, Total	ug/l	68.09	B P		-			-			69.9	B P N *	
Lead, Total	ug/l	-	ND F W N R	3	-			-			14.8	F N	
Magnesium, Total	ug/l	4660	B P		-			-			1860	B P	
Manganese, Total	ug/l	1290	P		-			-			23.1	P	
Nickel, Total	ug/l	51.2	P		-			-			-	ND P	14
Potassium, Total	ug/l	5460	P		-			-			2490	B P	
Sodium, Total	ug/l	8340	P		-			-			7270	P	
Vanadium, Total	ug/l	-	ND P	5	-			-			-	ND P	5
Zinc, Total	ug/l	8290	P		-			-			60.9	P	
Dissolved Metals													
Aluminum, Dissolved	ug/l	-			192	B P		-			-		
Barium, Dissolved	ug/l	-			39.29	B P		-			-		
Beryllium, Dissolved	ug/l	-			-	ND P	1	-			-		
Cadmium, Dissolved	ug/l	-			76.8	P		-			-		
Calcium, Dissolved	ug/l	-			11400	P		-			-		
Chromium, Dissolved	ug/l	-			-	ND P	5	-			-		
Cobalt, Dissolved	ug/l	-			71.8	P		-			-		
Copper, Dissolved	ug/l	-			44.59	P		-			-		
Iron, Dissolved	ug/l	-			27.2	B P		-			-		
Lead, Dissolved	ug/l	-			-	ND W N F	3	-			-		
Magnesium, Dissolved	ug/l	-			4700	B P		-			-		
Manganese, Dissolved	ug/l	-			1280	P		-			-		
Nickel, Dissolved	ug/l	-			52.7	P		-			-		
Potassium, Dissolved	ug/l	-			5770	P		-			-		
Sodium, Dissolved	ug/l	-			8650	P		-			-		
Zinc, Dissolved	ug/l	-			8120	P		-			-		
Volatile Organics													
1,2-Dichloroethane	ug/l	-			-			- ND		5	-		
1,2-Dichloroethylene, Total	ug/l	-			-			- ND		5	-		
Acetone	ug/l	-			-			9 B J			-		
Benzene	ug/l	-			-			- ND		5	-		
Carbon tetrachloride	ug/l	-			-			- ND		5	-		
								- ND		5			
								- ND		5			