### GEOTECHNICAL SUBSURFACE INVESTIGATION DATA REPORT (REVISION NO. 1)

CGG Combined Operating License Application (COLA) Project Calvert Cliffs Nuclear Power Plant (CCNPP) Calvert County, Maryland

**April 13, 2007** 

Prepared By:

SCHNABEL ENGINEERING NORTH, LLC Gaithersburg, Maryland (Schnabel Project No. 06120048)

Submitted To:

BECHTEL POWER CORPORATION
Frederick, Maryland
(Bechtel Subcontract No. 25237-103-HC4-CY00-00001)



#### April 13, 2007

Mr. Frank Lopez, Jr., P.E. Bechtel Power Corporation 5275 Westview Drive Frederick, MD 21703-8306

Subject: Geotechnical Subsurface Investigation Data Report (Revision No. 1)

CGG Combined Operating License Application (COLA) Project, Calvert Cliffs Nuclear Power Plant

(CCNPP), Calvert County, Maryland

Subcontract No. 25237-103-HC4-CY00-00001

(Schnabel Project No. 06120001)

Dear Mr. Lopez:

Schnabel Engineering North, LLC (Schnabel) is pleased to submit this Geotechnical Subsurface Investigation Data Report (Revision No. 1) for the above referenced project. This data report contains a summary of the equipment and methods used, subsurface information Schnabel personnel collected for this project, and soil and water laboratory testing. This report supersedes the Geotechnical Subsurface Investigation Data Report dated December 19, 2006, and incorporates information contained in Addendum No. 1, dated January 8, 2007, and Addendum No. 2, dated January 31, 2007.

This report has been prepared in accordance with the Technical Services Subcontract agreement between Bechtel Power Corporation (Bechtel) and Schnabel, dated March 23, 2006, and subsequent Change Orders.

Sampling and testing activities for this project were performed under Bechtel's quality assurance program meeting NQA-1 requirements, and according to the pre-approved project technical specification, technical procedures, and work plans.

We appreciate the opportunity to be of service to you for this project. Please contact Mr. Brian Banks at (301) 417-2400 if you have any questions regarding this report.

Very truly yours,

SCHNABEL ENGINEERING NORTH, LLC

Brian K. Banks, P.G.

Associate

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#### 1.0 Introduction

Schnabel Engineering North, LLC (Schnabel) performed a geotechnical subsurface investigation under the direction of Bechtel Power Corporation (Bechtel) to support the Combined Operation License Application (COLA) for two new nuclear reactors and associated infrastructure (e.g., heat sinks, cooling towers, switch yard, construction access road, water intake structure, etc.) and help evaluate the siting feasibility for the new reactors.

#### 1.1 Site Description

The project site is located adjacent to the existing Calvert Cliffs Nuclear Power Plant (CCNPP). The site is bordered by the CCNPP to the north, and by Calvert Cliffs along the western shores of the Chesapeake Bay to the east.

The site includes the land currently occupied by "Camp Canoy", a lightly developed recreational facility with a few small, widely-spaced buildings and shelters; a baseball field; tennis courts; pool; a small, earth-dam pond; both paved and un-paved access roads; and utilities.

The majority of the site is wooded with small to large trees and a thin understory of brush and vines, except for some open grassy areas in Camp Canoy. The topography generally consists of gently to moderately sloped terrain, although some areas exhibit steep slopes. Streams and wetland areas occupy many of the topographic lows. Wetland areas were also found at intermediate levels on some of the slopes.

#### 1.2 Scope of Work

The scope of our work as defined by Exhibit D, Scope of Work and Technical Specification 25237-103-3PS-CY00-00001 of the Subcontract included performing field testing and sampling, conducting laboratory testing, providing quality control surveillances during field and laboratory activities, and preparing this data report. Specifically, the following scope items were performed:

- Surveying to establish the horizontal and vertical locations of subsurface exploration points;
- Detecting underground utilities at subsurface exploration points;

- Drilling 145 standard penetration test (SPT) borings to depths up to 403 feet, and collection of disturbed SPT and undisturbed tube soil samples;
- Installation and development of 40 ground water observation wells to depths up to 122 feet, permeability testing in each well, and ground water sampling in each well:
- Excavating 20 test pits to depths up to ten feet and collection of bulk soil samples;
- Performing 63 cone penetration test (CPT) soundings, some including shear wave and/or pore water pressure dissipation measurements, to depths up to 142.4 feet with auger pre-drilling;
- Conducting two-dimensional field electrical resistivity testing along four alignments;
- Performing borehole geophysical logging including natural gamma, long- and short-normal resistivity, spontaneous potential, three-arm caliper, and direction survey, and P-S velocity logging in 10 SPT borings;
- Conducting SPT hammer energy testing for each of the five hammer-rod combinations used.
- Soils laboratory testing for moisture content, unit weight, specific gravity, sieve and hydrometer analysis, Atterberg limits, organic content, chemical analysis (pH, sulfate, chloride, cation exchange capacity), moisture-density, unconfined compression, unconsolidated-undrained triaxial compression, consolidated-undrained triaxial compression, direct shear, resonant column torsional shear (RCTS), and consolidation properties. RCTS data is not yet available and will be submitted as an addendum to this report.
- Water laboratory testing for alkalinity, ammonia, nitrogen, bromide, chloride, dissolved solids, fluoride, nitrate, nitrite, sulfate, and sulfide.

This data report, prepared to convey information collected during the subsurface investigation, includes the following:

- Table listing the manufacturer field equipment used,
- As-built exploration point survey data,
- List of subcontractors used,
- Underground utility detection report,
- Typed SPT boring logs,
- CPT report,
- Typed observation well logs,

- Field permeability test results,
- Field electrical resistivity test results,
- Borehole geophysical logging results,
- Laboratory test results, and
- SPT hammer energy study results.

Services with respect to providing engineering analyses and recommendations, approval of testing locations, environmental assessments, and wetlands identification are not included in our scope of services.

#### 2.0 Field Testing and Sampling

The subsurface investigation, including field testing and sampling, was performed between April 27, 2006 and August 8, 2006, except for the as-built survey which was performed between September 15, 2006 and October 19, 2006, and the ground water sampling which was performed between December 19 through 21, 2006. All field testing and sample collection was performed in accordance with technical procedures and work plans established for this project. The field equipment used during field testing and sampling activities is provided as Table A1 in Appendix A.

The subsurface exploration test locations were planned by Bechtel personnel and presented to us on the Subsurface Investigation Location Plan (Drawings 25237-0-CY-0000-00001 and 25237-0-CY-0000-00002) and on the Test Pit Location Plan, (Drawing 25237-0-CY-0000-00003). Each planned test location was staked in the field in advance of the associated testing activity. Offsets from the planned locations were sometimes necessary to avoid steep slopes, large trees, wetland buffers, overhead power lines, underground utilities, and debris piles. Offset locations were approved by Bechtel personnel in advance of testing.

#### **2.1 Surveying Services**

Surveying services included both an initial stakeout prior to testing and an as-built survey after testing. The originally planned subsurface exploration point locations (i.e., northing and easting) were staked in the field during the initial stakeout. The follow-up survey was performed after completion of field testing activities to determine the as-built locations for subsurface exploration points offset from their originally planned locations. A summary of the as-built subsurface exploration point locations is provided as Table A2 in Appendix A.

#### **2.2 Underground Utility Detection**

Underground utility detection activities were performed to investigate for the presence of underground utilities at each subsurface exploration point location. When underground utility conflicts were detected, subsurface exploration point locations were offset to avoid underground utilities. The underground utility location report prepared by AMT (provided in Appendix B) includes the methods used and the results of the underground utility detection activities.

#### 2.3 SPT Drilling and Sampling

A total of 145 SPT borings were performed to depths up to 403 feet. Schnabel personnel provided full-time field inspection of SPT boring activities and logged each boring during drilling. SPT boring logs are presented in Appendix C. Five drilling rigs equipped with automatic SPT hammers were used to advance the borings, including:

- 1. Failing 1500 (truck-mounted)
- 2. CME 75 (truck-mounted)
- 3. CME 550 (ATV-mounted)
- 4. CME 750 (ATV-mounted)
- 5. Diedrich D50 (ATV-mounted)

Borings were advanced using primarily mud rotary techniques, although hollow-stem augers were used as casing in the upper portions of some borings. Details about the drilling tools used for each boring are included on the boring logs. The drilling mud, consisting of a weighted bentonite-water mixture, was used to stabilize the borehole walls and to facilitate sediment removal during drilling. Clean water was used during drilling. The water was brought in from offsite and stored in a water tank.

Standard penetration testing (ASTM D 1586) was generally conducted at a regular spacing of one test every five feet. However, tests were conducted every two-and-a-half feet in the upper 15 feet of each boring. Additionally, SPTs were conducted approximately every ten feet below a depth of about 300 feet in boring B-401. Pocket penetrometer measurements were collected on the exposed bottom portion of selected cohesive undisturbed tube samples. SPT and pocket penetrometer results are included on the boring logs in Appendix C.

Soil sampling in SPT borings included collecting disturbed SPT samples and undisturbed tube samples. SPT split-spoon samples retrieved at each SPT interval were visually described and classified by a Schnabel field inspector. A representative portion of each recovered split-spoon sample was placed in a glass sample jar sealed with a moisture-proof lid. Undisturbed tube samples were collected at selected intervals between SPT tests. The methods used to collect tube samples, including Shelby tubes, Osterberg, and Pitcher sampling, were selected on based on geologic conditions. When possible, the exposed bottom portion of each recovered tube sample

was visually described and classified by a Schnabel field inspector before the tubes were capped and sealed with wax.

SPT borings were backfilled with bentonite-cement grout using a tremie-pipe to displace drilling mud during grout placement. All borings were sealed with grout except for the boring in which wells were installed. A note indicating whether a boring was sealed with grout or finished with a well is included on each boring log.

#### 2.4 Test Pit Excavation

A total of 20 test pits were excavated to depths up to ten feet with a backhoe. Schnabel personnel provided full-time field inspection of test pit excavation activities and logged each test pit during excavation. The Schnabel field inspector collected bulk soil samples at various depths within the test pit excavations. Test pit logs, including subsurface soil descriptions and classifications, ground water observations, and sampling depth intervals, are presented in Appendix C.

#### 2.5 Well Installation

A total of 40 ground water observation wells were installed to depths up to 122 feet. Schnabel personnel provided full-time field inspection of well installation activities and prepared a well construction field log during well installation. Wells were either installed in SPT boreholes in lieu of grout backfill, or at an offset location, typically about ten feet from the SPT "companion" boring. For wells installed in SPT boreholes, the borehole was grouted to the planned bottom depth of the well and reamed to at least six-inch diameter using mud rotary methods and biodegradable drilling fluid. The well holes installed at offset locations were advance using either six-and-a-quarter-inch inside diameter hollow-stem augers or six-inch diameter mud rotary methods with biodegradable drilling fluid. No SPT sampling was conducted at offset well locations.

Well construction logs are presented in Appendix D. Ground water observation wells were constructed using two-inch diameter schedule 40 PVC riser casing; ten-foot long, ten-slot (0.01-inch), machine-cut PVC screen; and a two-foot long sump made of blank casing capped on the bottom. Centralizers were placed above and below the screen interval. Filter pack sand consisting of clean, well-graded sand was placed around the sump and screen intervals, and at

least two feet above the top of the screen. A bentonite seal at least three feet thick was placed above the filter pack. The annular space around the riser casing above the bentonite seal was backfilled with cement-bentonite grout. A protective steel well cover, locking cap, and concrete surface seal were installed for each well.

Each well was developed by pumping and/or flushing with clean water to remove sediment from the well and filter pack prior to field permeability testing. The duration and extent of well development was determined by Bechtel field personnel. However, in general development was carried out until the well water appeared clear.

#### 2.6 Field Permeability Testing

Schnabel personnel performed field permeability testing at each of the 40 ground water observation wells from July 21 to 31, 2006. We followed the falling head slug test method in accordance with Section 8 of ASTM D 4044. A falling head slug test is an unsophisticated test method in which an object of known volume is lowered into a well to induce a rise in water level in the well. Water in the well is subsequently forced out into the surrounding aquifer due to an increase in water pressure at a rate proportional to the hydraulic conductivity of the aquifer. Permeability testing results are presented in Appendix D.

Of the 40 wells tested, 38 contained water immediately prior to testing and two, OW-729 and OW-770, were dry immediately prior to testing. We used a mechanical slug in the wet wells and a water slug in the two dry wells. The mechanical slug was a five-foot long, 1-¼ inch internal diameter (1-¾ external diameter) PVC pipe filled with sand. The water slug was a measured amount of water poured quickly into the well.

We recorded a pre-test water level for each well using a water level indicator. Prior to conducting the falling head test at each well, we used an In-situ, Inc. LevelTroll pressure transducer to obtain pre-test water level trends. The LevelTroll was inserted into the well and linked by a cable to a field laptop at the surface. We recorded water level measurements with the LevelTroll every two seconds until the water level in the well recovered from the insertion of the transducer.

To conduct the falling head test, we quickly inserted the slug in the well to raise the water height almost instantaneously. The LevelTroll recorded the water level in the well every 0.250 seconds for the first five minutes, and every two seconds thereafter. The duration of the tests

varied from several minutes to three hours, depending on the time it took for the water levels to return to approximate pre-test levels. We ended the test when the water level recovered to within about 0.3 feet of the pre-test water levels, or three hours duration.

#### 2.7 Hydraulic Conductivity Analysis

Hydraulic conductivity analysis was performed for each set of permeability test data using the Bouwer and Rice method for slug/bail testing and Aquifer Test software (version 2.57) by Waterloo Hydrogeologic, Inc. Input parameters (static water level, depth to bottom of aquifer, length of screen, casing radium, and radius of influence) used in the analysis are included on each of the hydraulic conductivity data report sheets included in Appendix D. The porosity of the well filter pack was assumed to be 25%. The hydraulic conductivity results are summarized in Table 1. The hydraulic conductivity analysis results for the two dry observation wells (OW-729 and OW-770) are not reported because the permeability testing for these wells impacted the filter pack material rather than the surrounding formation soil.

**Table 1: Summary of Hydraulic Conductivity Results** 

Location	Screened Interval Depth (ft)	USCS	Hydraulic Conductivity (ft/s)
OW-301	65 - 75	SP	1.58X10 <sup>-4</sup>
OW-313A	40 – 50	SM, ML	7.50X10 <sup>-6</sup>
OW-313B	95 – 105	CL, ML, MH	2.74X10 <sup>-7</sup>
OW-319A	20 - 30	SP-SM, SC, CH, CL	2.89X10 <sup>-6</sup>
OW-319B	70 - 80	SM	3.42X10 <sup>-5</sup>
OW-323	30 - 40	SP, SP-SM	6.24X10 <sup>-5</sup>
OW-328	60 - 70	SM, OH	3.79X10 <sup>-6</sup>
OW-336	60 - 70	SP-SM, SM	2.10X10 <sup>-5</sup>
OW-401	63 - 73	SM	6.77X10 <sup>-6</sup>
OW-413A	35 - 45	SP-SM	1.21X10 <sup>-5</sup>
OW-413B	110 - 120	SP-SM, SM	2.78X10 <sup>-6</sup>
OW-418A	25 - 35	SP-SM	4.41X10 <sup>-6</sup>
OW-418B	75 - 85	SC, SM	2.16X10 <sup>-7</sup>
OW-423	28 - 38	SP-SM, SM, SC	6.86X10 <sup>-5</sup>
OW-428	35 - 45	SM, SC	1.19X10 <sup>-5</sup>
OW-436	29 - 39	SC, SM	2.80X10 <sup>-6</sup>
OW-703A	35 - 45	SM	1.34X10 <sup>-5</sup>

OW-703B	68 - 78	SM, ML	1.08X10 <sup>-6</sup>
OW-705	40 - 50	SC, SM	4.99X10 <sup>-6</sup>
OW-708	22 - 32	SM	2.56X10 <sup>-5</sup>
OW-711	35 – 45	SM	6.04X10 <sup>-6</sup>
OW-714	38 - 48	SP-SM, SC	2.81X10 <sup>-6</sup>
OW-718	30 - 40	SP-SM	4.44X10 <sup>-6</sup>
OW-725	48 - 58	SM	7.54X10 <sup>-6</sup>
OW-735	60 - 70	SP-SM, SM	5.48X10 <sup>-5</sup>
OW-743	40 - 50	SP-SM, SM	6.23X10 <sup>-7</sup>
OW-744	38 - 48	CL, SC, SM	1.07X10 <sup>-6</sup>
OW-752A	25 - 35	CH, SM	$7.03X10^{-5}$
OW-752B	85 – 95	SP-SM	3.35X10 <sup>-6</sup>
OW-754	32 - 42	CL, SM	5.29X10 <sup>-6</sup>
OW-756	30 - 40	SP-SM, SP-SC	2.01X10 <sup>-4</sup>
OW-759A	20 - 30	SM, SC, MH	4.64X10 <sup>-7</sup>
OW-759B	75 - 85	SM, SP, SP-SM	1.17X10 <sup>-6</sup>
OW-765A	17 - 27	SP-SM	1.00X10 <sup>-5</sup>
OW-765B	82 - 92	SM	1.36X10 <sup>-6</sup>
OW-766	20 - 30	SP-SM	1.10X10 <sup>-6</sup>
OW-768	30 - 40	SM	5.29X10 <sup>-6</sup>
OW-769	32 - 42	SM, SC	1.74X10 <sup>-6</sup>

#### 2.8 Ground Water Sampling

Ground water sampling was performed between December 19 and 21, 2006 to obtain ground water samples for laboratory analysis. A total of 15 ground water observation wells, were sampled, including OW-301, OW-323, OW-336, OW-401, OW-423, OW-428, OW-705, OW-708A, OW-711, OW-725, OW-735, OW-744, OW-752, OW-768A, and OW-769. The wells were purged prior to obtaining the ground water samples. Water quality field parameters including pH, dissolved oxygen, electrical conductivity, oxidation-reduction potential, and turbidity, were measured during purging in accordance with ASTM D 6452. Water sampling was also performed in accordance with ASTM D 6452 using a submersible pump laced below the water level in the well and above the screen interval, if possible. The well sampling records for each well are included in Appendix D.

#### 2.9 Field Electrical Resistivity Testing

Field electrical resistivity (ER) testing was performed on June 19 and 20, 2006 to provide apparent resistivity values and modeled one dimensional ground resistivity profiles for

grounding design. ER testing results are provided in Tables 1 and 2 below, and in graphical format (i.e., Resistivity Sounding Data Sheets) in Appendix E.

Schnabel personnel collected field resistivity data using an Advanced Geosciences, Inc., Sting resistivity meter, a Wenner four-electrode array, and "a" spacings of 1.5, 3, 5, 7.5, 10, 15, 20, 30, 40, 50, 100, 200, and 300 feet in accordance with ASTM G57 and IEEE 81. The arrays were centered on the surveyed and staked locations R-1 and 2, R-3, and R-4 as shown on the Subsurface Investigation Location Plan. The electrode locations used for the "a" spacings were located using 300 ft measuring tapes along the appropriate bearings using a Brunton compass. ER line R-1, oriented to site east-west, and line R-2, oriented to site north-south crossed at their midpoints. ER lines R-3 and R-4 were single lines in two separate locations oriented to site north-south. Ground cover at the testing locations generally consisted of forest litter underlain by sandy soil.

Perpendicular lines R-1 and R-2 may be used to observe resistivity anisotropy in the subsurface. Anisotropy is typically caused by differing soil types, soil grain orientation, or moisture content within the test area. In general, the site soils exhibited anisotropy at greater depths. However, consideration should be given to the terrain, which varied between lines R-1 and R-2. The measurements appear to be consistent with those expected from coastal plain soils. The location of the vertical resistivity profile is considered at the midpoint of the array. The depth of the measurements is about ½ of the "a" spacing (Roy, A. and Apparao, A., 1971, *Depth of Investigation in Direct Current Methods*, Geophysics, v. 36, No. 5, pp. 943-959).

The raw field data are considered "apparent" resistivity values because the measured data includes influences from the large volume of material that is sampled and influences from the geometry of the array used. Modeling the data is an attempt to remove these influences and develop vertical profiles that estimate the true subsurface resistivity values. Schnabel personnel modeled the apparent resistivity data using the modeling software Res1D by M.H. Loke, which uses an iterative approach to model true conditions, and a multi-layer approach. The multiple-layer inversion method results in models with much lower RMS error than a simple two layer method. We found that a seven-layer scenario resulted in the lowest error for ER-1 (12.4%), and a five-layer scenario resulted in the lowest RMS error for line R-2 (7.70%). The inversion results for lines R-1 and R-2 are presented in Table 2 below and on the Resistivity Sounding Data Sheet (sheet one of three) in Appendix E.

Table 2: Field Resistivity Results, ER Lines R-1 and R-2

Location	Bottom Depth of Layer (ft)	Resistivity (Ohm-feet)
	0.5	1,404
	2.2	40,413
	6.3	3,169
R-1	15.0	10,216
	43.1	167
	119.4	56
	N/A	308
	0.5	2,096
	7.6	11,969
R-2	17.9	7,372
	62.9	3,885
	N/A	223

The two perpendicular lines R-1 and R-2 show similar apparent resistivity values in the upper layers. However, the models show differences between their layer resistivities and thicknesses. This may be due to complexities in the subsurface that the inversion program cannot resolve or the fact that lines R-1 and R-2 had potentially significant differences in topography.

The model inversions for lines R-3 and R-4 resulted in best fit of a four layer model with an RMS error of 9.4%, and a best fit of a five layer model with an RMS error of 11.2%, respectively. Although these ER lines were collected with the same trend, the raw data show significant differences which are reflected in the inverted model results. The inversion results for lines R-3 and R-4 are presented in Table 3 below and on the Resistivity Sounding Data Sheets (sheets 2 and 3 of 3) in Appendix E.

Table 3: Field Resistivity Results, ER Lines R-3 and R-4

Location	Bottom Depth of Layer (ft)	Resistivity (Ohm-feet)		
	2.4	9,685		
ER-3	10.6	39,140		
EK-3	59.8	420		
	N/A	98		
	4.6	1,621		
	13.8	16,535		
ER-4	39.9	2,923		
	53.2	1,230		
	N/A	118		

#### 2.10 CPT Soundings

ConeTec, Inc. completed a total of 63 cone penetration test (CPT) soundings to depths up to 142.4 feet, including seismic and pore pressure dissipation testing at selected depth intervals. Many CPT soundings encountered refusal above the target depths. Predrilling with hollow-stem augers was performed in several locations to penetrate refusal zones. Schnabel personnel provided full-time field inspection of CPT activities.

The ConeTec report, *Presentation of In Situ Testing Program Results*, is presented in Appendix F. The ConeTec report includes a summary of the equipment and methods used as well as CPT test results (i.e., CPT logs, shear wave velocity data, and pore pressure dissipation curves).

#### 2.11 Borehole Geophysical Logging

Geovision, Inc. performed borehole geophysical logging in a total of ten SPT borings. Borehole geophysical methods included natural gamma, long- and short-normal resistivity, spontaneous potential, three-arm caliper, direction survey, and P-S velocity logging. Schnabel personnel provided full-time field inspection of borehole geophysical logging activities. The Geovision report, *Boring Geophysical Logging*, is presented in Appendix G. The Geovision report includes a summary of the equipment and methods used as well as the borehole geophysics test results.

#### 2.12 SPT Hammer Energy Testing

GRL Engineers, Inc. performed SPT energy measurements for each of the five SPT drilling rigs used for this project to evaluate the energy transfer efficiency for each rig-hammer combination. Schnabel personnel provided full-time field inspection of SPT energy measurement activities. The GRL report, *Summary Report for SPT Energy Measurements*, is included in Appendix H. The GRL report presents a summary of the equipment and methods used as well as the results of the SPT hammer energy testing.

#### 2.13 Subcontractors

Table A3 in Appendix A lists the subcontractors used by Schnabel on the project.

#### 3.0 Laboratory Testing

Laboratory testing of selected soil samples was performed on disturbed SPT and bulk samples, and undisturbed tube samples recovered from the SPT test borings and test pit excavations. Laboratory testing of selected water samples was performed on ground water samples obtained from ground water observation wells. The samples selected for testing were based on laboratory assignments provided by Bechtel personnel. Soil laboratory tests included moisture content, grain size (sieve and hydrometer), Atterberg limits, organic content, chemical analysis (pH, chloride, sulfate, cation exchange capacity), unit weight, specific gravity, moisturedensity, California bearing ratio (CBR), consolidation, unconfined compression (UC), unconsolidated-undrained triaxial compression (UU), consolidated-undrained triaxial compression (CIU-bar), direct shear, resonant column torsional shear (RCTS) testing. Water laboratory testing included total dissolved solids, inorganic ions (bromide, chloride, fluoride, sulfide, sulfate, nitrite, and nitrate), alkalinity (bicarbonate/carbonate), and ammonia. Laboratory testing was conducted in accordance with the following ASTM standards:

#### 1) Identification and Index Testing:

- a) Unified Soil Classification System (USCS) ASTM D 2487 and ASTM D 2488
- b) Sieve and Hydrometer Analysis ASTM D 422 and ASTM D 6913
- c) Atterberg Limits ASTM D 4318
- d) Natural Moisture Content ASTM D 2216
- e) Specific Gravity ASTM D 854
- f) Organic Content ASTM D 2974

#### 2) Compaction and Strength Tests

- a) Moisture-Density Relationship ASTM D 1557
- b) California Bearing Ratio ASTM D 1883
- c) Unconfined Compression ASTM D 2166
- d) Unconsolidated-undrained Triaxial Compression ASTM D 2850
- e) Consolidated-undrained Triaxial compression ASTM D 4767
- f) Direct Shear ASTM D 3080

- 3) Compressibility Tests
  - a) Consolidation ASTM D 2435
- 4) Chemical Testing Soil
  - a) pH ASTM D 4972
  - b) Chloride EPA 300.0
  - c) Sulfate EPA 300.0
  - d) Cation Exchange Capacity ECL-SOP-313
- 5) Chemical Testing Water
  - a) Total Dissolved Solids ECL-SOP-306
  - b) Inorganic Ions ECL-SOP-301a
  - c) Alkalinity ECL-SOP-312
  - d) Ammonia ECL-SOP-320 and ECL-SOP-350

A total of five approved soil testing laboratories were used to conduct soil laboratory testing for this project, including:

• Schnabel Engineering, Baltimore, Maryland

Performed moisture content, sieve, sieve with hydrometer, Atterberg limits, unit weight, specific gravity, moisture density, and CBR tests.

Schnabel Engineering, Blacksburg, Virginia

Performed moisture content, sieve with hydrometer, Atterberg limits, unit weight, specific gravity, consolidation, UC, UU, CIU-bar and direct shear tests.

GeoTesting Express, Boxborough, Massachusetts

Performed moisture content, sieve, sieve with hydrometer, Atterberg limits, unit weight, specific gravity, consolidation, UC, UU, CIU-bar and direct shear tests.

• Enviro-Chem, Baltimore, Maryland

Performed chemical analysis tests on soil and ground water samples.

• Fugro Consultants, Houston, Texas

Performed RCTS tests (results pending).

Detailed laboratory test results are presented in Appendix I. The boring logs in Appendix B include moisture content, grain size, and Atterberg limits results. The Unified Soil Classification System (USCS) group names and group symbols shown on the logs are consistent with laboratory testing results. The color descriptions on the gradation curves indicate the colors observed during laboratory testing and therefore may differ from the color descriptions on the boring logs which reflect field observations.

#### APPENDIX A SUMMARY TABLES

- Table A1: Field Equipment List
- Table A2: As-Built Subsurface Exploration Point Locations
- Table A3: Subcontractors

#### Constellation Generation Group (CGG) COLA Project Calvert Cliffs Nuclear Power Plant (CCNPP) Calvert County, Maryland

	Equipment Used								
Field Activity	General Description	Manufacturer	Model	Serial Number	Calibration Certification Date				
Surveying	Transit	Topcon	GPT-3002W	990609	2/13/2006				
	Pipe/Cable Locator	Radiodetection	RD-4000	142021NZ	1/26/2006				
Underground Utility	Pipe/Cable Locator	Radiodetection	RD-4001	2938UZ	1/26/2006				
Detection	Pipe/Cable Locator	Metrotech	Metrotech	3222	3/13/2006				
	Pipe/Cable Locator	Metrotech	Metrotech	3222	3/13/2006				
	SPT Drilling Rig	Failing	1500 (truck-mounted)	N/A	N/A				
	SPT Drilling Rig	Central Mine Equipment Co.	75 (truck-mounted)	N/A	N/A				
	SPT Drilling Rig	Central Mine Equipment Co.	550 (ATV-mounted)	N/A	N/A				
	SPT Drilling Rig	Central Mine Equipment Co.	750 (ATV-mounted)	N/A	N/A				
Standard Penetration	SPT Drilling Rig	Diedrich Drill, Inc.	D50 (ATV-mounted)	N/A	N/A				
Testing (SPT) and Well Installation	Automatic SPT Hammer	Central Mine Equipment Co.	N/A	C-I	4/18/2006				
	Automatic SPT Hammer	Central Mine Equipment Co.	N/A	C-II	4/18/2006				
	Automatic SPT Hammer	Diedrich Drill, Inc.	N/A	C-III	5/12/2006				
	Automatic SPT Hammer	Central Mine Equipment Co.	N/A	UTD-001	4/20/2006				
	Automatic SPT Hammer	Central Mine Equipment Co.	N/A	UTD-002	4/24/2006				
	CPT Sounding Rig	ConeTec, Inc./Moroka	TC3	N/A	N/A				
Cone Penetration Testing	Load Cell	ConeTec, Inc.	N/A	LC1129	5/15/2006				
(CPT)	Electronic Seismic Piezo Cone	ConeTec, Inc.	N/A	AD195	2/13/2006 & 7/11/2006				
	Electronic Seismic Piezo Cone	ConeTec, Inc.	N/A	AD184	9/14/2005 & 7/11/2006				
Field Electrical Resistivity	Resistivity Meter	Advanced Geosciences, Inc.	STING R1 Resistivity Meter	990324	6/16/2006				

#### Constellation Generation Group (CGG) COLA Project Calvert Cliffs Nuclear Power Plant (CCNPP) Calvert County, Maryland

	Equipment Used							
Field Activity	General Description	Manufacturer	Model	Serial Number	Calibration Certification Date			
	Accelerometer	Pile Dynamics, Inc.	N/A	P548	11/11/2005			
	Accelerometer	Pile Dynamics, Inc.	N/A	K0280	11/17/2005			
	Accelerometer	Pile Dynamics, Inc.	N/A	K0018	6/29/2005			
	Accelerometer	Pile Dynamics, Inc.	N/A	K0262	6/30/2005			
	Accelerometer	Pile Dynamics, Inc.	N/A	K0277	5/30/2006			
	Accelerometer	Pile Dynamics, Inc.	N/A	K0019	5/16/2006			
	Accelerometer	Pile Dynamics, Inc.	N/A	122Ј	11/3/2005			
	Accelerometer	Pile Dynamics, Inc.	N/A	K0363	9/22/2005			
SPT Hammer Energy Study	Accelerometer	Pile Dynamics, Inc.	N/A	K0455	2/2/2006			
	Accelerometer	Pile Dynamics, Inc.	N/A	K0417	12/1/2005			
	Accelerometer	Pile Dynamics, Inc.	N/A	K0397	12/1/2005			
	Accelerometer	Pile Dynamics, Inc.	N/A	K0281	7/20/2005			
	Accelerometer	Pile Dynamics, Inc.	N/A	K0286	7/20/2005			
	Accelerometer	Pile Dynamics, Inc.	N/A	K0287	7/20/2006			
	Accelerometer	Pile Dynamics, Inc.	N/A	K0288	12/13/2005			
	Pile Driving Analyzer	Pile Dynamics, Inc.	Model PAK	1702	5/19/2006			
	Pile Driving Analyzer	Pile Dynamics, Inc.	Model PAK	1638	3/23/2005			
	Caliper Calibration Plate	Robertson Geo Logging	N/A	201	4/6/2006			
	Suspension Logger	Oyo Corp.	3331-A	19029	4/21/2006			
Downhole Geophysics	Suspension Telemetry	Oyo Corp.	3403	160023	4/21/2006			
Downhole Geophysics	Seismograph	Geometrics	STRATAVIEW	75299	4/21/2006			
	Counter	Hewlett Packard	2626A09881	5335A	4/21/2006			
	FCTN Gen	Hewlett Packard	2847A14447	3325B	4/21/2006			

#### Constellation Generation Group (CGG) COLA Project Calvert Cliffs Nuclear Power Plant (CCNPP) Calvert County, Maryland

			<b>Equipment Used</b>		
Field Activity	General Description Manufacturer		Model	Serial Number	Calibration Certification Date
	Pressure Transducer	InSitu, Inc.	Level Troll 700	104259	1/24/2006
Permeability Testing	Pressure Transducer	InSitu, Inc.	Level Troll 700	104213	1/19/2006
rermeability resting	Pressure Transducer	InSitu, Inc.	Level Troll 700	104255	1/23/2006
	Water Level Meter	Heron Instruments	Dipper-T	WLP-001	7/20/2006
	Pocket Penetrometer	Ben Meadows Company	5JF-49015	PP-01	4/25/2006
Pocket Penetration	Pocket Penetrometer	Ben Meadows Company	5JF-49015	PP-02	4/25/2006
Index Testing	Pocket Penetrometer	Ben Meadows Company	5JF-49015	PP-03	4/25/2006
	Pocket Penetrometer	Ben Meadows Company	5JF-49015	PP-04	4/25/2006

### Table A2 As-Built Subsurface Exploration Point Locations

Location	•	Termination Elevation (ft)	Maryland	nates (ft) State Plane 1927)	Ground Surface Elevation	Elevation (ft) Top of Concrete at Base of Well Head	Elevation (ft) Ground Water Level Measuring Point	Date of As Built Survey
			North	East	(ft) (NGVD 29)	Protector	(V-Notch)	
B-301	403.0	-308.5	217024.06	960815.05	94.51	N/A	N/A	9/15/2006
B-302	200.0	-123.6	217122.24	960766.98	76.41	N/A	N/A	9/15/2006
B-303	200.0	-112.6	217016.91	960867.69	87.40	N/A	N/A	9/15/2006
B-304	200.0	-132.0	217188.61	960896.88	68.00	N/A	N/A	9/15/2006
B-305	151.5	-79.5	217166.25	960686.74	72.01	N/A	N/A	9/15/2006
B-306	150.0	-31.4	217024.31	960681.82	118.58	N/A	N/A	9/15/2006
B-307	201.5	-82.2	216955.27	960690.13	119.28	N/A	N/A	9/15/2006
B-308	150.0	-42.9	216906.69	960771.28	107.10	N/A	N/A	9/15/2006
B-309	150.0	-49.9	216949.24	960890.70	100.06	N/A	N/A	9/15/2006
B-310	100.0	-8.4	217081.40	960616.60	91.62	N/A	N/A	5/15/2006
B-311	150.0	-91.6	217268.61	960771.76	58.43	N/A	N/A	9/15/2006
B-312	99.5	-44.2	217293.00	960740.00	55.27	N/A	N/A	5/15/2006
B-313	150.0	-99.3	217372.34	960713.67	50.73	N/A	N/A	9/15/2006
B-314	100.0	-47.2	217321.89	960654.50	52.78	N/A	N/A	9/15/2006
B-315	100.0	-34.5	217184.68	960559.43	65.54	N/A	N/A	9/15/2006
B-316	100.0	8.1	216767.16	960864.35	108.07	N/A	N/A	9/15/2006
B-317	100.0	-5.6	217094.70	961249.20	94.42	N/A	N/A	5/15/2007
B-318	200.0	-102.2	217019.30	961227.20	97.82	N/A	N/A	5/15/2006
B-319	100.0	2.9	216963.62	961123.01	102.87	N/A	N/A	9/15/2006
B-320	150.0	-43.6	216943.50	961044.10	106.43	N/A	N/A	5/15/2006
B-321	150.0	-79.3	217152.50	960333.20	70.66	N/A	N/A	5/25/2006
B-322	100.0	-10.1	217170.03	960202.65	89.87	N/A	N/A	9/15/2006
B-323	200.0	-92.5	217027.97	960060.86	107.48	N/A	N/A	9/15/2006
B-324	101.5	3.7	216906.40	960114.44	105.20	N/A	N/A	9/15/2006
B-325	100.0	-15.0	216948.98	960549.73	84.97	N/A	N/A	9/15/2006
B-326	100.0	3.1	216859.22	960652.25	103.11	N/A	N/A	9/15/2006
B-327	150.0	-63.1	216865.70	960573.37	86.92	N/A	N/A	9/15/2006
B-328	150.0	-73.7	216828.86	960493.21	76.29	N/A	N/A	9/19/2006
B-329	100.0	-25.2	216800.38	960379.43	74.83	N/A	N/A	9/19/2006
B-330	100.0	-14.5	216715.40	960523.70	85.46	N/A	N/A	9/15/2006
B-331	100.0	-31.7	216970.57	960481.79	68.32	N/A	N/A	9/15/2006
B-332	100.0	-34.6	217127.42	960400.52	65.40	N/A	N/A	9/15/2006
B-333	98.8	-9.3	216657.04	960386.24	89.49	N/A	N/A	9/15/2006
B-334	100.0	-13.3	216515.53	960556.61	86.75	N/A	N/A	9/15/2006
B-335	100.0	-0.5	216732.70	960703.30	99.47	N/A	N/A	5/15/2006
B-336	100.0	-3.1	216632.91	960750.27	96.87	N/A	N/A	9/15/2006
B-337	100.0	-28.2	217257.88	960264.41	71.77	N/A	N/A	9/15/2006
B-338	99.6	-1.6	217121.10	960150.10	97.97	N/A	N/A	5/25/2006
B-339	100.0	-8.0	217095.21	960211.99	91.96	N/A	N/A	9/15/2006

•	Termination Elevation (ft)	Maryland	nates (ft) State Plane 1927)	Ground Surface Elevation	Elevation (ft) Top of Concrete at Base of Well Head	Elevation (ft) Ground Water Level Measuring Point	Date of As Built Survey	
			North	East	(ft) (NGVD 29)	Protector	(V-Notch)	
B-340	100.0	-15.4	217171.34	961225.22	84.57	N/A	N/A	9/15/2006
B-341	100.5	-2.3	217036.40	961104.48	98.16	N/A	N/A	9/15/2006
B-401	401.5	-329.4	216344.12	961516.81	72.06	N/A	N/A	9/15/2006
B-402	200.0	-117.8	216405.10	961463.50	82.22	N/A	N/A	5/15/2006
B-403	200.0	-136.6	216305.80	961562.90	63.41	N/A	N/A	5/15/2006
B-404	200.0	-132.1	216441.34	961596.49	67.90	N/A	N/A	9/21/2006
B-405	150.0	-28.0	216487.38	961408.73	122.00	N/A	N/A	9/15/2006
B-406	150.0	-31.6	216315.62	961352.01	118.36	N/A	N/A	9/15/2006
B-407	200.0	-118.4	216238.96	961412.45	81.63	N/A	N/A	9/15/2006
B-408	150.0	-81.6	216261.74	961482.04	68.41	N/A	N/A	9/15/2006
B-409	150.0	-88.5	216253.80	961614.80	61.55	N/A	N/A	4/20/2006
B-410	55.0	64.1	216374.30	961323.70	119.05	N/A	N/A	4/20/2006
B-410A*	98.7	20.4	216381.30	961323.70	119.05	N/A	N/A	4/20/2006
B-411	150.0	-68.6	216556.31	961517.19	81.45	N/A	N/A	9/15/2006
B-412	98.9	-6.7	216589.24	961495.42	92.17	N/A	N/A	9/15/2006
B-413	150.0	-27.1	216694.88	961413.25	122.90	N/A	N/A	9/15/2006
B-414	100.0	21.2	216630.18	961354.48	121.20	N/A	N/A	9/15/2006
B-415	98.7	20.6	216480.90	961264.20	119.26	N/A	N/A	4/20/2006
B-416	100.0	-13.8	216084.50	961596.34	86.22	N/A	N/A	9/15/2006
B-417	101.5	-52.3	216435.75	961901.11	49.23	N/A	N/A	9/15/2006
B-418	200.0	-156.3	216340.25	961976.71	43.67	N/A	N/A	9/22/2006
B-419	100.0	-44.7	216267.83	961895.60	55.29	N/A	N/A	9/21/2006
B-420	150.0	-87.4	216213.53	961670.44	62.57	N/A	N/A	9/15/2006
B-421	150.0	-34.4	216497.56	961019.77	115.58	N/A	N/A	9/15/2006
B-422	100.0	4.0	216478.23	960915.01	104.02	N/A	N/A	9/15/2006
B-423	201.5	-91.4	216331.76	960850.21	110.14	N/A	N/A	9/15/2006
B-424	100.0	18.9	216263.30	960818.60	118.92	N/A	N/A	4/26/2006
B-425	101.5	16.9	216247.50	961274.70	118.43	N/A	N/A	4/20/2006
B-426	100.0	-16.3	216193.04	961386.57	83.73	N/A	N/A	9/21/2006
B-427	150.0	-33.7	216164.05	961272.73	116.27	N/A	N/A	9/19/2006
B-428	150.0	-35.9	216109.19	961210.06	114.11	N/A	N/A	9/19/2006
B-429	100.0	3.7	216087.85	961119.27	103.66	N/A	N/A	9/19/2006
B-430	100.0	2.5	216006.88	961193.12	102.48	N/A	N/A	9/19/2006
B-431	101.5	16.9	216271.10	961177.30	118.43	N/A	N/A	4/20/2006
B-432	100.0	18.6	216399.00	961139.10	118.62	N/A	N/A	4/20/2006
B-433	100.0	-2.5	215963.80	961107.50	97.49	N/A	N/A	4/27/2006
B-434	100.0	5.2	215827.10	961244.30	105.15	N/A	N/A	5/2/2006
B-435	100.0	7.7	216020.06	961404.74	107.71	N/A	N/A	9/15/2006
B-436	100.0	8.3	215923.92	961441.55	108.29	N/A	N/A	9/22/2006

Location Depth (ft)	•	•			Ground Surface Elevation	Surface Top of Concrete at Elevation Base of Well Head	Elevation (ft) Ground Water Level Measuring Point	Date of As Built Survey
			North	East	(ft) (NGVD 29)	Protector	(V-Notch)	
B-437	100.5	10.1	216521.76	960968.80	110.63	N/A	N/A	9/15/2006
B-438	6.5	99.5	216414.91	960848.90	105.95	N/A	N/A	9/28/2006
B-438A	100.0	6.6	216411.98	960867.31	106.59	N/A	N/A	9/28/2006
B-439	100.0	13.8	216340.49	960948.68	113.80	N/A	N/A	9/15/2006
B-440	100.0	-43.7	216349.47	961813.66	56.34	N/A	N/A	9/21/2006
B-701	75.0	-66.3	219485.54	960507.60	8.66	N/A	N/A	9/21/2006
B-702	50.0	-39.7	218980.62	961183.23	10.33	N/A	N/A	9/21/2006
B-703	100.0	-54.6	218171.00	960957.01	45.42	N/A	N/A	9/21/2006
B-704	50.0	-10.4	217991.06	960926.05	39.58	N/A	N/A	9/21/2006
B-705	50.0	-3.3	217581.30	960917.90	46.75	N/A	N/A	4/19/2006
B-706	50.0	27.4	217140.14	961339.74	77.42	N/A	N/A	9/21/2006
B-707	50.0	17.4	217396.98	961481.84	67.38	N/A	N/A	9/21/2006
B-708	100.0	-62.7	217585.84	961810.64	37.35	N/A	N/A	9/28/2006
B-709	50.0	-18.8	217642.82	961978.18	31.25	N/A	N/A	9/28/2006
B-710	75.0	-27.0	217542.51	962136.88	47.96	N/A	N/A	9/28/2006
B-711	50.0	3.0	216755.70	961743.50	53.01	N/A	N/A	4/19/2006
B-712	50.0	-7.6	216506.16	961997.56	42.41	N/A	N/A	9/22/2006
B-713	50.0	8.0	216117.68	962283.16	57.99	N/A	N/A	9/28/2006
B-714	50.0	66.0	215705.73	962034.37	116.02	N/A	N/A	10/16/2006
B-715	50.0	36.3	214951.76	962639.59	86.29	N/A	N/A	10/17/2006
B-716	49.5	32.9	215003.21	961364.57	82.35	N/A	N/A	10/16/2006
B-717	50.0	40.7	214302.45	962349.27	90.72	N/A	N/A	10/17/2006
B-718	50.0	67.5	214130.52	961929.05	117.47	N/A	N/A	10/18/2006
B-719	49.4	25.8	213978.69	961500.20	75.23	N/A	N/A	10/18/2006
B-720	75.0	-1.5	215674.48	962378.47	73.47	N/A	N/A	9/28/2006
B-721	100.0	1.3	215545.80	962462.10	101.30	N/A	N/A	5/4/2006
B-722	73.9	25.9	215386.10	962467.00	99.78	N/A	N/A	5/4/2006
B-723	75.0	15.0	215108.00	963000.80	90.02	N/A	N/A	4/28/2006
B-724	100.0	-3.0	214780.00	963106.20	96.97	N/A	N/A	4/28/2006
B-725	75.0	-16.0	214664.30	963219.40	59.02	N/A	N/A	4/28/2006
B-726	75.0	3.3	215564.67	961709.57	78.33	N/A	N/A	10/16/2006
B-727	100.0	4.9	215300.85	961884.98	104.88	N/A	N/A	10/16/2006
B-728	75.0	37.3	215163.63	961910.05	112.30	N/A	N/A	10/16/2006
B-729	75.0	42.3	214861.87	962454.60	117.28	N/A	N/A	10/17/2006
B-730	75.0	40.4	214728.50	962523.84	115.36	N/A	N/A	10/17/2006
B-731	99.3	16.4	214546.48	962547.88	115.67	N/A	N/A	10/17/2006
B-732	75.0	15.7	215034.10	961594.70	90.72	N/A	N/A	5/11/2006
B-733	100.0	-12.1	214866.80	961697.70	87.92	N/A	N/A	5/11/2006
B-734	75.0	30.7	214589.60	961812.50	105.73	N/A	N/A	5/9/2006

Location Depth (ft)	•	Maryland	nates (ft) State Plane 1927)	Ground Surface Elevation	Elevation (ft) Top of Concrete at Base of Well Head	Elevation (ft) Ground Water Level Measuring Point	Date of As Built Survey	
			North	East	(ft) (NGVD 29)	Protector	(V-Notch)	
B-735	75.0	16.2	214805.48	961021.83	91.20	N/A	N/A	10/16/2006
B-736	75.0	23.3	214681.67	961154.26	98.29	N/A	N/A	10/16/2006
B-737	100.0	-36.5	214511.91	961147.40	63.47	N/A	N/A	10/16/2006
B-738	75.0	12.3	213826.30	961679.62	87.29	N/A	N/A	10/19/2006
B-739	99.8	0.5	213719.60	961793.32	100.35	N/A	N/A	10/19/2006
B-740	75.0	-0.7	213605.13	961781.13	74.29	N/A	N/A	10/19/2006
B-741	75.0	6.4	213760.48	961029.82	81.38	N/A	N/A	10/18/2006
B-742	100.0	2.4	213472.84	961217.19	102.39	N/A	N/A	10/18/2006
B-743	75.0	28.6	213315.70	961232.00	103.60	N/A	N/A	5/9/2006
B-744	100.0	13.3	216377.30	959963.38	113.28	N/A	N/A	9/29/2006
B-745	75.0	36.7	215971.20	960529.02	111.71	N/A	N/A	9/29/2006
B-746	75.0	7.8	215743.35	960721.36	82.79	N/A	N/A	9/29/2006
B-747	75.0	15.3	216176.28	959944.95	90.34	N/A	N/A	9/29/2006
B-748	100.0	-17.6	216039.74	960288.74	82.40	N/A	N/A	9/29/2006
B-749	75.0	27.5	215775.08	960332.24	102.53	N/A	N/A	9/29/2006
B-750	73.9	-1.6	215849.16	959930.06	72.35	N/A	N/A	9/29/2006
B-751	73.9	18.3	215588.86	960146.20	92.23	N/A	N/A	9/29/2006
B-752	100.0	-4.2	215489.21	960257.57	95.79	N/A	N/A	9/29/2006
B-753	40.0	8.8	217831.20	960648.86	48.81	N/A	N/A	9/21/2006
B-754	50.0	17.0	217369.78	960290.37	67.00	N/A	N/A	9/21/2006
B-755	40.0	55.0	215923.66	961637.86	94.98	N/A	N/A	9/22/2006
B-756	50.0	56.9	215504.60	961215.10	106.85	N/A	N/A	4/21/2006
B-757	40.0	66.9	215135.13	960760.60	106.86	N/A	N/A	10/16/2006
B-758	40.0	42.6	215133.29	960332.67	82.63	N/A	N/A	10/16/2006
B-759	100.0	-1.7	214526.25	960025.32	98.35	N/A	N/A	10/19/2006
B-765	102.0	-4.6	216424.51	959701.22	97.37	N/A	N/A	9/29/2006
B-766	50.0	58.9	216932.89	959791.50	108.89	N/A	N/A	9/19/2006
B-768	100.0	-51.6	217116.03	962242.98	48.39	N/A	N/A	9/28/2006
B-769	50.0	4.2	216589.75	962559.47	54.23	N/A	N/A	9/28/2006
B-770	50.0	71.6	215466.60	962826.95	121.59	N/A	N/A	10/18/2006
C-301	52.3	42.5	217041.78	960820.13	94.84	N/A	N/A	9/15/2006
C-302	61.7	29.3	217088.90	960833.77	90.94	N/A	N/A	9/15/2006
C-302-2*	55.3	39.2	217026.56	960817.55	94.51	N/A	N/A	7/26/2006
C-302-2a*	138.0	-43.5	217026.56	960817.55	94.51	N/A	N/A	7/26/2006
C-303	25.4	36.2	217230.60	960804.00	61.58	N/A	N/A	4/24/2006
C-303a*	47.1	14.5	217230.60	960804.00	61.58	N/A	N/A	7/25/2006
C-303a-1*	71.4	-9.8	217230.60	960804.00	61.58	N/A	N/A	7/25/2006
C-303b*	123.4	-61.8	217230.60	960804.00	61.58	N/A	N/A	7/25/2006

Location	Depth (ft)	Termination Elevation (ft)	Coordinates (ft) Maryland State Plane (NAD 1927)		Ground Surface Elevation	Elevation (ft) Top of Concrete at Base of Well Head	Elevation (ft) Ground Water Level Measuring Point	Date of As Built Survey
			North	East	(ft) (NGVD 29)	Protector	(V-Notch)	
C-304	26.7	34.2	217235.29	960606.73	60.95	N/A	N/A	9/15/2006
C-305	74.3	41.6	216876.50	960961.50	115.91	N/A	N/A	4/24/2006
C-306	56.9	40.4	217042.12	961184.89	97.31	N/A	N/A	9/15/2006
C-306a*	102.5	-5.2	217038.92	961181.69	97.31	N/A	N/A	7/27/2006
C-307	75.3	42.4	216853.68	961079.64	117.64	N/A	N/A	9/15/2006
C-308	48.2	36.1	217129.90	960263.70	84.33	N/A	N/A	5/1/2006
C-309	70.1	36.0	217045.62	960110.76	106.04	N/A	N/A	9/15/2006
C-311	34.9	39.0	216869.75	960488.16	73.97	N/A	N/A	9/15/2006
C-312	56.4	43.3	216799.20	960596.36	99.75	N/A	N/A	9/15/2006
C-313	37.2	42.7	216757.92	960336.75	79.93	N/A	N/A	9/15/2006
C-314	39.5	40.6	216531.40	960493.83	80.09	N/A	N/A	9/15/2006
C-401	28.1	39.4	216384.26	961574.09	67.46	N/A	N/A	9/15/2006
C-401-2a*	81.9	-14.4	216381.06	961570.89	67.46	N/A	N/A	7/27/2006
C-401-2b*	131.2	-63.8	216381.06	961570.89	67.46	N/A	N/A	7/27/2006
C-402	34.5	38.7	216333.85	961494.18	73.13	N/A	N/A	9/15/2006
C-403	43.8	39.2	216517.33	961511.47	82.96	N/A	N/A	9/15/2006
C-404	80.1	39.2	216524.30	961308.90	119.21	N/A	N/A	4/20/2006
C-405	40.0	35.5	216163.49	961666.32	75.54	N/A	N/A	9/15/2006
C-406	15.6	28.3	216380.92	961901.51	43.89	N/A	N/A	9/28/2006
C-407	32.3	30.9	216159.20	961732.20	63.23	N/A	N/A	6/22/2006
C-407-2a*	96.3	-33.1	216161.50	961726.70	63.23	N/A	N/A	7/28/2006
C-407-b*	142.4	-79.2	216161.50	961726.70	63.23	N/A	N/A	7/31/2006
C-408	77.4	40.8	216396.64	961001.81	118.18	N/A	N/A	9/15/2006
C-408a*	98.3	19.9	216398.76	960999.69	118.18	N/A	N/A	7/24/2006
C-408-2a*	123.7	-5.5	216393.81	961004.64	118.18	N/A	N/A	7/31/2006
C-409	80.5	38.6	216288.45	960760.56	119.12	N/A	N/A	9/15/2006
C-411	80.4	36.2	216178.94	961178.21	116.60	N/A	N/A	9/19/2006
C-412	76.8	37.5	216093.75	961306.66	114.31	N/A	N/A	9/28/2006
C-413	13.6	86.3	216045.53	961037.78	99.90	N/A	N/A	9/28/2006
C-414	62.5	39.9	215893.42	961201.10	102.36	N/A	N/A	9/28/2006
C-415	20.0	36.6	216305.70	961857.40	56.63	N/A	N/A	5/26/2006
C-701	29.5	-18.6	219262.19	960933.61	10.95	N/A	N/A	9/21/2006
C-701a*	28.1	-17.1	219265.39	960936.81	10.95	N/A	N/A	7/21/2006
C-702	20.3	-9.0	218720.05	961033.95	11.34	N/A	N/A	9/21/2006
C-703	32.6	35.2	217361.27	961165.03	67.82	N/A	N/A	10/17/2006
C-704	48.2	-2.9	217500.74	961710.02	45.36	N/A	N/A	9/28/2006
C-705	34.0	-2.9	217637.26	961983.10	31.08	N/A	N/A	9/28/2006
C-706	50.0	55.2	216958.95	961494.86	105.28	N/A	N/A	9/21/2006
C-707	19.5	20.8	216308.12	962079.42	40.35	N/A	N/A	9/22/2006

Location	Depth (ft)	Termination Elevation (ft)	Coordinates (ft) Maryland State Plane (NAD 1927)		Ground Surface Elevation	Elevation (ft) Top of Concrete at Base of Well Head	Elevation (ft) Ground Water Level Measuring Point	Date of As Built Survey
			North	East	(ft) (NGVD 29)	Protector	(V-Notch)	
C-708	50.0	62.9	215658.28	961962.86	112.97	N/A	N/A	10/16/2006
C-709	50.0	61.7	215027.59	962824.89	111.73	N/A	N/A	10/18/2006
C-710	21.2	85.0	214875.83	961187.31	106.15	N/A	N/A	10/16/2006
C-711	34.9	65.6	214222.13	962176.75	100.54	N/A	N/A	10/17/2006
C-712	29.7	29.4	213909.83	961370.06	59.05	N/A	N/A	10/18/2006
C-713	41.8	21.3	215855.86	962296.57	63.11	N/A	N/A	9/28/2006
C-714	85.1	24.2	214920.30	963057.62	109.32	N/A	N/A	10/18/2006
C-715	57.3	33.6	215445.62	961798.99	90.85	N/A	N/A	10/16/2006
C-716	20.5	75.7	214432.49	962659.44	96.21	N/A	N/A	10.17/2006
C-717	66.6	35.8	214698.14	961692.58	102.35	N/A	N/A	10/16/2006
C-718	34.1	33.6	214343.71	961205.59	67.67	N/A	N/A	10/16/2006
C-719	12.0	78.2	214025.30	961636.90	90.21	N/A	N/A	10/18/2006
C-720	70.7	28.0	213593.77	961134.09	98.66	N/A	N/A	10/18/2006
C-721	52.0	35.6	216157.88	960330.47	87.62	N/A	N/A	9/29/2006
C-722	38.4	36.1	215478.76	960648.26	74.52	N/A	N/A	10/16/2006
C-723	68.7	28.9	215988.18	959760.36	97.60	N/A	N/A	9/29/2006
D 1	NT/A	NI/A	215927.20	0.00255.00	05.45	N/A	N/A	5/2/2006
R-1	N/A	N/A	215837.30	960255.80	85.45	N/A	N/A	5/3/2006
R-2	N/A	N/A	215837.30	960255.80	85.45	N/A	N/A	5/3/2006
R-3	N/A	N/A	216622.50	960406.80	89.12	N/A	N/A	5/2/2006
R-4	N/A	N/A	215915.40	961114.00	99.40	N/A	N/A	4/27/2006
OW-301	80.0	14.5	217048.02	960814.47	94.51	94.78	96.27	9/15/2006
OW-313A	57.5	-6.5	217367.31	960705.30	51.03	51.31	53.20	9/15/2006
OW-313B	110.0	-59.3	217372.34	960713.67	50.73	51.16	53.54	9/15/2006
OW-319A	35.0	68.1	216962.56	961116.12	103.13	103.31	104.91	9/15/2006
OW-319B	85.0	18.5	216957.32	961125.02	103.53	103.85	105.35	9/19/2006
OW-323	43.5	63.5	217034.46	960057.07	106.96	107.55	109.69	9/19/2006
OW-328	72.0	4.3	216828.86	960493.21	76.29	76.55	77.85	9/19/2006
OW-336	74.0	23.1	216643.18	960746.61	97.11	97.50	99.07	9/16/2006
OW-401	77.5	-6.1	216348.86	961530.99	71.38	71.91	73.49	9/21/2006
OW-413A	50.0	73.2	216703.14	961418.81	123.15	123.51	125.04	9/15/2006
OW-413B	125.0	-2.1	216694.88	961413.25	122.90	123.25	124.85	9/15/2006
OW-418A	40.0	3.7	216340.41	961966.46	43.66	44.31	45.83	9/22/2006
OW-418B	92.0	-48.3	216340.25	961976.71	43.67	44.13	45.77	9/22/2006
OW-423	43.0	68.1	216339.99	960882.24	111.12	111.67	113.16	9/15/2006
OW-428	50.0	63.9	216105.21	961212.38	113.92	114.32	115.92	9/19/2006
OW-436	50.0	58.1	215922.47	961446.87	108.13	108.53	110.39	9/22/2006
OW-703A	49.0	-5.0	218171.23	960967.72	44.02	44.44	45.65	9/21/2006

Location	Depth (ft)	Termination Elevation (ft)	Coordinates (ft) Maryland State Plane (NAD 1927)		Ground Surface Elevation	Elevation (ft) Top of Concrete at Base of Well Head	Elevation (ft) Ground Water Level Measuring Point	Date of As Built Survey
			North	East	(ft) (NGVD 29)	Protector	(V-Notch)	
OW-703B	80.0	-34.4	218171.67	960958.91	45.57	45.97	47.53	9/21/2006
OW-705	52.0	-4.3	217566.62	960917.18	47.71	47.77	50.22	9/15/2006
OW-708A	34.0	3.4	217586.23	961803.52	37.44	37.82	39.61	9/28/2006
OW-711	50.0	2.9	216748.48	961741.61	52.92	53.26	55.31	9/22/2006
OW-714	50.0	66.0	215705.73	962034.37	116.02	116.32	117.98	10/16/2006
OW-718	43.0	75.5	214133.58	961924.87	118.53	118.96	120.41	10/18/2006
OW-725	60.0	-2.0	214649.30	963212.73	58.04	58.38	59.94	10/18/2006
OW-729	42.0	76.9	214872.58	962445.93	118.88	119.44	121.11	10/17/2006
OW-735	72.0	19.2	214805.48	961021.83	91.20	91.81	93.44	10/16/2006
OW-743	55.0	48.7	213320.62	961234.01	103.65	104.05	105.89	10/18/2006
OW-744	50.0	47.5	216405.37	960089.41	97.50	97.96	99.81	9/29/2006
OW-752A	37.0	58.3	215482.18	960250.12	95.30	95.73	97.00	9/29/2006
OW-752B	97.0	-1.2	215489.21	960257.57	95.79	96.09	97.41	9/29/2006
OW-754	44.0	23.0	217369.78	960290.37	67.00	67.21	68.85	9/15/2006
OW-756	42.0	64.6	215497.07	961212.39	106.56	107.07	108.77	10/16/2006
OW-759A	35.0	62.8	214536.47	960055.02	97.78	98.05	99.69	10/19/2006
OW-759B	90.0	8.3	214526.25	960056.32	98.35	98.72	100.14	10/19/2006
OW-765A	29.0	68.4	216424.51	959701.22	97.37	97.92	99.60	9/29/2006
OW-765B	102.0	-5.2	216420.42	959693.64	96.82	97.19	98.47	9/29/2006
OW-766	50.0	58.9	216932.89	959791.50	108.89	109.32	110.72	9/19/2006
OW-768A	42.0	6.5	217106.06	962238.98	48.48	48.96	49.84	9/28/2006
OW-769	42.0	12.2	216589.75	962559.47	54.23	54.39	56.43	9/28/2006
OW-770	42.0	79.6	215466.60	962826.95	121.59	121.79	123.08	10/18/2006
TP-B307	6.7	112.7	216957.53	960690.62	119.35	N/A	N/A	9/19/2006
TP-B314	9.0	43.8	217320.35	960658.25	52.78	N/A	N/A	9/15/2006
TP-B315	8.5	57.3	217182.50	960563.12	65.80	N/A	N/A	9/15/2006
TP-B334	10.0	77.0	216515.64	960560.94	87.03	N/A	N/A	9/19/2006
TP-B335	8.0	91.6	216730.79	960706.97	99.64	N/A	N/A	9/19/2006
TP-B407	7.0	74.3	216391.76	961465.02	81.25	N/A	N/A	9/21/2006
TP-B414	6.5	114.3	216631.18	961530.95	120.83	N/A	N/A	9/15/2006
TP-B415	6.5	112.4	216490.91	961298.37	118.92	N/A	N/A	9/15/2006
TP-B423	8.0	97.9	216414.95	960849.03	105.86	N/A	N/A	9/19/2006
TP-B434	8.5	96.7	215825.90	961244.18	105.24	N/A	N/A	9/22/2006
TP-B435	10.0	97.7	216020.06	961404.74	107.71	N/A	N/A	9/19/2006
TP-B715	8.5	79.7	214964.18	962637.77	88.16	N/A	N/A	10/17/2006
TP-B716	8.8	88.3	214983.83	961289.79	97.13	N/A	N/A	10/16/2006
TP-B717	8.0	82.5	214297.68	962346.36	90.53	N/A	N/A	10/17/2006
TP-B719	8.0	64.3	213966.93	961493.94	72.28	N/A	N/A	10/18/2006

#### Table A2

Location	Depth (ft)	Termination Elevation (ft)	Coordinates (ft) Maryland State Plane (NAD 1927)		Ground Surface Elevation	Elevation (ft) Top of Concrete at Base of Well Head Protector	Elevation (ft) Ground Water Level Measuring Point	Date of As Built Survey
			North	East	(ft) (NGVD 29)	Protector	(V-Notch)	
TP-B727	7.0	97.3	215299.14	961883.13	104.33	N/A	N/A	10/16/2006
TP-B744	6.5	106.8	316377.30	959963.38	113.28	N/A	N/A	9/29/2006
TP-B758	9.0	73.6	215133.29	960332.67	82.63	N/A	N/A	10/16/2006
TP-C309	8.0	100.5	217020.05	960105.24	108.45	N/A	N/A	9/19/2006
TP-C723	7.0	89.8	215989.07	959754.78	96.75	N/A	N/A	9/29/2006

<sup>\*</sup> Location and elevation approximated based on offset observed in the field and recorded on Field Checklist

**Schnabel Project No**. 06120048 **Appendix A:** Summary Tables

Table A3
Subcontractors

# Table A3 Subcontractors

### Constellation Generation Group (CGG) COLA Project Calvert Cliffs Nuclear Power Plant (CCNPP) Calvert County, Maryland

Subcontractor Name	Contact Information	Services Provided
ABM Construction	Mr. Al Muirhead P.O. Box 402 Lusby, MD 20657 (410) 326-4277	Test pit excavation, and path construction and grading for boring access.
A. Morton Thomas and Associates, Inc.	Mr. Ken Williams 12750 Twinbrook Parkway Rockville, MD 20852-1700 (301) 881-2545	Underground utility location.
Collinson, Oliff & Associates, Inc.	Mr. Richard Lewis P.O. Box 2209 Prince Frede4rick, MD 20678 (301)-855-1599	Test location surveying.
Connelly and Associates, Inc.	Mr. Sam Connelly 260 Interstate Ct. Frederick, MD 21704-6627 (301) 696-8820	SPT drilling and sampling, and ground water observation well installation and development.
Enviro-Chem Laboratories, Inc.	Mr. Stephen Shelley 100 Lakefront Dr. Hunt Valley, MD 21030 (410) 785-9739	Soil (pH, chloride, sulfate, cation exchange capacity) and water (total dissolved solids, inorganic ions, alkalinity, ammonia) chemical laboratory testing.
GeoTesting Express	Mr. Gary Torosian 1145 Massachusetts Ave. Boxborough, MA 01719 (978) 635-0424	Soil laboratory testing (moisture content, grain size, Atterberg limits, organic content, unit weight, specific gravity, consolidation, unconfined compression, unconsolidated-undrained triaxial compression, consolidated-undrained triaxial compression, direct shear).
GEOVision, Inc.	Mr. John Diehl 1151 Pomona Rd., Unit P Corona, CA 92882 (951) 549-1234	Borehole geophysical logging (natural gamma, long- and short-normal resistivity, spontaneous potential, three-arm caliper, direction survey, and P-S velocity logging)

# Table A3 Subcontractors

### Constellation Generation Group (CGG) COLA Project Calvert Cliffs Nuclear Power Plant (CCNPP) Calvert County, Maryland

Subcontractor Name	Contact Information	Services Provided
	Mr. Wondem Toferra	SPT hammer energy testing.
	4535 Renaissance Parkway	
GRL Engineers, Inc.	Cleveland, OH 44128	
	(216) 831-6131	
	Mr. Mark Cox	Silt fence construction.
	50 Mulberry Lane	
Mark's Lawn Service, Inc.	Huntington, MD 20639	
	(410) 257-3885	
	Ms. Joan Baer	SPT drilling and sampling, and ground water
	P.O. Box 407	observation well installation and development.
Uni-Tech Drilling Co., Inc.	Franklinville, NJ 08322-0407	
	(856)-694-4200	

# APPENDIX B UNDERGROUND UTILITIES

• Underground Utility Location Report

Schnabel Project No. 06120048 Appendix B: Underground Utilities

## UNDERGROUND UTILITY LOCATION REPORT

Underground Utility Detection Report A Morton Thomas and Associates, Inc. October 3, 2006



October 3, 2006

Mr. Brian K. Banks, P.G. Schnabel Engineering North, LLC 656 Quince Orchard Road, Suite 700 Gaithersburg, MD 20878

Subject: Underground Utility Detection Report

CGG Combined Operating License Application (COLA) Project, Calvert Cliffs Nuclear Power Plant (CCNPP), Calvert

County, Maryland

**AMT Project No. 106-219.001U** 

Dear Mr. Banks:

A Morton Thomas and Associates, Inc. (AMT) is pleased to submit this Underground Utility Detection Report for the above referenced project. This report contains a summary of the equipment and methods used for, and results of the underground utility detection activities. Underground utility detection activities for this project were performed in accordance with the Subcontractor Agreement between AMT and Schnabel Engineering North, LLC, dated May 31, 2006, and according to the pre-approved project technical specification, technical procedures, and work plans.

#### 1.0 Introduction

AMT performed underground utility location activities under the direction of Schnabel personnel to support the subsurface investigation. Geophysical prospecting techniques including conductive and inductive techniques were used to investigate the occurrence and approximate horizontal location of underground utilities within a 10-foot radial distance of each of the subsurface exploration point locations.

1. Inductive refers to "dropping the box" in the vicinity of a known utility and "sweeping" that area to pick up the electromagnetic signature and alignment of the utility.

2. Conductive refers to "directly connecting to any and all utilities in the dig area to verify there exact location. This work is considered quality Level B. Quality level B refers to utility designating. The marking of the utility in 2 dimensions

on the ground's surface, with paint depicting its approximate horizontal location. This method was needed to clear all bore hole locations.

#### 2.0 Equipment Used

The equipment used on this project included:

- 1) Metro Tech 810 DX (calibrated on March 13, 2006), and
- 2) RD 4000 RX (calibrated January 26, 2006)

The Metro Tech 810 DX and the RD 4000 RX are geophysical prospecting instruments that apply a radio signal to a conductive utility with the use of a transmitter. The receiver "senses" that signal and shows a approximate measurement of the location of said utility, both horizontally and vertically. The accuracy of this unit is within 2 feet vertically and horizontally.

#### 3.0 Results

Nine subsurface exploration point locations were found to have a conflicting utility present, either within the ten foot radius of the staked location or directly outside of this area. These locations include: B-316, B-421, B-408, B-702, B-707, B-717, C-703, C-715, and TP-B415. A site plan showing the approximate locations will be submitted with highlighted bubbles that will include type of utility found to be in conflict with an approximate location of that utility.

We appreciate the opportunity to be of service to you for this project. Please contact Mr. Ken Williams at (301) 881-2545 if you have any questions regarding this report.

Very truly yours,
A MORTON THOMAS AND ASSOCIATES, INC.

Ken Williams

Director of S.U.E.

KW: kw

# <u>APPENDIX C</u> BORINGS AND TEST PITS

- Test Boring and Test Pit Log General Notes
- SPT Boring Logs
- Test Pit Logs

**Schnabel Project No.** 06120048 **Appendix C:** Boring and Test Pits

# TEST BORING AND TEST PIT LOG GENERAL NOTES

### **Test Boring and Test Pit Log General Notes**

- 1. Test borings and test pits were logged by Schnabel personnel to provide a record for geotechnical evaluation, construction inspection or other specialized purposes. The log itself includes a description of soil materials encountered using visual classification in the field. The group symbols on the logs represent the Unified Soil Classification System Group Symbols (ASTM D-2487) based on visual observation and limited laboratory testing of the samples. Criteria for visual identification of soil samples are included in this appendix. Some variation may be expected between samples visually classified and samples classified in the laboratory. Boundary lines between various strata are identified where possible and a graphical presentation is included based on the material excavated from the pit. Any significant features such as fill conditions, underground structures, ground water, or water seepage conditions are recorded.
- 2. Numbers in the sampling data column of test boring logs indicate the standard penetration test (SPT) blow counts, N value, and recovery length for each SPT sample, and the recovery length for each undisturbed sample. The blow counts indicate the number of SPT hammer blows required to drive the SPT sampler three successive 6 in intervals. The first 6 in interval typically represents a seating interval. The total number of blows for the second and third intervals is the N value, unless the standard penetration testing for a given interval was stopped when blow counts reached 50 blows in any 6 in interval (i.e., stopped at "refusal"). In cases where refusal is reached, the N value is defined as the total number of blows performed in the last two intervals (or the total number of blows performed in the first interval if refusal was achieved in the first interval) over the penetration length resulting from those blows (e.g., 60/8").
- 3. Strata descriptions are based on visual inspection and are in accordance with the Unified Soil Classification System. Representative soil samples are recovered from the boring logs and test pits, generally from each stratum, for later identification and testing. The locations of samples obtained during test pit excavation are generally not shown on the logs unless laboratory tests performed on samples are referred to in the geotechnical analysis.
- 4. The values following "PP=" in the Sampling Data column of the logs represent pocket penetrometer readings. Pocket penetrometer readings provide an estimate of the unconfined compressive strength of fine-grained soils.
- 5. Key to abbreviations and symbols:

PL = Plastic Limit w = Moisture Content

LL = Liquid Limit

WOW = Ground Water Observation Well

= Interval Sampled by SPT = Tube Sample Pushed

6. The boring and test pit logs and related information depict subsurface conditions at these specific locations and at the particular time when drilled or excavated. Soil conditions at

- other locations may differ from conditions occurring at these boring and test pit locations. The passage of time may result in a change in the subsurface soil and ground water conditions at these boring and test pit locations.
- 7. The stratification lines represent the approximate boundary between soils and/or rock types as observed in the drilling and sampling operation. Some variation may be expected vertically between samples taken. The soil profile, water level observations and penetration resistances presented on the boring and test pit logs have been made with reasonable care and accuracy, but must be considered only an approximate representation of subsurface conditions to be encountered at the particular location.
- 8. Estimated ground water levels are indicated on the logs. These are only estimates from available data and may vary with precipitation, porosity of the soil, site topography and similar factors.

**Schnabel Project No**. 06120048 **Appendix C:** Borings and Test Pits

# **SPT BORING LOGS**



Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-301 Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 13

**Boring Contractor: UNI-TECH DRILLING** 

MALAGA, NEW JERSEY

Boring Foreman: J. Evans Drilling Method: Mud Rotary

Drilling Equipment: Failing-1500 (Truck) Schnabel Representative: K. Megginson Dates Started: 5/25/06 Finished: 6/6/06

**Location:** Northing: 217024.06 ft Easting: 960815.05 ft

**Ground Surface Elevation:** 94.5 (feet)

	Ground	water Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	5/25		10.5'		
Start of day	5/26		25.0'		
Start of day	5/30		41.0'		
Start of day	6/1		10.0'		

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL			TESTS	REMARKS
(FT)	01101171 B2001111 11011	0271001	(FT)		DEPTH	DATA	.20.0	112111111111
2.0	CLAYEY SAND, fine to medium grained, contains root fragments, moist, brown. Majority of root system extends about 0.7 ft below ground surface.	SC	92.5			3+3+4 N =7 REC =9"		
	POORLY GRADED SAND WITH SILT, trace gravel, fine to medium grained, moist, stratified orangeish brown and brown, contains fine to coarse silty sand lense at 3.5 ft.	SP-SM	02.0			3+4+5 N =9 REC =13"	w=6.6%	
	fine to coarse grained, brown.				5 -	4+7+7 N =14 REC =10"		
-	fine to medium grained,stratified light brown and yellowish brown					4+7+8 N =15 REC =12"		
_ - -	wet, brown and light brown			⊻		6+9+9 N =18 REC =9"	w=14.3%	
14.5	light orangeish brown.  CLAYEY SAND, fine to medium grained, moist, brown	SC	80.0			8+6+8 N =14 REC =10"		
17.0	POORLY GRADED SAND WITH SILT, trace gravel, fine to coarse grained, wet, dark orangeish brown and orangeish brown, contains fine to medium clayey sand pockets.	SP-SM	77.5			6+11+10 N =21 REC =14"	w=19% *	Drilling foremal used 5.4" O.D. Drag Bit from 0 to 18.5 ft. Switched to 4-3/4" O.D. Drag bit below
22.0	SANDY LEAN CLAY, fine to medium, trace mica, moist, gray.	CL	72.5		-	3+3+5		18.5 ft.
	continued on next page				_25_	N =8 REC =18"		

- 1. Boring backfilled with cement/bentonite grout via tremie pipe upon completion.

- Downhole geophysical logging performed on 6/6/06.
   \* = See Appendix I for additional lab testing data.
   Ground water observation well OW-301 installed at nearby location.

TEST Project: Calvert Cliffs Nuclear Power Plant B-301 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG **Sheet:** 2 of 13 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** CL 27.0 67.5 SANDY LEAN CLAY, with fine to CL medium sand, trace mica, contains fine to medium sandy fat clay and fine to w=28.9% medium clayey sand pockets, moist, 2+4+3 LL=48 N =7 PL=17 **REC =18"** 32.0 62.5 FAT CLAY, with fine to medium sand СН and mica, moist, gray. Osterberg sampler tube w=31.1% REC =22" push from 33.5 LL=59 to 35.5 ft PL=17 -35 gray and dark gray, trace organic matter 4+5+5 (±1%), contains fine to medium silty N =10 sand pockets. REC =18" Osterberg sampler tube PP=2.00 tsf REC =22" push from 43.5 gray and light greenish gray. to 45.2 ft 47.5 47.0 SANDY LEAN CLAY, fine to medium, CL trace mica, contains indurated lean clay pockets, moist, gray. w=29.6% 5+6+8 N =14 REC =18" 52.0 42.5

SC

SP

37.5

Switched to 4-3/4" Tri-cone

53.5 ft.

Moderate

chatter).

difficulty in rotary advancement from 54.5 to

roller bit below

56.5 ft (slight rig

11+48+50/3"

N = 98/9"

REC =16"

-55

#### Comments:

57.0

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout via tremie pipe upon completion.
- 2. Downhole geophysical logging performed on 6/6/06. 3. \* = See Appendix I for additional lab testing data.

CLAYEY SAND, fine to medium

grained, trace fine to medium shell fragments (±5%), strong HCl reaction,

gray, contains indurated silt layer from

54.5 to 54.7 ft (layer exhibits fissility).

POORLY GRADED SAND, trace silt,

fine to medium grained, wet, gray, weak continued on next page

moderate cementation, moist, dark

- 4. Ground water observation well OW-301 installed at nearby location.

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**TEST** BORING LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-301 Boring Number:** Contract Number: 06120048

Schnab	pel Engineering LOG					Sheet	: 3 of 13	
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	DEPTH	SAMPLING DATA	TESTS	REMARKS
-	HCI reaction, trace coarse gravel.	SP			 			Sampler refusal at 54.7 ft. Sampler refusal at 58.8 ft.
- - - -	few fine to coarse shell fragments (±10%), moderate HCl reaction.				  65- 	44+50/2" N =50/2" REC =8"	w=20.4%	Switched to 4-3/4" O.D. Drag Bit below 63.5 ft. Sampler refusal at 64.2 ft.
- - - -	contains fine to medium strongly cemented sand pockets, strong HCl reaction.					50 REC =6"		
- - - -	moist and light gray, mostly strongly cemented sand layers (±80%), trace fine to coarse shell fragments (±5%), weak HCl reaction.					50/5" N =50/5" REC =3"		Slow rotary advancement from 72.5 to 73.5 ft Sampler refusa at 73.9 ft. Slight to difficul rotary advancement from 74 to 75 ft
- - - -	light oliveish gray, mostly fine to medium strongly cemented sand layer (±95%), trace fine to coarse shell fragments (±5%), moderate HCl reaction.				   - 80	50/5" N =50/5" REC =3"		Slight to moderately difficult rotary advancement from 77 to 78.5 ft. Switched to 4-3/4" O.D. Tri-cone roller bit below 78.5 ft.
82.0 -	SILTY SAND, fine to medium grained, wet, gray, trace fine to coarse shell fragments (±5%), weak HCI reaction.	SM	12.5		85	4+5+8 N =13 REC =16"	w=26.5%	Sampler refusa at 78.9 ft. Moderate to difficult rotary advancement from 80 to 82 ft Switched to 4-3/4" O.D. Drag Bit below 83.5 ft.
87.0 -	No sample recovery.		7.5		  90-	REC =0"		Osterberg sampler tube push from 88.5 to 90.5 ft
1	continued on next page							

- Boring backfilled with cement/bentonite grout via tremie pipe upon completion.
   Downhole geophysical logging performed on 6/6/06.
   \* = See Appendix I for additional lab testing data.
   Ground water observation well OW-301 installed at nearby location.

B-301 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG **Sheet:** 4 of 13 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** 92.0 2.5 SILTY SAND, fine to medium grained, SM wet, gray, trace mica, very weak HCI reaction. w=25.8% 6+10+12 N =22 REC =16" -95 Osterberg sampler tube moist, gray, contains fine to medium **REC =6"** pushed from moderately cemented sand pockets, moderate HCl reaction. 98.5 to 99.8 ft -100 102.0 -7.5 LEAN CLAY, moist, greenish gray and CL light greenish gray, little fine to coarse shell fragments (±20%), contains fine to medium silty sand and silt pockets, w=17.8% 14+28+24 strong HCI reaction, trace fine to N =52 104.5 -10.0 medium sand. REC =18" SM -105 SILTY SAND, fine to medium grained, wet, light gray, some fine to coarse shell fragments (±40%), strong HCl reaction. w=23.2% trace fine to medium shell fragments 22+29+30 N =59 REC =15" contains fine to medium weakly cemented sand pockets below 109.7 ft 112.0 -17.5 SANDY LEAN CLAY, fine to medium, CL moist, greenish gray and gray, trace fine to coarse shell fragments (±5%), strong HCI reaction. 7+10+15 N =25 REC =18" 117.0 -22.5 SILTY SAND, fine to medium grained, SM wet, gray and light greenish gray, trace fine to medium shell fragments (±1%), w=33.1% weak HCl reaction. 10+15+19 N = 34Resumed REC =18" -120 drilling at 7:50 AM on 5/26/06. 122.0 -27.5 ELASTIC SILT, moist, greenish gray, MH trace fine to medium sand and fine to medium shell fragments (±1%), weak HCI reaction. 9+10+16 continued on next page

Calvert Cliffs Nuclear Power Plant

#### Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout via tremie pipe upon completion.
- 2. Downhole geophysical logging performed on 6/6/06.
  3. \* = See Appendix I for additional lab testing data.
- 4. Ground water observation well OW-301 installed at nearby location.

TEST

Project:

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**TEST** BORING

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

Schnab	el Engineering LOG						:: 5 of 13	
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	Ι.	AMPLING	TESTS	REMARKS
( /		MH	( /		DEPTH	DATA N =26		
_		IVIII			125- X 	REC =18"		
127.0	CLAYEY SAND, moist, greenish gray, trace fine to medium shell fragments (±5%) and mica, weak HCl reaction, contains silt pockets.	SC	-32.5			7+10+19 N =29 REC =17"	w=42.3%	
132.0 -	CLAYEY SAND, fine grained, moist, greenish gray, trace fine to medium shell fragments (±5%), weak HCl reaction.	SC	37.5			5+8+12 N =20 REC =17"		
- - - -	fine to medium grained, moist, gray, few fine to coarse shell fragments (±10%)				  -140- 	REC =4"		Osterberg sampler tube pushed from 138.5 to 140 ft
142.0 -	SANDY LEAN CLAY, moist, dark greenish gray, with fine sand, trace mica, weak HCl reaction.	CL	47.5			8+13+15 N =28 REC =18"	w=45% *	
147.0 -	ELASTIC SILT, moist, dark greenish gray, trace fine to medium sand and mica, moderate HCl reaction.	MH	52.5			8+10+13 N =23 REC =18"	w=62.2% LL=114 PL=55 *	Resumed drilling at 8:4 AM on 5/30/0
152.0	SILTY SAND, moist, dark greenish gray, few fine to medium shell fragments (±10%), strong HCl reaction.	SM	57.5		-	6+8+11 N =19	w=34%	AWI ON 5/30/0
155.0	FAT CLAY, with fine to medium sand, trace mica, very weak HCl reaction.	CH	-60.5		155-  <u> </u>   	REC =18"		
4	continued on next page				⊦ -			

- 1. Boring backfilled with cement/bentonite grout via tremie pipe upon completion.

- Downhole geophysical logging performed on 6/6/06.
   \* = See Appendix I for additional lab testing data.
   Ground water observation well OW-301 installed at nearby location.

TEST Project: Calvert Cliffs Nuclear Power Plant B-301 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG **Sheet:** 6 of 13 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** CH Osterberg sampler tube push from w=38.7% REC =13" 158.5 to 159.6 LL=76 PL=30 -160 PP=>4.5 tsf 162.0 -67.5 CLAYEY SAND, fine to medium SC grained, moist, dark greenish gray, trace mica, very weak HCI reaction. 7+8+11 N =19 REC =18" 167.0 -72.5 SANDY FAT CLAY, gray. CH Osterberg sampler push w=65.4% REC =9" from 168.5 to LL=112 170.4 ft PL=39 170 172.0 -77.5 SANDY ELASTIC SILT, moist, greenish МН gray, trace fine to medium sand and mica, weak HCl reaction. 7+10+13 N = 23REC =18" -175 w=60.4% trace fine to medium shell fragments 6+9+10 LL=111 (±<5%), moderate HCl reaction, and N =19 PL=47 indurated elastic silt pockets (<1/4 inch). REC =18" 180 wet, weak HCI reaction below 179.5 ft. Osterberg sampler tube push from PP=>4.5 tsf moist, mostly indurated elastic silt layers REC =10" 183.5 to 184.3 (±100%). -18<del>5</del> 8+10+15 dark greenish gray. N =25 REC =18" -190continued on next page

#### Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout via tremie pipe upon completion.
- 2. Downhole geophysical logging performed on 6/6/06.
  3. \* = See Appendix I for additional lab testing data.
- 4. Ground water observation well OW-301 installed at nearby location.

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TEST BORING LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-301 Boring Number:** Contract Number: 06120048

Schnab	el Engineering LOG	1				Sheet	: 7 of 13	1
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL		AMPLING	TESTS	REMARKS
(F1)		MH	(1-1)		DEPTH	DATA		
- - - - -	with fine to medium sand, trace organic matter (±1%).				- - - -195	6+10+13 N =23 REC =18"	w=53.2% LL=98 PL=45 *	
	greenish gray, trace fine to medium sand, moderate HCl reaction					8+9+12 N =21 REC =18"	w=82.6% LL=157 PL=71 *	Resumed drilling at 7:20 AM on 5/31/0
202.0 -	CLAYEY SAND, fine to medium grained, moist, dark greenish gray, few fine to coarse shell fragments (±10%), strong HCl reaction.	SC	-107.5 109.5		-	10+20+22	w=27.5%	
	SILTY SAND, fine to medium grained, moist, dark gray, few fine to coarse shell fragments (±10%), strong HCl reaction.	SM	100.0		205	N =42 REC =18"		
	wet, dark greenish gray, trace fine to medium shell fragments (±5%), strong HCl reaction					8+12+21 N =33 REC =18"	w=32.4%	
212.0 +	CLAYEY SAND, fine to medium grained, wet, greenish gray, weak HCl reaction.	SC	117.5			5+8+19 N =27 REC =3"		Driller notes increase in rotary resistance in formation belicated to the control of the control
217.0	SANDY LEAN CLAY, moist, greenish gray, trace mica, very weak HCl reaction.	CL	122.5			6+10+23 N =33 REC =18"	w=47.9% *	
-	continued on next page							

- Boring backfilled with cement/bentonite grout via tremie pipe upon completion.
   Downhole geophysical logging performed on 6/6/06.
   \* = See Appendix I for additional lab testing data.
   Ground water observation well OW-301 installed at nearby location.

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**TEST** BORING LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-301 Boring Number:** Contract Number: 06120048

Schnab	el Engineering LOG						t: 8 of 13	
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	١.	AMPLING	TESTS	REMARKS
-	greenish gray and gray, trace fine to medium circular, orangeish brown organic matter (±1%).	CL			I II X II	5+8+18 N =26 REC =18"		
228.5	CLAYEY SAND, greenish gray, weak HCl reaction.	c SC	134.0		I IIXII	7+10+17 N =27 REC =18"	w=54% *	
- - - -	with fine sand.				  235	7+9+16 N =25 REC =18"		
238.5	LEAN CLAY, moist, greenish gray, w fine sand, trace mica, very weak HCl reaction.	ith CL	144.0		I IIXII	8+11+17 N =28 REC =18"	w=56.8% *	Resumed drilling at 7:0 AM on 6/1/06
- - - -						8+13+19 N =32 REC =18"		No SPT
- - - - -					  250-			conducted at 248.5 ft because 210 of rods free f 40 ft (slipped free of slide ring), thus penetrating s to 251.4 ft du to drill rod free fall momentu
252.0 -	SANDY ELASTIC SILT, moist, green gray, with fine sand, trace mica, very weak HCl reaction.	ish MH	157.5			7+9+19 N =28 REC =18"	w=72.7% LL=137 PL=87 *	iaii momentu
+	continued on next page							

- Boring backfilled with cement/bentonite grout via tremie pipe upon completion.
   Downhole geophysical logging performed on 6/6/06.
   \* = See Appendix I for additional lab testing data.
   Ground water observation well OW-301 installed at nearby location.

TEST Project: Calvert Cliffs Nuclear Power Plant B-301 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG **Sheet:** 9 of 13 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** МН 257.0 -162.5 LEAN CLAY, moist, greenish gray, with CL fine sand, trace mica, and orangeish brown organic matter (±1%), very weak HCI reaction. 9+12+23 N =35 ∐ REC =18" -260 w=100.9% trace fine sand, moderate HCl reaction. 8+12+24 N =36 REC =18" -265 -172.5 267.0 ELASTIC SILT, moist, greenish gray, MH trace fine sand and mica, moderate HCI reaction. 10+12+23 N =35 REC =18" w=102% trace orangeish brown organic matter 7+10+19 LL=199 (±1%), weak HCI reaction. N =29 PL=119 REC =18" 8+12+21 trace fine sand and mica. N =33 REC =18"

-280

-285

7+11+20 N = 31REC =18"

8+11+21

w=91.3%

-187.5

-192.5

CL

MH

#### Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

282.0

287.0

- 1. Boring backfilled with cement/bentonite grout via tremie pipe upon completion.

weak HCl reaction.

Downhole geophysical logging performed on 6/6/06.
 \* = See Appendix I for additional lab testing data.
 Ground water observation well OW-301 installed at nearby location.

LEAN CLAY with sand, moist, greenish

gray, trace fine sand and mica, weak HCl reaction.

ELASTIC SILT, moist, greenish gray, with fine sand, trace mica and dark

orangeish brown organic matter (±1%),

continued on next page

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**TEST** BORING LOG Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-301 Boring Number:** Contract Number: 06120048

	el Engineering LOG				_		Sheet: 10	01 13	
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL		AMPLING	1	TESTS	REMARKS
( /		MH	(1.1)		DEPTH	<b>DAT</b> N =32	Α		
		IVIII			_ <sub>290</sub> _ Ŭ	REC =18	3"		
1					t 1				
4					F 4				
1	Construction of the Constr					7.44.04	W	=64.4%	
-	fine sandy.				H 1	7+11+21 N =32	L	L=117	
_					295-	REC =18	3"   1	PL=73 *	Resumed drilling at 6:5
									AM on 6/2/06
+									
4					F 4				
	trace fine sand, very weak HCl reaction.					9+14+22	<u> </u>		
1						N =36 REC =18	2"		
-					300-	NLC -10	<b>'</b>		Moderate to
4					F 4				difficult rotary advancemen
302.0			-207.5						from 301.5 to
302.0	CLAYEY SAND, fine to coarse grained,	SC	-207.5						303 ft (moderate rig
+	moist, dark greenish gray, trace mica, contains fine to coarse sandy fat clay				<b> </b>				chatter).
4	lenses, weak HCl reaction				<u> </u>	21+17+2	23 W	=24.8%	
	trace organic matter (±1%), very weak				ans   \	N =40 REC =18	3"		
٦	HCl reaction below 304.5 ft				305-				
+					F +				
307.0	CANDY FAT OLAY 5	011	-212.5		<u> </u>				
	SANDY FAT CLAY, fine to medium, moist, dark greenish gray and dark	СН							
7	gray, contains fine to medium clayey sand pockets and lenses , and					10.40:0			
+	indurated fat clay pockets, trace fine to				H 1	10+13+2 N =35			
4	coarse shell fragments (±1%), strong HCl reaction.				-310-L	REC =10	)"		
	Horreaction.								
7					i 1				
312.0	CLAYEY SAND, fine to coarse grained,	SC	-217.5		<b> </b>				
4	moist, dark greenish gray and greenish				F 4				
	gray, trace fine gravel, few fine to coarse shell fragments (±10%), contains					9+17+28	, v	v=20%	
7	lean clay pockets, strong HCl reaction.					N =45 REC =18		*	
$\dashv$					315-	KEC = 18	'		
4					F 4				
1									
+					<u> </u>				Sampler refu
4						50/2"	,		at 318.7 ft.
					-320-	N =50/2" REC =0"			
$\neg$	contains industrial alexanders described				320				Variete
+	contains indurated clayey sand pockets, weak HCl reaction, glauconitic.				<b> </b>				Very to extremely
4	·				<u> </u>				difficult rotary
	continued on next page								

- Boring backfilled with cement/bentonite grout via tremie pipe upon completion.
   Downhole geophysical logging performed on 6/6/06.
   \* = See Appendix I for additional lab testing data.
   Ground water observation well OW-301 installed at nearby location.

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-301 Boring Number:** Contract Number: 06120048 Sheet: 11 of 13

DEPTH			ELEV.		SA	MPLING		
(FT)	STRATA DESCRIPTION	CLASS.	(FT)	WL	DEPTH	DATA	TESTS	REMARKS
324.7	LEAN CLAY, wet, dark gray, with fine to coarse sand, trace mica, strong HCI reaction.	SC	230.2		- 	11+13+22 N =35 REC =18"	w=27.8% *	advancement from 319 to 320.5 ft (stron rig chatter).
327.0 -	CLAYEY SAND, fine to coarse grained, moist, dark greenish gray and dark gray, trace fine gravel and mica, very weak HCl reaction, glauconitic.	SC	232.5			10+15+19 N =34 REC =18"		Slight to moderate difficulty in rotary advancemem below 328.5 f
- - - -	light blueish gray and greenish gray, contains fine to coarse sandy fat clay pockets, weak HCl reaction.				Γ 7 X  ₁	9+14+29 N =43 REC =18"	w=31.8% *	Resumed drilling at 6:5 AM on 6/3/06 Start of day a 6:56 AM
337.0 +	CLAYEY SAND, moist, dark blackish gray and dark greenish gray, trace mica, contains indurated lean clay pockets and clayey sand pockets, weak HCI reaction, glauconitic.	SC	-242.5			18+30+40 N =70 REC =18"		Below 338.5 drillers descr rotary advancemen moderately slow due to dense/stiff so
- - - -	fine to coarse sandy, trace shell fragment, strong cementation.				<u>      </u>	20+50 N =50 REC =12"	w=22.9% LL=47 PL=24 *	Moderate to difficult rotary advancemen from 347 to
- - - -	dark greenish gray and dark gray, with fine to medium sand, contains fine to medium sandy lean clay pockets.					8+17+35 N =52 REC =8"		347.5 ft (moderate to strong chatte
-	fine to medium sandy, dark blackish gray and dark gray, very weak HCl reaction.  continued on next page				ا	14+18+28 N =46 REC =13"	w=36.1% LL=58 PL=22	Slight difficult in rotary advancemen

- Boring backfilled with cement/bentonite grout via tremie pipe upon completion.
   Downhole geophysical logging performed on 6/6/06.
   \* = See Appendix I for additional lab testing data.
   Ground water observation well OW-301 installed at nearby location.

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-301 Boring Number:** Contract Number: 06120048 Sheet: 12 of 13

DEPTH			ELEV.		SA	MPLING		
(FT)	STRATA DESCRIPTION	CLASS.	(FT)	WL	DEPTH	DATA	TESTS	REMARKS
- - - -	fine to coarse sandy, trace coarse gravel, and mica, weak HCl reaction.	SC			  	16+27+50 N =77 REC =15"	*	from 355 to 35 ft (slight wobbl in kelly bar rotation).
362.0	SILTY SAND, fine to medium grained, moist, dark blackish gray and brownish gray, trace mica, weak HCl reaction, glauconitic.	SM	267.5			11+15+27 N =42 REC =18"	w=37.2% LL=54 PL=36 *	Resumed drilling at 6:55 AM on 6/4/06. Start of day at 7:05 AM, drilling mud at
- - - -						14+30+43 N =73 REC =18"		35 ft on 6/4/06 Mubtub (270 gallons) was empty of mud except for soil cuttings at the bottom of the tub on 6/4/06.
372.0 +	CLAYEY SAND, fine to medium grained, moist, dark gray, contains silt pockets, very weak HCl reaction, glauconitic.	SC	277.5			15+28+42 N =70 REC =18"	w=30.3% LL=61 PL=26 *	
377.0	CLAYEY SAND, fine to medium grained, wet, dark blackish gray, trace mica, very weak HCl reaction, glauconitic.	SC	282.5			24+50 N =50 REC =12"		
- - - - -	dark blackish gray and dark brownish gray.					34+50/5" N =50/5" REC =10"		Moderately difficult rotary advancement from 383 to 383.5 ft. Sampler refus at 384.4 ft. Moderately difficult rotary advancement from 383.5 to 384.5 ft.
4	continued on next page				+ +			

- Boring backfilled with cement/bentonite grout via tremie pipe upon completion.
   Downhole geophysical logging performed on 6/6/06.
   \* = See Appendix I for additional lab testing data.
   Ground water observation well OW-301 installed at nearby location.

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-301 Boring Number:** Contract Number: 06120048 Sheet: 13 of 13

	el Engineering LOG					'	13 of 13	
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	DEPTH	MPLING	TESTS	REMARKS
-	fine to coarse grained, dark blackish gray.	SC			1 N	DATA 6+28+50 I =78 REC =12"	w=32.7%	
- - - - -					l ∥∐IN	8+50 I =50 REC =0"		Resumed drilling at 6:4 AM on 6/5/06 Start of day a 6:53 AM, drilling mud a 25 ft on 6/5/0
-	fine to medium grained, dark blackish gray and dark brownish gray, contains clayey sand pockets.				X   N	9+28+43 I =71 REC =3"	w=33.7% *	
403.0	BOTTOM OF BORING @ 403.0 FT.		-308.5		 			Start of day a 7:20 AM, drilling mud a 48 ft on 6/6/0

- Boring backfilled with cement/bentonite grout via tremie pipe upon completion.
   Downhole geophysical logging performed on 6/6/06.
   \* = See Appendix I for additional lab testing data.
   Ground water observation well OW-301 installed at nearby location.

chnabel Schnabel Engineering

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 7

**B-302** 

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Bender Drilling Method: Mud Rotary **Drilling Equipment:** CME-550 Schnabel Representative: K. Bell

Dates Started: 5/30/06 Finished: 5/31/06

**Location:** Northing: 217122.24 ft Easting: 960766.98 ft

**Ground Surface Elevation:** 76.4 (feet)

	Groundwater Observations							
	Date	Time	Depth	Casing	Caved			
Encountered	5/30		40.0'					
Start of day	5/31		38.0'					

DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	SAMPLING		TESTS	REMARKS
					DEPTH	DATA		KLINAKKO
0.5	ROOTMAT AND TOPSOIL.	SP-SM	75.9			1+2+2		
]	POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, yellowish brown, trace root fragments.					N =4 REC =11"		
	brown, trace root fragments.				LJM	2+3+4		
-						N =7 REC =16"		
-	yellowish brown and orange, trace				<u></u> 5 →	4+5+6		
-	gravel.				├ <u> </u>	N =11 REC =18"		
7.0	CLAYEY SAND, fine to coarse grained, moist, orangeish brown, trace gravel.	SC	69.4			4+5+3		
	molet, orangelon brown, adde graven.					N =8 REC =14"		
_					-10-			
_	orangeish brown and gray, trace root				L  M	3+7+8 N =15		
12.0	fragments	0	64.4		L 10	REC =17"		color change
_	FAT CLAY, moist, gray, trace sand.	CH			_			mud tub from
-					L -M	2+2+4 N =6		brown to gray
_					_15-	REC =18"		
-								
-								
-								
-						3+3+5 N =8 REC =18"		
					-20-L	REC - 16		
1								
					L  M	4+4+7		
_					25_	N =11 REC =18"		
	continued on next page							

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-302 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 7 ELEV. **SAMPLING DEPTH** STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA CH water loss from mud tub 6+8+10 N =18 **REC =18"** 32.0 44.4 SILTY SAND, fine to medium grained, SM moist, gray and greenish gray. 6+10+14 N =24 REC =17" -35 greenish gray and white, trace fine to 24+50/4" N = 50/4" coarse shell fragments, trace cobbles, 20-30%, HCl reaction moderate. REC =7"  $\overline{\nabla}$  $|\boxtimes|$ 50/5" N =50/5" REC =5" 47.0 29.4 SANDY SILT, wet, gray and white, with MLfine to coarse shell fragments, trace organic matter, HCI reaction strong. 26+30+30 N =60 REC =15" -50 greenish gray and white, with fine to coarse shell fragments, 10-20%, HCl 3+50/5" N = 50/5" reaction moderate. REC =9" -55 Rig chatter

#### Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

continued on next page

**B-302** Project: **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 3 of 7 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA  $\mathsf{ML}$ 6+50/4" N =50/4" REC =10" -60 5+5+7 N =12 REC =17" 5+4+7 N =11 REC =18" 4+4+8 N = 12REC =17" 2+4+5 N =9 REC =18" 82.0 -5.6 SILTY SAND, fine to medium grained, wet, light gray and white, with fine to coarse shell fragments, 20-30%, weak SM PP=2.00 tsf cementation, HCI reaction strong. REC =16" -85 11+11+18 N =29 | REC =16" -90 continued on next page

Calvert Cliffs Nuclear Power Plant

#### Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

**TEST** 

2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-302 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 4 of 7 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SM 5+8+14 N =22 REC =18" -95 with fine to coarse shell fragments, 4+7+12 25-35%, HCI reaction moderate. N =19 REC =16" -100 trace fine to coarse shell fragments, 5+7+11 5-10%, HCI reaction weak. N =18 Resumed REC =18" drilling on 5/31/06@ 7:30am -30.6 107.0 SANDY SILT, moist, greenish gray, ML trace fine to medium shell fragments, 2-5%, HCl reaction weak. 6+7+10 N = 17REC =18" 6+8+9 N =17 REC =18" 117.0 -40.6 SILTY SAND, fine to medium grained, SM wet, greenish gray and white, with fine to coarse shell fragments, 40-50%, HCl reaction strong. 6+19+20 N = 39REC =18" -120 122.0 -45.6 SANDY SILT, moist, greenish gray, trace fine to medium shell fragments, ML 2-5%, HCl reaction weak. 6+8+11

#### Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

continued on next page

**B-302 Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 5 of 7 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DATA **DEPTH**  $\mathsf{ML}$ N =19 REC =18" -125 127.0 -50.6 SANDY ELASTIC SILT, moist, greenish МН gray, trace fine to medium shell fragments, 2-5%, HCl reaction weak. PP=>4.5 tsf REC =12" -130 6+7+10 N =17 ∐ REC =18" **-135** 5+7+9 N =16 REC =18" 4+7+9 N =16 REC =18" 147.0 -70.6 SANDY FAT CLAY, moist, greenish СН gray and gray. 6+8+12 N =20 REC =18" 150 152.0 -75.6 SANDY ELASTIC SILT, moist, greenish MH gray. 6+9+12 N =21 REC =18" -155 continued on next page

Calvert Cliffs Nuclear Power Plant

#### Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

**TEST** 

Project:

2. \* = See Appendix I for additional lab testing data.

**TEST B-302** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 6 of 7 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA МН 5+7+10 N =17 REC =18" 7+9+12 N =21 REC =18" 7+7+10 N =17 REC =18" 8+11+14 N =25 REC =18" -175 trace fine to medium shell fragments, 6+9+13 2-5%, HCl reaction weak. N =22 REC =17" 180 182.0 -105.6 SILTY SAND, fine to medium grained, SM wet, greenish gray, trace fine to medium shell fragments, 2-5%, HCl reaction 4+5+9 N =14 REC =18" **-185** 8+11+16 N =27 REC =18" -190-

#### Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

2. \* = See Appendix I for additional lab testing data.

continued on next page

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

**TEST** Project: **B-302** Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 7 of 7 Schnabel Engineering LOG DEPTH (FT) **SAMPLING** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) DEPTH DATA SM 5+8+16 N =24 REC =18" -195 6+7+14 N =21 REC =18" -200 200.0 -123.6 BOTTOM OF BORING @ 200.0 FT.

#### Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.

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**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 7

**B-303** 

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Evans **Drilling Method:** Mud Rotary

Drilling Equipment: Failing-1500 (Truck) Schnabel Representative: R. Vinzant Dates Started: 5/9/06 Finished: 5/10/06

**Location:** Northing: 217016.91 ft Easting: 960867.69 ft

**Ground Surface Elevation:** 87.4 (feet)

Choose 1 of 7										
Groundwater Observations										
	Date	Time	Depth	Casing	Caved					
Encountered	5/9		15.0'							
Start of Day	5/10		20.0'							

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	SAMPLING		TESTS	REMARKS
(FT)	OTTATA DESCRIPTION	JEAGO.	(FT)	***	DEPTH	DATA		
2.0	Silty sand FILL, fine to medium grained, moist, dark brown, contains root fragments, organic matter, and brick fragments	FILL	85.4			2+2+6 N =8 REC =6"		
POORLY GRADED SAND WITH SILT, fine to medium grained, moist, light brown.	SP-SM	05.4			2+3+3 N =6 REC =15"			
_					5 -	2+3+4 N =7 REC =14"		
medium to coarse grained, orangeish brown, some organic matter.	000	78.4			3+5+7 N =12 REC =15"			
_ - -	CLAYEY SAND, fine to medium grained, moist, light brown, layers of white clay.	SC			10 	3+3+3 N =6 REC =14"		
-	light orange, contains mottles of white clay.			⊻	  15	2+1+1 N =2 REC =18"		
20.0	dark gray.		- 67.4			2+2+2 N =4 REC =18"		
	LEAN CLAY with sand, fine to medium grained, moist, dark gray.	CL			 			
_						2+3+5 N =8 REC =18"		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**B-303 Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 7 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** CL PP=4.25 tsf REC =24" -30 7+7+10 trace sand. N =17 REC =18" 35.0 52.4 -35 CLAYEY SAND, fine to medium SC grained, moist, dark gray. PP=4.50 tsf REC =24" 41.0 46.4 SILTY SAND, fine to medium grained, SM moist, dark brown, contains mica, and organic matter. 10+14+23 N =37 REC =12" 45.0 42.4 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, moist, greenish gray, 25% shell fragments, weak HCl reaction, coarse flat shells.  $|\boxtimes|$ 50/5" N = 50/5" REC =5" -50 51.0 36.4 CLAYEY SAND, fine to medium SC grained, moist, greenish gray, 50% coarse shell fragments, weak HCl reaction.  $\boxtimes$ 50/3" N = 50/3" REC =4" 55.0 32.4 -55 POORLY GRADED SAND WITH SILT, SP-SM medium to coarse grained, moist, greenish gray, 40% medium to coarse shell fragments, weak HCl reaction. continued on next page

Calvert Cliffs Nuclear Power Plant

#### Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

TEST

Project:

2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant **B-303 Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 7 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SP-SM 38+35+19 N =54 REC =15" 61.0 26.4 POORLY GRADED SAND WITH CLAY, SP-SC fine to medium grained, moist, greenish gray, , 5% shell fragments, fine to coarse shell fragments, weak HCI reaction. 5+9+25 N = 34REC =18" 65.0 22.4 POORLY GRADED SAND WITH SILT, fine to medium grained, moist, light SP-SM greenish gray, 5% shell fragments, medium to coarse shell fragments, weak HCl reaction. 8+50/3" N =50/3" REC =10" 73.0 14.4 SILTY SAND, fine to medium grained, SM moist, light greenish gray, 5% shell fragments, medium to coarse shell 5+6+8 N =14 fragments, weak HCI reaction. REC =18" 3+7+12 N =19 REC =18" 82.0 5.4 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, moist, light greenish gray, 5% shell fragments, medium to coarse shell fragments, 6+7+9 weak HCl reaction. N =16 **REC =18"** -85 3+5+8 N = 13REC =18" -90 continued on next page

#### Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST B-303** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 7 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA 91.0 -3.6 SILTY SAND, fine to medium grained, SM moist, light gray, 40% shell fragments, and cemented sand pockets, moderate HCI reaction. 12+23+50/5" N =73/11" REC =17" -95 greenish gray, 15% shell fragments. 12+18+27 N =45 REC =18" -100 50% shell fragments, layers of shells. 9+11+15 N =26 REC =18" 4+10+14 N =24 REC =18" 3% shell fragments. 7+11+20

N =31 REC =18"

8+8+12 N =20 REC =18"

7+11+15

-120

#### Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

continued on next page

25% shell fragments.

**TEST B-303** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 5 of 7 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SM N =26 REC =18" -125 7+18+15 N =33 REC =18" 130 5% shell fragments. 5+8+12 N =20 ∐ REC =18" **-135** 8+9+12 contains mica. N =21 REC =18" greenish gray, 5% shell fragments, 8+8+14 weak HCl reaction. N = 22REC =18" 3% shell fragments. 7+8+10 N =18 REC =18" -150-6+10+15 contains mica. N =25 **-155** 

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion. 2.  $\star$  = See Appendix I for additional lab testing data.

continued on next page

**TEST B-303** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 6 of 7 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SM 9+10+14 N =24 REC =18" 8+10+12 N =22 REC =18" 7+8+10 N =18 REC =18" 8+12+14 N =26 REC =18" **-175** 7+8+11 N =19 REC =18" 180 7+11+14 N =25 REC =18" -185 6+8+13 N =21 REC =18" -190continued on next page

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion. 2.  $\star$  = See Appendix I for additional lab testing data.

**TEST B-303** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 7 of 7 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SM dark greenish gray, 25% shell 4+6+15 N =21 fragments. REC =18" 195.0 -107.6 195 POORLY GRADED SAND, fine to SP medium grained, moist, dark greenish gray, 5% shell fragments, moderate HCl reaction. 7+10+15 N =25 REC =18" 200.0 -112.6 -200 BOTTOM OF BORING @ 200.0 FT.

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

2. \* = See Appendix I for additional lab testing data.

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.



**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-304 Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 7

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings Drilling Method: Mud Rotary **Drilling Equipment:** CME-750 (ATV) Schnabel Representative: M. Arles

Dates Started: 5/26/06 Finished: 5/31/06

**Location:** Northing: 217188.61 ft Easting: 960896.88 ft

**Ground Surface Elevation:** 68.0 (feet)

	Groundy	vater Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	5/26		Dry	0.0'	
Start of day	5/30		10.0'	0.0'	
Start of day	5/31		12.0'	0.0'	
Start of day	6/1		5.0'	0.0'	

	(11)		1	1			
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	SAMPLING DEPTH DATA	TESTS	REMARKS
0.5	Forest litter, rootmat, and topsoil		67.5		2+3+5	w=17.1%	
0.5	SILTY SAND, fine to coarse grained, moist, yellowish orange, trace gravel.	SM	07.5		N =8 REC =16"	*	
-	fine to medium grained, dark orange, contains cemented sand.				10+3+4 N = 7 REC = 6"	w=25.9% *	3'- Driller noted softer material
4.5	SANDY SILT, fine to medium, moist, mottled brownish orange, with clay.	ML	63.5		2+2+3 N =5	w=29.4%	
7.0 -	FAT CLAY with sand, fine to medium, moist, mottled brownish orange, with shell fragments, 10-15% shell frag, brown colored.  dark gray, with sand.	CH	61.0		1+2+3 N =5 REC =18"	w=34.1% LL=57 PL=23	
-	fine to medium sandy.				2+4+5 N =9 REC =18"	w=31.4% LL=59 PL=19	
	with sand. fine to medium sandy				3+3+5 N =8 REC =18"	w=31.7% LL=63 PL=23	
22.0 -	very stiff.				3+6+8 N = 14 REC = 18"	w=32.1% LL=62 PL=21 *	
22.0 -	SANDY LEAN CLAY, fine to medium grained, moist, dark gray.	CL	46.0			w=25.6%	
_	continued on next page				4+5+6 N =11 REC =18"	LL=38 PL=20	

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. Downhole Geophysical Testing Performed on 6/1/2006 3. \* = See Appendix I for additional lab testing data.

Schnabel

**TEST** BORING LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

DEPTH	STRATA DESCRIPTION	CLASS.		WL		S	AMPLING	TESTS	REMARK
(FT)	OTTATA DEGOTAL TION	OLAGO.	(FT)	***			DATA	12010	KEWAKK
-		CL						*	
27.0	SILTY SAND, fine to coarse grained, moist, mottled brown and orange, with shell fragments, 25-30% brown/red shell frag.	SM	41.0			М	6+15+45	w=32.3%	
29.4	CLAYEY SAND, fine to medium grained, moist, dark gray, contains cemented sand, slightly cemented.	SC	38.6		-30-	M	N =60 REC =18"	•	
32.0			36.0		L 4				
- - -	POORLY GRADED SAND, fine to medium grained, moist, dark gray, contains cemented sand.	SP			 - 35- 	$\boxtimes$	50/5" N =50/5" REC =5"	w=20.1%	
37.0	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, grayish green, with fine to coarse shell fragments, strong HCl reaction, 30-40% shell frag.	SP-SM	31.0		  - 40- 		28+50/5" N =50/5" REC =11"	w=19.3% *	
- - - -	wet, green and white, 60-70% shell frag.						16+11+10 N =21 REC =14"	w=21.9%	
47.0	SILTY and CLAYEY ROCK FRAGMENTS, fine to medium grained, moist, greenish gray, contains cemented sand. 4" shell layer at 49.3 ft	GM-GC	21.0		 		21+15+50/4" N =65/10" REC =16"	w=14.5% LL=25 PL=18	49.3'- 4" she layer
52.0	CII TV CAND for to man!	014	16.0		50 			*	
- - - -	SILTY SAND, fine to medium grained, moist, green and white, with fine to coarse shell fragments, contains cemented sand, strong HCI reaction, 80% shell frag.	SM			  55	$\boxtimes$	50/2" N =50/2" REC =3"	w=13.5% *	55'- Harder drilling
-	continued on next page								

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   Downhole Geophysical Testing Performed on 6/1/2006
   \* = See Appendix I for additional lab testing data.

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-304 Boring Number:** Contract Number: 06120048 Sheet: 3 of 7

	el Engineering LOG					Sheet: 3 of 7	
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	SAMPL	TESTS	REMARK
-	20-30% shell frag.	SM			5+6+ N =1	DATA  -11	
- - - -	10-20% shell frag.				5+7+ 5 - 65 - REC	9 W=29.4% 6 LL=30 PL=23	65'- Start of day, 5/30/06
- - - -	dark green.				5+5+ 5+5+ N =1 -70 - REC	w=29.5% 1 =18"	
- - - -	green, with fine to coarse shell fragments, strong HCl reaction, 15-20% shell frag.				REC 	=22"	
77.0	CLAYEY SAND, fine to medium grained, moist, green and white, with fine to coarse shell fragments, contains cemented sand, strong HCl reaction, 45-55% shell frag.	SC	9.0			20+15	77'- Rig cha
83.0	SILTY SAND, fine to medium grained, moist, green, with fine to coarse shell fragments, moderate HCl reaction, 15-25% shell frag.	SM	15.0		5+12 N =2 REC	7 *	
	strong HCl reaction,10-15% shell frag.				9+11 N =2 REC	2   LL=49	

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   Downhole Geophysical Testing Performed on 6/1/2006
   \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-304 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 4 of 7 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SM w=33% 5+12+15 N =27 ∐ REC =18" -95 -29.0 97.0 CLAYEY SAND, fine to medium SC grained, moist, green, trace fine to medium shell fragments, moderate HCI w=42.1% reaction, 0-5% shell frag, med dense. REC =12" LL=79 PL=28 -100 103.0 -35.0 SILTY SAND, fine to medium grained, SM w=44% moist, green, trace fine to coarse shell 8+9+18 fragments, strong HCI reaction, 5-10% N = 27shell frag. REC =18" w=33.8% fine to coarse shell fragments, 20-30% 6+9+17 shell frag. N =26 REC =18" w=43.9% with fine to coarse shell fragments, 9+9+15 strong HCl reaction, 20-25% shell frag. N =24 REC =18" w=47.9% trace fine to medium shell fragments, 8+11+12 5-10% shell frag. N = 23REC =18" -120 123.0 -55.0 SILT, moist, oliveish green. MLw=60.2% 5+10+14

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. Downhole Geophysical Testing Performed on 6/1/2006

continued on next page

3. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-304 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 5 of 7 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH **DATA** ML N =24 REC =18" 125 127.0 -59.0 CLAYEY SAND, fine to medium SC grained, moist, oliveish green, with fine to coarse shell fragments, strong HCI w=34.9% reaction, 10-15% shell frag. 6+6+10 N =16 REC =18" -130-133.0 -65.0 FINE TO MEDIUM SANDY SILT, moist, ML w=45% oliveish green, moderate HCI reaction. 8+9+11 N = 20∐ REC =18" <del>-</del>135 137.0 -69.0 CLAYEY SAND, dark green SC w=36.5% REC =10" LL=43 PL=26 140'- Start of 140.0 -72.0 FAT CLAY, trace sand, dark green CH day, 5/31/06 w=70% 9+9+15 LL=134 N =24 PL=49 REC =18" 145.0 -77.0 SANDY ELASTIC SILT, moist, oliveish МН green, with sand, moderate HCI reaction. w=72.1% 8+8+13 N =21 REC =18" -150w=70.9% trace fine to medium shell fragments, 9+10+16 moderate HCl reaction, 0-3% shell frag. N =26 REC =18" -155

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. Downhole Geophysical Testing Performed on 6/1/2006

continued on next page

3. \* = See Appendix I for additional lab testing data.

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**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048 Sheet: 6 of 7

DEPTH	OTDATA DECORPTION	01.400	ELEV.	14"	SA	AMPLING	TECTO	DE1145:
(FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	DEPTH	DATA	TESTS	REMARK
		MH			DEFIII	DAIA		
					L ] [			
						0.40.40	w=55.1%	
4	weak HCl reaction.					8+10+12 N =22	LL=92	
					1 11/ \11	REC =18"	PL=53	
-					160-	1120 10	*	
					L ]			
4					1			
1					t 1_l			
_					L 1M	8+10+10	w=47.2%	
						N =20		
$\dashv$					165-	REC =18"		
7					r 11			
					<u> </u>			
+					F			
_]						8+11+14	w=62.9%	
7						N =25	*	
_					<u> </u>	REC =18"		
+					<u> </u>			
					LJI			
4					F 4 1			
						8+8+10	w=84%	
1						N =18	LL=158	
					175-	REC =18"	PL=84 *	
+					F 1 1			
477.0			-109.0					
177.0 +	CLAYEY SAND, fine to medium	SC	-109.0		F 7 I			
4	CLAYEY SAND, fine to medium grained, moist, green, with fine to coarse shell fragments, strong HCl reaction, 25-30% shell frag.							
	coarse snell tragments, strong HCl					10±14±00	w=27.5%	
+	readion, 20-00 /0 silen nag.				X	12+14+23 N =37	*	
					_ <sub>180</sub> _	REC =18"		
					100   1			
4					F 4 1			
1								
						0.45.45	w=39.2%	
4					H	8+15+15 N =30	*	
					1 11/ \11	REC =18"		
$\exists$					185			
4								
+					+ +			
7							W=40.00/	
4					F M	7+12+16	w=42.8%	
					1 11/ \11	N =28 REC =18"		
-	continued on next page				H190- L	0 10		
	pago		1		1 1 1			

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   Downhole Geophysical Testing Performed on 6/1/2006
   \* = See Appendix I for additional lab testing data.

**TEST B-304** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** hnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 7 of 7 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SC 193.0 -125.0 SANDY LEAN CLAY, fine to medium, CL w=51.1% 9+10+13 green, moist N =23 REC =18" 195 w=55.8% with sand, small 1/4" pockets of gray 4+5+17 N =22 REC =18" 200.0 -132.0 -200 BOTTOM OF BORING @ 200.0 FT.

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   Downhole Geophysical Testing Performed on 6/1/2006
   \* = See Appendix I for additional lab testing data.



**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-305 Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 5

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: T. Connelly Drilling Method: Mud Rotary **Drilling Equipment:** CME-550 Schnabel Representative: K. Bell

Dates Started: 7/17/06 Finished: 7/20/06

**Location:** Northing: 217166.25 ft Easting: 960686.74 ft

Ground Surface Elevation: 72.0 (feet)

	Ground	water Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	7/18		37.5'		
Start of Day	7/19		35.0'		
Start of Day	7/20		24.0'		

DEPTH			ELEV.		SAMPLING		
(FT)	STRATA DESCRIPTION	CLASS.	(FT)	WL	DEPTH DATA	TESTS	REMARKS
0.5 - 2.0 -	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, yellowish brown, trace root fragments, trace wood fragments.  POORLY GRADED SAND WITH SILT, fine to medium grained, moist, yellowish brown, trace root fragments, trace wood fragments.	SP-SM SP-SM SC	71.5		woh+1+2 N =3 REC =11" 1+1+3 N =4 REC =7"		
4.5	CLAYEY SAND, fine to medium grained, moist, yellowish brown and orangeish brown, trace root fragments, trace wood fragments.  SILTY SAND, fine grained, moist, gray and orangeish brown, trace root fragments.	SM	67.5		2+2+3 N =5 REC =12" woh+woh+1 N =1 REC =4"		
10.0 —	FAT CLAY, moist, gray and orangeish brown, trace sand.	CH	62.0		2+2+2 N =4 REC =15" REC =22" -15-2 2+3+4 N =7 REC =18" -2 3+4+6 N =10	PP=2.50 tsf	color change i mud tub from orangeish brown to gray
19.0 - - -	SILTY SAND, fine to medium grained, moist, gray.	SM	- 53.0		REC =18"		
22.5	ELASTIC SILT, moist, gray, trace sand.	МН	49.5		4+4+6 N =10 REC =18"		
_	continued on next page				-25		

- 1. Boring backfilled with cement/bentonite grout through
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-305 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** 5+7+9 MH N =16 REC =18" 45.0 27.0 SANDY SILT, moist, gray. ML5+5+7 N =12 **REC =18"** -30 4+5+8 weak cementation N =13 REC =18" 8+13+25 N = 38REC =18" Harder drilling 35.0 37.0 -35 CLAYEY SAND, fine to medium SC REC =5" grained, wet, gray and white, contains fine to medium shell fragments, resumed drilling 30-40%, HCl reaction strong. on 7/18/06  $\nabla$ @7:30am Harder drilling 32+45+48 N =93 REC =12" w=34.7% REC =23" LL=72 PL=22 30+50/5" N =50/5" REC =10" 50/5" N =50/5" REC =4" 47.0 25.0 CLAYEY SAND, fine to medium SC grained, wet, white and gray, with fine to coarse shell fragments, 60-70%, HCl 40+50/5" N = 50/5" reaction strong. REC =8" -50 12+8+8 50.8 N =16 21.2 CL LEAN CLAY, wet, gray, trace sand, REC =16" contains fine to medium shell fragments, 20-30%, HCl reaction moderate. PP=>4.5 tsf REC =8" harder 55.0 17.0 -55  $\boxtimes$ SILTY SAND, fine to medium grained, 50/5" SM N = 50/5" wet, greenish gray, strong cementation. REC =5"

36+50/1"

# Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through

with fine to coarse shell fragments, continued on next page

2. \* = See Appendix I for additional lab testing data.

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**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-305 Boring Number:** Contract Number: 06120048 Sheet: 3 of 5

DEPTH	OTD 171		ELEV.			S	AMPLING		<b></b>
(FT)	STRATA DESCRIPTION	CLASS.	(FT)	WL	DEPT		DATA	TESTS	REMARKS
	50-60%, HCl reaction strong	SM			DEFI	T	N =50/1"		Harder drilling
	00 00 /0, 110110000000000000000000000000	0			L -		REC =7"		
$\dashv$	contains fine to coarse shell fragments,				<del></del> 60-	М	3+4+12		
4	20-30%				<u> </u>	$\ X\ $	N =16		
						Ш	REC =18"		
1					_	_			
4	HCI reaction moderate					M	4+6+8 N =14		
					L _	$\mathbb{N}$	REC =18"		
$\dashv$					-65-	М	8+9+12		
4					L -	IIXII	N =21		
						Ш	REC =18"		
1					-	_			
4						łM	4+5+9 N =14		
						M	REC =18"		
7									
-					<del></del> 70	П	4+4+7		
1					L -	IIXII	N =11		
						Ш	REC =18"		
1					-	_			
4						M	4+5+7 N =12		
						M	REC =18"		
7									
$\dashv$	trace fine to medium shell fragments,				<del></del> 75	М	3+4+7		
4	2-5%, HCl reaction weak				L -	$\ X\ $	N =11		
						Ш	REC =18"		
1					_	١_,			
4						M	4+5+8 N =13		
					L _	$\mathbb{N}$	REC =18"		
79.5	CANDY Off Toward and a sigh and a sigh	241	-7.5						
$\dashv$	SANDY SILT, wet, greenish gray and white, contains fine to coarse shell	ML			-80-	М	4+7+9		
4	fragments, 30-40%, HCI reaction				L -	$\ \chi\ $	N =16		
	strong.					Ш	REC =18"		
82.0 +	SILTY SAND, fine to medium grained,	SM	-10.0		_				
4	wet, white and gray, with fine to coarse shell fragments, 60-70%, strong					$\ \mathbf{y}\ $	8+34+50/2" N =84/8"		
84.0	cementation, HCl reaction strong.		-12.0		L _	لكاإ	REC =13"		Dia shattar
J-1.0	CLAYEY SAND, fine to medium	sc	12.0						Rig chatter
-	grained, wet, white and gray, with fine to coarse shell fragments, 60-70%, HCl				85	$\square$	9+15+9		
_	reaction strong.				ļ -	$\ \chi\ $	N =24		
07.0			4- ^				REC =18"		
87.0 +	SILTY SAND, fine to medium grained,	SM	-15.0		Γ -	<u> </u>			
4	wet, gray, contains fine to coarse shell fragments, 30-40%, strong					M	16+11+29 N =40		
	cementation, HCl reaction strong.				L		REC =18"		
7	-				-				resumed drilling on 7/19/06 @
-					-90-		REC =8"		7:15am
4									

- Boring backfilled with cement/bentonite grout through
   \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-305 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 4 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SM contains fine to coarse shell fragments, 6+9+14 10-20%. HCI reaction moderate N =23 REC =18" 95.0 -23.0 -95 SANDY SILT, wet, greenish gray and ML7+9+12 white, contains fine to coarse shell N = 21REC =18" fragments, 20-30%, HCl reaction moderate. 97.0 -25.0 SM SILTY SAND, fine to medium grained, 6+7+10 wet, greenish gray and white, contains fine to coarse shell fragments, 10-20%, N =17 REC =18" HCI reaction moderate. -100-4+7+11 N =18 REC =18" -30.0 102.0 SANDY SILT, wet, greenish gray and MLwhite, trace fine to coarse shell 8+10+17 fragments, 5-10%, HCI reaction N =27 moderate, weak cementation. REC =18" 105.0 -33.0 -105 SANDY ELASTIC SILT, moist, greenish 7+13+13 МН gray, trace fine to medium shell fragments, 2-5%, HCl reaction weak. N =26 REC =18" -35.0 107.0 SANDY SILT, wet, greenish gray and ML white, trace fine to medium shell 7+7+11 fragments, 2-5%, HCl reaction weak. N =18 REC =18" 6+8+13 N =21 REC =18" 6+6+11 N = 17REC =18" -115-7+8+12 N = 20REC =18" 8+9+16 N =25 REC =18" 120 5+7+11 N =18 REC =18" 7+10+14 N =24 REC =18" continued on next page

# Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through
- 2. \* = See Appendix I for additional lab testing data.

**TEST** B-305 Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 5 of 5 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA  $\mathsf{ML}$ resumed drilling 125 on 7/20/06 @ 6+9+12 7:15am N =21 **REC =18"** 9+10+14 N =24 REC =18" -130-8+9+11 N =20 N =20 REC =18" 7+7+12 HCI reaction moderate N =19 REC =18" -135-6+8+10 N =18 REC =18" 7+8+11 N =19 ∐ REC =18" 7+7+10 N =17 REC =18" 5+8+9 N =17 REC =18" **CLAYEY SILT** 8+8+12 N =20 REC =18" 8+9+11 N =20 REC =18" -150 10+10+12 N =22 REC =18" 151.5 -79.5 BOTTOM OF BORING @ 151.5 FT.

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through
- 2. \* = See Appendix I for additional lab testing data.

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**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-306 Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 5

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Evans Drilling Method: Mud Rotary **Drilling Equipment:** FAILING-1500 Schnabel Representative: R. Vinzant Dates Started: 5/5/06 Finished: 5/8/06

**Location:** Northing: 217024.31 ft Easting: 960681.82 ft

Ground Surface Elevation: 118.6 (feet)

	Ground	water Obs	ervations	i	
	Date	Time	Depth	Casing	Caved
Encountered	5/5		18.5'		

) EDT.:			EL EV		SAMPLING		
OEPTH (FT)	STRATA DESCRIPTION	CLASS.	(FT)	WL		TESTS	REMARKS
(	01177/01117/01117/0117/0117/0117/0117/0		(,		DEPTH DATA		
	SILTY SAND, fine to medium grained, moist, orangeish brown.	SM			3+3+2 N =5		
1	moist, orangeish brown.				REC =16"		
_							
	light orangeish brown and black.				2+2+3		
-	light drangeish brown and black.						
_					REC =16"		
-	light gray and black.				5 - 3+4+4		
4							
					REC =13"		
1							
4	light orangeish gray and black.				4+3+4		
					N =7 REC =13"		
1							
_					<del>-10-</del>		
					4+4+5		
1					N =9		
4					REC =13"		
1							
4	light orangeish gray.						
					REC =14"		
					_ 15		
+							
+				$\overline{\Sigma}$			
	wet, no black, trace fine gravel.			<u> </u>	_ <u></u>		
	- -						
-					REC =13"		
+					<del> </del>		
	liabt annualish music d blli						
+	light orangeish gray and black.				└		
		1			/\   DEC -12"		
					-25-   KLC - 12		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant **B-306 Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 5 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SM 8+13+17 trace fine gravel. N = 30medium to coarse grained,dark REC =16" orangeish brown. orangeish brown and black. 5+8+10 N =18 REC =13" -35 light orangeish brown, with 3" layer of 4+9+10 fine gravel. N =19 REC =14" 41.0 77.6 SC CLAYEY SAND, fine to medium grained, moist, orange and gray. 3+2+2 N =4 REC =18" gray, contains mica. 3+3+5 N =8 REC =18" -50 51.0 67.6 LEAN CLAY, with sand, fine to medium CL grained, moist, gray. 3+3+5 N =8 REC =18"

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

continued on next page

TEST Project: Calvert Cliffs Nuclear Power Plant **B-306 Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** PP=2.00 tsf REC =24" CL greenish gray. -60 PP=1.50 tsf 6+6+7 with fine to medium sand lenses. N = 13REC =18" 67.0 51.6 FAT CLAY, trace fine sand, moist, light CH gray. w=30.7% REC =24" LL=62 PL=24 PP=3.15 tsf 71.0 47.6 SILTY SAND, fine grained, moist, SM greenish gray, contains mica. 6+8+10 N =18 REC =18" 38+50/4" N =50/4" dark gray, with fine shell fragments, weak HCl reaction. **REC =10"** -80 81.0 37.6 POORLY GRADED SAND, fine to SP medium grained, moist, gray, with fine to medium shell fragments, weak HCI reaction.  $\boxtimes$ 50/3" N = 50/3" REC =4" -85 87.0 31.6 SILTY SAND, fine to medium grained, SM moist, light gray, with fine to medium shell fragments, strong HCl reaction. 35+29+41 N = 70REC =18" -90 continued on next page

# Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant **B-306 Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 4 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SM 92.0 26.6 CLAYEY SAND, fine to medium SC grained, moist, gray, with fine to medium shell fragments, strong HCI reaction. 8+9+9 N =18 with fine to medium shell fragments, strong HCI reaction. REC =18" -95 96.0 22.6 SILTY SAND, fine and coarse grained, SM wet, gray, with fine shell fragments, weak HCl reaction.  $\boxtimes$ 50/4" trace fine to medium shell fragments, weak HCl reaction, contains cemented N = 50/4" REC =4" sand. with fine to coarse shell fragments, no 8+10+17 cemented sand, moderate HCI reaction. N =27 REC =18" fine to medium grained, moist, greenish gray, with fine to coarse shell fragments, moderate HCl reaction. 8+14+18 N = 32REC =18" gray, trace fine to medium shell fragments, weak HCl reaction. 10+14+19 N =33 REC =18" 5+9+12 no shell fragments, no HCI reaction. N = 21REC =18" -120 121.0 -2.4 CLAYEY SAND, fine to medium SC grained, wet, gray, with fine to coarse shell fragments, moderate HCl reaction on shells only.

X 4+11+21

# Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

continued on next page

**TEST** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 5 of 5 Schnabel Engineering LOG

**B-306** 

DEPTH	CTDATA DECODIDATION	CLASS.	ELEV.	WL	SAMPLING		TECTO	REMARKS	
(FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	DEPTH	DATA	TESTS	REMARKS	
		SC							
-					125	REC =18"			
_					L -				
127.0			-8.4						
127.0	SILTY SAND, fine to medium grained, wet, light gray and white, with fine to	SM	-0.4						
1	medium shell fragments, strong HCI								
-	reaction, contains cemented sand.				├	34+50/1" N =50/1"			
_					-130-	REC =7"			
	greenish gray, trace fine to medium shell fragments, weak HCl reaction.								
-	Shell fragments, weak i for reaction.				F 1				
-					-				
4					$\vdash \dashv \nabla$	17+14+20			
					<sub>135</sub>	N =34 REC =18"			
-					<u> </u>				
-									
					L JM	9+17+26			
						N =43 REC =18"			
					-140- <sup>  </sup>				
-					-				
-					<u> </u>				
_					L -				
	no visable shell fragments, no HCl				L JM	8+10+18			
	reaction.				l IX	N =28 REC =18"			
-					-145- <sup> L</sup>	INEO - 10			
-					<u> </u>				
_	maint granish gray transfine to				<u> </u>				
	moist, greenish gray, trace fine to medium shell fragments, moderate HCl								
	reaction.					8+9+17			
1						N =26 REC =18"			
150.0	BOTTOM OF BORING @ 150.0 FT.		-31.4		150-	REC = 10			
	-								
			1		1 1	1	1		

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.



**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-307 Boring Number:** Contract Number: 06120048 Sheet: 1 of 7

**Boring Contractor: UNI-TECH DRILLING** MALAGA, NEW JERSEY

Boring Foreman: J. Evans Drilling Method: Mud Rotary

Drilling Equipment: Failing-1500 (Truck) Schnabel Representative: K. Megginson Dates Started: 6/14/06 Finished: 6/16/06

**Location:** Northing: 216955.27 ft Easting: 960690.13 ft

**Ground Surface Elevation:** 119.3 (feet)

	Groundy	vater Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	6/15		23.5'		
Start of day	6/16		42.0'		

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	S	AMPLING	TESTS	REMARKS
(FT)	SHAIR BEGGINI HON	JEAGO.	(FT)		DEPTH	DATA		TEMPARICE.
0.3	Rootmat and topsoil.	CH	119.0			3+6+7 N =13		
2.0 -	FAT CLAY, moist, brown, trace fine to medium sand, contains root fragments, contains clayey sand and lean clay lenses.	SC	117.3		<u> </u>	REC =8"		
_	CLAYEY SAND, trace gravel, fine to medium grained, moist, brown, contains clayey sand pockets.					N =3 REC =17"		
5.5	fine to coarse grained, light orangeish brown below 4.5 ft		113.8		<u></u> 5 − <sub>     </sub>	4+5+6	w=11.6%	
7.0 -	CLAYEY SAND, fine to coarse grained, moist, orangeish brown and light brown.	SC	112.3			N =11 REC =11"		
7.0 -	SILTY SAND, fine to medium grained, moist, brown and orangeish brown.	SM	112.3			6+7+9 N =16 REC =15"		
9.5	POORLY GRADED SAND, fine to	SP	109.8		-10-			
-	medium grained, moist, stratified light brown and orangeish brown, trace silt.					5+9+13 N =22		
12.0 -	SILTY SAND, fine to medium grained, moist, light brown and orangeish brown, with silt.	SM	107.3			REC =12"		
_						22+32+38 N =70 REC =13"	w=7.9% LL=NP PL=NP *	
- 17.0 -			102.3					
-	SILTY SAND, fine to coarse grained, moist, stratified light brown and light yellowish brown.	SM	102.3					*Drilling foreman used 5.4" O.D. Dra
_						9+12+12 N =24 REC =11"		bit from 0 to 18.5 ft. *Switched to
-					_			4-3/4" O.D. Drag bit below 18.5 ft.
22.0 -	POORLY GRADED SAND WITH SILT, trace gravel, fine to coarse grained, moist, light brown.	SP-SM	97.3	Ī		7.40.43	w=13%	
24.0 - 	SILTY SAND, fine to coarse grained, wet, light brown.	SM	95.3		25_	7+10+13 N =23 REC =13"	W=13%	

- 1. Boring backfilled with cement/bentonite grout via tremie pipe upon completion.
- Downhole geophysical logging performed on 6/16/06.
   \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-307 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 7 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** stratified light brown and light yellowish SM brown below 24.5 ft. light orangeish brown, fine silty gravel 8+14+20 layer below 29.8 ft. N =34 REC =12" w=14.5% fine to medium grained, orangeish 8+11+13 LL=NP brown and light brown. N =24 PL=NP **REC =11"** -35 fine to coarse grained, orangeish brown, 7+7+7 trace fine gravel. N =14 REC =8" w=24.8% fine to medium grained, light grayish 3+1+2 brown and orangeish brown. N = 3REC =18" fine to coarse grained, gray below 44 ft. 47.0 72.3 SANDY LEAN CLAY, fine to medium, CL wet, gray, (difficult soil to field classify may lab classify as SC with high w=25.1% percentage of fines). 3+3+6 N =9 REC =18" 67.3 52.0 SANDY FAT CLAY, moist, gray and CH light gray, with fine sand, trace mica. w=28.1% 3+4+4 N =8 REC =18"

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout via tremie pipe upon completion.
- 2. Downhole geophysical logging performed on 6/16/06. 3. \* = See Appendix I for additional lab testing data.

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**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048 Sheet: 3 of 7

DEPTH			ELEV.		SAMPLING	;	DEMARKS
(FT)	STRATA DESCRIPTION	CLASS.	(FT)	WL	DEPTH DAT	TESTS	REMARKS
- - -	gray and light greenish gray, with fine to medium sand, contains clayey sand lense (1/8 inch thick) at 59.5 ft.	СН			4+4+6 N =10 REC =18	w=33.1% LL=62	
64.5	trace fine to medium sand, contains sandy fat clay pockets.  SILTY SAND, fine to medium grained, wet, dark gray.	SM	- 54.8		4+11+16 N =27 REC =18	LL=52	
67.0	FAT CLAY, moist, gray and light gray, with fine sand.	СН	52.3		  -   6+9+11	w=34%	
	light greenish gray, trace fine sand and organic matter (±1%).				N =20 REC =18	LL=66 PL=23 *	
72.0	CLAYEY SAND, fine to medium grained, moist, gray, contains fine to medium sandy lean clay pockets, trace mica.	SC	47.3		4+7+11 N =18 REC =18	w=24.9%	
77.0 -	SILTY SAND, fine to medium grained, moist, dark gray, few fine to coarse shell fragments (±10%), contains moderately cemented sand, moderate HCl reaction.	SM	42.3		28+50/5' N =50/5'' REC =11		*Switched to O.D. Tri-cond roller bit belo 78.5 ft.
- - - - -	wet, gray, contains black particles (1/16 inch), strong HCl reaction.				36+50/3" N =50/3" REC =10	*	
- - - -	Silt, gray and light gray, mostly fine to coarse shell fragments (±50%).				16+22+3 N =53 REC =15	LL=NP	*Switched to 4-3/4" O.D. Drag bit beld 88.5 ft.
-	continued on next page						

- Boring backfilled with cement/bentonite grout via tremie pipe upon completion.
   Downhole geophysical logging performed on 6/16/06.
   \* = See Appendix I for additional lab testing data.

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**TEST BORING** 

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

B-307 **Boring Number:** 

Schnab	el Engineering LOG					ntract Number: 0	
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	SAMPLING	TESTS	REMARKS
-		SM	,		DEPTH DATA		
94.5	some fine to coarse shell fragments (±40%).  LEAN CLAY, moist, gray, trace fine to medium sand, little fine to coarse shell	CL	- 24.8		8+10+17 N =27 REC =18"	w=27.7%	*Very difficult
97.5	fragments (±25%), strong HCI reaction.		21.8				rotary advancement from 97.5 to 98.5 ft (slow
	CLAYEY SAND, fine to medium grained, moist, light greenish gray and light brownish gray, contains strongly cemented sand pockets, weak HCl reaction.	SC			50/5" N =50/5" REC =5"		advancement rate).  *Switched to 9 O.D. Tri-cone roller bit below 98.5 ft.  *Very to
103.0	POORLY ORANGE CAND III III	00.014	16.3				extremely difficult rotary advancement from 98.5 to
-	POORLY GRADED SAND with silt, trace shells, green	SP-SM			8+12+15 N =27 REC =18"		100 ft (very strong rig chatter). *Very to extremely difficult rotary advancement from 101 to 1
110.0			9.3		10+14+19 N =33 REC =18"	w=29.2% LL=NP PL=NP	ft (very strong rig chatter). *Rotary advancement from 98.5 to 103 ft is extremely
-	SILTY SAND, fine to medium grained, wet, gray, trace fine to coarse shell fragments (±5%), moderate HCl reaction.	SM	3.0				difficult. *Switched to 4-3/4" O.D. Drag bit below
-	gray and light greenish gray, trace fine to medium shell fragments (±5%), weak HCl reaction.				6+10+14 N =24 REC =18"		
- - -	light greenish gray, trace fine to medium shell fragments (±1%), very weak HCl reaction.				4+7+14 N =21 REC =18"	w=28.9% LL=32 PL=25 *	
22.0	CLAYEY SAND gray and light gray, weak HCl reaction.	SC	2.7				
-	continued on next page				REC =14"	w=29.8%	*Osterberg

- Boring backfilled with cement/bentonite grout via tremie pipe upon completion.
   Downhole geophysical logging performed on 6/16/06.
   \* = See Appendix I for additional lab testing data.

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TEST **BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

B-307 **Boring Number:** Contract Number: 06120048 Sheet: 5 of 7

**SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** LL=35 sampler tube SC push from 123.5 to 124.7 PL=19 125 ft. \*Slight to moderate difficulty in rotary X advancement from 128.5 to moist, little fine to coarse shell 50 REC =6" fragments (±25%), contains strongly cemented sand layer, strong HCI 128.8 ft (slight -130reaction. rig chatter). 132.0 -12.7 SILTY SAND, wet, light greenish gray, SM trace fine to medium shell fragments w=26% 13+20+30 N = 50REC =17" <del>-</del>135 10+13+20 moist, greenish gray, trace fine to coarse shell fragments (±1%), weak HCI N = 33**REC =18"** reaction. -22.7 142.0 FINE TO MEDIUM SANDY ELASTIC МН SILT, moist, greenish gray, trace mica, weak HCl reaction. w=36.8% 9+11+18 LL=59 N =29 PL=33 REC =18" FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08 w=50.6% fine sandy. 7+12+20 N = 32REC =18" -150-153.5 -34.2w=38.8% SILTY SAND, fine to medium sandy, SM 7+13+17 LL=58 trace fine to medium shell fragments N = 30PL=37 (±1%), very weak HCl reaction. REC =18" -155 continued on next page

- 1. Boring backfilled with cement/bentonite grout via tremie pipe upon completion.
- 2. Downhole geophysical logging performed on 6/16/06. 3. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-307 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 6 of 7 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** 157.0 -37.7 CLAYEY SAND, fine to medium SC grained, wet, greenish gray, little fine to coarse shell fragments (±15%), strong HCI reaction. 7+18+18 N =36 REC =18" -160 162.0 -42.7 FINE TO MEDIUM SANDY LEAN CL CLAY, moist, gray and light greenish gray, trace fine to medium shell fragments (±5%), strong HCl reaction. 6+11+18 N =29 REC =18" 167.0 -47.7 FINE SANDY SILT, moist, gray and ML greenish gray, trace fine to medium shell fragments (±5%) and mica, weak HCI reaction. 8+12+18 N = 30REC =18" 172.0 -52.7 CLAYEY SAND, moist, dark greenish SC gray, trace fine sand and mica, contains indurated elastic silt pockets, weak HCl reaction. 7+12+14 N =26 -175 \*Osterberg sampler tube w=33.5% push from trace fine to medium sand, mostly REC =23" . 178.5 to 180.4 LL=41 indurated elastic silt layers, strong HCI ft PL=25 reaction. 180 PP=>4.5 tsf 183.5 -64.2 SILTY SAND, very weak HCl reaction. SM 7+12+14 N =26 REC =18" **-185** 

w=43%

LL=61

PL=39

6+9+15

REC =18"

N =24

190-

# Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout via tremie pipe upon completion.
- 2. Downhole geophysical logging performed on 6/16/06. 3. \* = See Appendix I for additional lab testing data.

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Project: **B-307 Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 7 of 7 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SM 193.5 -74.2 Sandy ELASTIC SILT, trace fine sand, МН 7+11+14 weak HCl reaction. N =25 REC =18" 195 \*\*Resumed grouting at 7:45 AM on 6/16/06. -200w=68.7% very weak HCl reaction. 7+11+14 LL=137 N =25 PL=61 REC =18" 201.5 -82.2 BOTTOM OF BORING @ 201.5 FT.

Calvert Cliffs Nuclear Power Plant

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout via tremie pipe upon completion.

**TEST** 

- Downhole geophysical logging performed on 6/16/06.
   \* = See Appendix I for additional lab testing data.

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**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-308 Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 5

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Evans Drilling Method: Mud Rotary **Drilling Equipment:** FAILING-1500 Schnabel Representative: R. Vinzant Dates Started: 5/3/06 Finished: 5/4/06

**Location:** Northing: 216906.69 ft Easting: 960771.28 ft

**Ground Surface Elevation:** 107.1 (feet)

	Ground	water Obs	ervations	i	
	Date	Time	Depth	Casing	Caved
Encountered	5/3		23.5'		

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	S	AMPLING	TEST	9	REMARKS
(FT)	STIGIA DESCRIPTION	CLASS.	' (FT)	***	DEPTH	DATA	1231	•	KLWAKKO
	SILTY SAND, fine to medium grained,	SM			1\/	3+3+3			
0.8 _	moist, dark brown, with organic matter, trace fine gravel.	SP	106.4			N =6 REC =18"			
_	POORLY GRADED SAND, fine to medium grained, moist, light brown, trace silt.					2+2+4 N =6 REC =14"			
_	grayish brown.								
					- 5 - 	2+6+5 N =11 REC =16"			
_	orangeish brown.								
-						4+4+6 N =10 REC =16"			
	medium to coarse grained, orangeish brown.								
	. Blown.				10	6+6+9 N =15			
-					├ <i>┤</i> Ľ\	REC =16"			
-					_				
-						10+13+14 N =27			
15.0 —	OH TV OAND fire to go divers are in a	014	92.1		15 <u></u>	REC =14"			
_	SILTY SAND, fine to medium grained, moist, orangeish brown, contains mica.	SM							
_									
-									
_					$\vdash \dashv \nabla$	7+10+12			
					\	N =22 REC =13"			
	medium to coarse grained, dark orange.				-20- <sup>[]</sup>				
-									
_									
_									
				$\nabla$		12+12+14			
_					├ <b>┤</b>   X	N =26			
	continued on next page				25  <sup>[/</sup>	REC =12"			
	Continued on next page								

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST B-308** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 5 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA wet, orange, with organic matter, trace SM fine gravel. 2+2+3 N =5 REC =14" 30.0 77.1 SC CLAYEY SAND, fine to medium grained, moist, dark gray. 2+2+3 N =5 REC =18" 35.0 72.1 -35 SANDY LEAN CLAY, fine, moist, dark CL gray. 2+3+2 N =5 REC =18" PP=3.00 tsf REC =24" 4+5+6 N =11 REC =18" contains mica. PP=3.25 tsf **REC =16"** -55

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

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**TEST** Project: Calvert Cliffs Nuclear Power Plant **B-308 Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA CL 5+7+7 N =14 REC =18" 60.0 47.1 SILTY SAND, fine to medium grained, SM moist, dark gray, with cemented sand. REC =0" 65.0 42.1 -65 CLAYEY SAND, fine grained, moist, SC gray, with fine to coarse shell fragments, moderate HCl reaction. 17+21+50/5" N =71/11" REC =16" 33.6 73.5  $\bowtie$ 50/4" SILTY SAND, fine to medium grained, SM N =50/4" moist, dark gray, with cemented sand. REC =1" -75  $\boxtimes$ 50/4" gray, with fine to coarse shell N = 50/4" fragments, strong HCl reaction. REC =1" 83.5 23.6 CLAYEY SAND, fine to medium SC 50/2" grained, moist, gray, with fine to coarse shell fragments, moderate HCl reaction. N =50/2" REC =0" -85  $\boxtimes$ 50/5" N = 50/5" REC =1" -90 continued on next page

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant **B-308 Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 4 of 5 ELEV. **SAMPLING DEPTH** STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SC 93.5 13.6 SILTY SAND, fine grained, moist, dark 7+14+14 SM greenish gray, with fine to coarse shell fragments, moderate HCl reaction. N =28 ∐ REC =18" -95 contains mica. 9+11+14 N =25 REC =18" -100 103.5 3.6 CLAYEY SAND, fine to medium SC 4+7+13 grained, moist, greenish gray. N =20 REC =18" 3+5+7 N =12 REC =18" 113.5 -6.4 SILTY SAND, fine to medium grained, SM 15+24+50/4" moist, light gray, with fine to coarse shell fragments, strong HCl reaction. N =74/10" REC =15" -115 34+29+23 greenish gray and white. N = 52REC =18" -120 trace fine to coarse shell fragments, 10+19+21 continued on next page

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant **B-308 Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 5 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA strong HCI reaction. SM N =40 REC =18" 125 128.5 -21.4 CLAYEY SAND, fine to medium SC 9+10+21 grained, moist, trace fine shell N = 31fragments, weak HCl reaction REC =18" -130-133.5 -26.4 SANDY SILT, fine to medium grained, ML 9+13+22 moist, greenish gray, trace fine to N =35 ∐ REC =18" medium shell fragments, weak HCl -13<del>5</del> reaction where shell fragments are present 138.5 -31.4 SILTY SAND, fine to medium grained, SM 10+10+15 N =25 moist, greenish gray, few fine to coarse shell fragments, strong HCl reaction. **REC =18"** 7+10+16 N =26 REC =18" 10+17+30 N =47 REC =18" 150.0 -42.9 -150-BOTTOM OF BORING @ 150.0 FT.

# Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

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**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-309 Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 5

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Reese Drilling Method: Mud Rotary Drilling Equipment: CME-75 (Truck) Schnabel Representative: M. Arles

Dates Started: 5/11/06 Finished: 5/12/06

**Location:** Northing: 216949.24 ft Easting: 960890.7 ft

**Ground Surface Elevation: 100.1 (feet)** 

÷					
	Groundy	vater Obs	ervations		
	Date	Time	Depth	Casing	Caved
Start of day	5/12		12.5'	14.0'	
Start of day	5/15		21.5'	14.0'	

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	SAMPLIN	NG TESTS	REMARKS
(FT)			(FT)		DEPTH DA	ATA	
0.4	ROOTMAT AND TOPSOIL.	FILL	99.7		2+2+2 N =4		Drill hollow stem auger
2.0	Clayey Sand FILL, fine to medium grained, moist, brownish orange.	1166	98.1		-	17"	Fill, water los and hole
2.0	Poorly graded sand FILL, fine to coarse grained, moist, brownish orange, contains wood fragments, with clay, trace silt.	FILL	96.1		WOH/7 N = W0 REC =	OH/18"	collapse, drillers cased auger to 14' t keep hole op
-		FILL			1+WOI +WOR N = WO REC =	OR	
7.0	Silty Sand FILL, fine to coarse grained, moist, grayish brown, contains wood fragments.	FILL	93.1		 	18" OH/18"	
11.0	wet, brown, trace gravel.	FILL	89.1		10 	2+2	
12.0	SILTY SAND, fine to coarse grained, moist, brown, trace gravel.  SANDY LEAN CLAY, fine to coarse,	SM	88.1		REC =	18"	
- -	moist, brown.				2+2+3 N =5 REC =		
17.0	POORLY GRADED SAND WITH SILT AND GRAVEL, fine to coarse grained, moist, orangeish brown.	SP-SM	83.1		 7+10+	11	
-					N = 21 REC =	17"	
_ - 24.8	orange.		75.3		9+14+8 N =22 REC =		
5	continued on next page		, 5.5		-25-KEC -	• •	

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-309 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 5 Schnabel Engineering LOG ELEV. **SAMPLING DEPTH** STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SILTY SAND, fine to medium grained, SM moist, orange. 27.0 73.1 CLAYEY SAND, fine to medium SC grained, moist, dark gray. 1+3+2 N =5 **REC =18"** 68.1 32.0 SANDY LEAN CLAY, fine, moist, dark CL gray. REC =23" -35 PP=2.50 tsf 4+4+6 N =10 REC =18" PP=3.75 tsf REC =24" trace sand. gray. 3+4+7 N =11 52.0 48.1 CLAYEY SAND, fine to medium SC grained, moist, greenish gray. REC =23" -55 57.0 43.1 POORLY GRADED SAND WITH CLAY, SP-SC fine to medium grained, moist, grayish continued on next page

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-309 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** green, with fine to coarse shell SP-SC fragments (15-20%), HCI+, contains 31+50/3" cemented sand. N = 50/3" REC =10" -60 62.0 38.1 CLAYEY SAND, fine to medium SC grained, moist, grayish green, 1/4" layers of clay and sand. 6+12+16 N =28 REC =18" 67.0 33.1 POORLY GRADED SAND, fine to SP medium grained, moist, grayish green, trace silt, with fine to medium shell  $\bowtie$ fragments (0-10%). 50/3" N =50/3" REC =4" 72.0 28.1 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, moist, green and white, with fine to coarse shell fragments (30-40%), HCI+. 23+19+14 N = 33REC =16"  $\bowtie$ 50/4" N = 50/4" REC =2" -80 greenish gray, with fine to coarse shell 8+17+22 fragments (10-20%). N =39 **REC =18"** -85 with fine to coarse shell fragments 9+10+9 (15-30%). N =19 REC =18" -90

# Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

continued on next page

B-309 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 4 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SP-SM trace fine to medium shell fragments 6+7+8 (<1%). N =15 ∐ REC =18" -95 3+3+4 N =7 REC =18" -100 grayish green, with fine to coarse shell fragments (15-30%). 5+6+11 N = 17REC =18" 107.0 -6.9 SILTY SAND, fine to medium grained, SM moist, grayish green, with fine to coarse shell fragments (30-40%). 23+10+26 N =36 REC =18" 112.0 -11.9 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, moist, grayish green, with fine to coarse shell fragments (10-15%), with silt, HCl+. 9+9+14 N =23 REC =18" 5+6+7 N =13 REC =18" -120 122.0 -21.9 POORLY GRADED SAND, fine to SP medium grained, moist, green, trace silt. 8+8+10 continued on next page

Calvert Cliffs Nuclear Power Plant

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

**TEST** 

Project:

2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-309 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 5 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SP N =18 REC =18" 125 127.0 -26.9 SILTY SAND, fine to medium grained, SM moist, green, trace fine to medium shell fragments (0-5%). 7+7+9 N =16 REC =18" 130 132.0 -31.9 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, moist, green, trace fine to medium shell fragments (0-5%), HCI+. 5+7+7 N =14 | REC =18" <del>-</del>135 with fine to coarse shell fragments 4+6+8 (10-25%).N =14 **REC =18"** 5+6+9 N =15 REC =18" 147.0 -46.9 SILTY SAND, fine to medium grained, SM moist, green, trace fine to medium shell fragments (0-10%). 5+7+8 N =15 REC =18" 150.0 -49.9 -150-BOTTOM OF BORING @ 150.0 FT.

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

chnabel Schnabel Engineering

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

**B-310** 

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Bender Drilling Method: Mud Rotary **Drilling Equipment:** CME-550 Schnabel Representative: K. Bell

Dates Started: 6/15/06 Finished: 6/15/06

**Location:** Northing: 217081.4 ft Easting: 960616.6 ft

**Ground Surface Elevation:** 91.6 (feet)

Groundwater Observations											
	Date	Time	Depth	Casing	Caved						
Encountered	6/15		48.5'								

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	s	AMPLING	TESTS	REMARKS
(FT)	5.15t.7t.22001til 11011	J	(FT)		DEPTH	DATA		
0.5	ROOTMAT AND TOPSOIL.	SP-SC	91.1			1+1+1		
2.0	POORLY GRADED SAND WITH CLAY, fine to medium grained, moist, orangeish brown, trace gravel.	SC SC	89.6			N =2 REC =6"		
_	CLAYEY SAND, fine to medium grained, moist, orangeish brown, trace root fragments, trace gravel, moderate cementation.	30				3+4+4 N =8 REC =18"		
_	yellowish brown				- 5 -	4+3+5 N =8 REC =16"		
7.0	POORLY GRADED SAND WITH CLAY, fine to coarse grained, moist, yellowish brown, trace gravel.	SP-SC	84.6			4+6+6 N =12 REC =15"		
10.0	OU TWO AND S	014	81.6		-10-			start of mud
-	SILTY SAND, fine to medium grained, moist, yellowish brown and orangeish brown.	SM				3+6+6 N =12 REC =5"		rotary drilling
13.0	SANDY LEAN CLAY, wet, yellowish	CL	78.6					
_	brown and gray.	OL			<del> </del>	1+1+2 N =3 REC =18"		
-								
4					_			
						2+2+2		
7						N =4 REC =18"		
7					-20- <i> </i> -	1120 - 10		color change
4					+ +			mud tub from orangeish
4								brown to gray
4					_			
						2+2+3		
					<u>                                   </u>	N =5 REC =18"		
_	continued on next page				25  <sup>[_]</sup>			

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

<sup>2. \* =</sup> See Appendix I for additional lab testing data.

**B-310 Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA CL 2+4+5 N =9 REC =18" 32.0 59.6 ELASTIC SILT, moist, gray, trace sand. МН 3+6+7 N = 13REC =17" -35 37.0 54.6 CLAYEY SAND, fine to medium SC Harder drilling grained, moist, gray. 4+5+7 N =12 REC =18" 11+21+50/ N =71/11" REC =16" 11+21+50/5" strong cementation Harder drilling 47.0 44.6 SILTY SAND, fine to coarse grained, SM wet, gray, trace fine to medium shell fragments, 2-5%, HCl reaction weak.  $\nabla$  $|\boxtimes|$ 50/5" N = 50/5" REC =5" -50 50/4" N = 50/4" REC =4" -55 Rig chatter continued on next page

Calvert Cliffs Nuclear Power Plant

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

**TEST** 

Project:

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-310 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering Sheet: 3 of 4 LOG ELEV. **SAMPLING DEPTH** STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SM gray and white, with fine to coarse shell fragments, 60-70%, HCl reaction strong 10+13+9 N =22 REC =18" 62.0 29.6 CLAYEY SILT, moist, greenish gray. MLHarder drilling 4+50 N =50 REC =12" -65 Rig chatter 50/2" No recovery. N =50/2" Harder REC =0" drilling/rig chatter 72.0 19.6 CLAYEY SAND, fine to medium SC grained, wet, greenish gray and white, contains fine to coarse shell fragments, 20-30%, HCl reaction moderate. 5+7+10 N =17 REC =18" REC =15" -80 trace fine to medium shell fragments, 5+6+8 2-5%, HCI reaction weak. N =14 **REC =18"** -85 4+4+8 N =12 REC =18" -90 continued on next page

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

**TEST B-310** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SC Rig chatter ||| 50/5 white and gray, with fine to coarse shell fragments, 60-70%, strong cementation, HCI reaction strong. N = 50/5" REC =4" -95 Rig chatter

-8.4

27+27+26

REC =18"

N =53

-100-

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

2. \* = See Appendix I for additional lab testing data.

contains fine to medium shell

moderate.

100.0

fragments, 10-20%, HCI reaction

BOTTOM OF BORING @ 100.0 FT.

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

chnabel Schnabel Engineering

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-311 Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 5

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Bender Drilling Method: Mud Rotary Drilling Equipment: CME-550X (ATV) Schnabel Representative: K. Bell

Dates Started: 5/15/06 Finished: 5/16/06

**Location:** Northing: 217268.61 ft Easting: 960771.76 ft

**Ground Surface Elevation:** 58.4 (feet)

	Groundwater Observations											
Date Time Depth Casing Car												
Encountered	5/15		23.5'									
Start of day	5/16		10.0'									

OEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL		AMPLING	TESTS	REMARKS
` ,	ROOTMAT AND TOPSOIL.		, ,		DEPTH	DATA		
0.8	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, yellowish brown, trace root fragments.  yellowish brown and brown, with wood fragments.	SP-SM	57.6		<u>   </u> 	1+1+1 N =2 REC =14" 4+3+2 N =5 REC =8"		
7.0			51.4		L _  X	1+3+5 N =8 REC =0"		
7.0	FAT CLAY with sand, moist, orangeish brown and gray, trace root fragments.	СН	51.4			2+4+5 N =9 REC =12"		
12.0			46.4			1+3+5 N =8 REC =17"		
_	SILTY SAND, fine to medium grained, moist, gray.	SM				6+9+10 N =19 REC =20"		
- - - -	gray and greenish gray.					4+5+9 N =14 REC =20"		
22.0	POORLY GRADED SAND WITH SILT, fine to medium grained, wet, gray and greenish gray.	SP-SM	36.4	∑		10+15+17 N =32 REC =15"		Harder drilling
-	continued on next page				—25— <sup>[]</sup>	0 10		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SP-SM trace fine to medium shell fragments, 23+17+15 HCI reaction weak. N =32 REC =14" 32.0 26.4 SILTY SAND, fine to medium grained, SM wet, gray and white, with fine to coarse shell fragments, HCl reaction strong. 11+11+18 N =29 REC =12" -35 37.0 21.4 SANDY LEAN CLAY, moist, greenish CL gray, trace fine to coarse shell fragments, HCl reaction moderate. 28+22+50/3" N = 72/9" REC =21" 42.0 16.4 SC CLAYEY SAND, fine to coarse grained, wet, oliveish gray and gray, trace fine to coarse shell fragments, HCl reaction moderate, weak cementation. 11+19+17 N =36 REC =17" Harder drilling 47.0 11.4 SILTY SAND, fine to medium grained, SM wet, greenish gray and white, trace fine to coarse shell fragments, HCl reaction weak. 4+4+6 N =10 | REC =14" -50 4+4+5 N =9 REC =14" continued on next page

Calvert Cliffs Nuclear Power Plant

B-311

# Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

TEST

Project:

**TEST B-311** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SM greenish gray. 2+3+5 N =8 REC =17" 4+4+7 N = 11REC =18" 67.0 -8.6 CLAYEY SAND, fine to medium SC grained, wet, light gray and white, with fine to coarse shell fragments, HCI  $\bowtie$ 50/3" N =50/3" reaction strong. REC =2" 72.0 -13.6 SILTY SAND, fine to medium grained, SM wet, greenish gray, trace fine to coarse shell fragments, HCl reaction moderate. 18+17+23 N = 40REC =17" HCI reaction weak. 8+12+15 N =27 REC =18" greenish gray and white, HCl reaction 9+8+10 moderate. N =18 **REC =18"** -85 87.0 -28.6 SANDY ELASTIC SILT, wet, gray and МН greenish gray. 6+7+10 N =17 REC =18" -90

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

continued on next page

**B-311 Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 4 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA МН trace fine to medium shell fragments 6+8+12 (5%), HCl reaction weak. N =20 REC =18" -95 Resumed drilling 5/16/06 @ 7:15am greenish gray 7+14+12 N =26 REC =18" -100 102.0 -43.6 SILTY SAND, fine to medium grained, SM wet, greenish gray and white, and fine to coarse shell fragments (35-45%), HCl reaction stronng. 11+12+31 N =43 REC =20" 107.0 -48.6 LEAN CLAY with sand, wet, greenish CL gray and white, trace fine to medium shell fragments (2-5%), HCl reaction moderate. 7+7+10 N = 17REC =19" trace fine to medium shell fragment 5+7+10 (5-10%). N =17 REC =19" -120 5+7+9 trace fine to medium shell fragments continued on next page

Calvert Cliffs Nuclear Power Plant

# Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

**TEST** 

Project:

**TEST B-311** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 5 of 5 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DATA **DEPTH** CL (2-5%), HCI reaction weak. N =16 REC =18" 125 greenish gray. 5+7+9 N =16 REC =20" 130 Softer drilling 132.0 -73.6 FAT CLAY with sand, moist, greenish СН gray and gray. 7+9+12 N =21 ∐ REC =21" **-135** trace fine to medium shell fragments 7+9+12 (<5%), HCl reaction weak. N =21 REC =19" trace fine to medium shell fragments 6+7+11 (5%). N =18 REC =20" trace fine to medium shell fragments 9+10+13 N =23 REC =20" 150.0 -91.6 -150-BOTTOM OF BORING @ 150.0 FT.

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

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**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Bender Drilling Method: Mud Rotary Drilling Equipment: CME-550X (ATV) Schnabel Representative: K. Bell

Dates Started: 5/18/06 Finished: 5/18/06

**Location:** Northing: 217293 ft Easting: 960740 ft

**Ground Surface Elevation:** 55.3 (feet)

Groundwater Observations											
	Date	Time	Depth	Casing	Caved						
Encountered	5/18		23.5'								

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	s	AMPLING	TESTS	REMARKS
(FT)		OLAGO.	(FT)		DEPTH	DATA	12010	- CENTAL CO
0.5	ROOTMAT AND TOPSOIL.	SP-SM	54.8			woh+1+2		
-	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, yellowish	3P-3IVI			├   X	N =3		
2.0	brown, trace root fragments.	CH	53.3		├ <u>┤</u> Ľ\	REC =15"		
_	FAT CLAY, moist, yellowish brown and orangeish brown, trace sand and root fragments.	СП				2+3+4 N =7 REC =11"		
_					_ 5 -	3+4+5		
-						N =9 REC =0"		
]	orangeish brown and gray, trace wood fragments.					2+3+3 N =6		
-	nagmente.					REC =13"		
					-10- 	REC =21"	PP=>4.5 tsf	
								Color change
12.0	ELASTIC SILT with sand, moist, dark gray.	МН	43.3		-   			tub from yello brown to gray
-					$\vdash \dashv \nabla$	3+4+8 N =12		
					—15— <sup>[/_</sup>	REC =18"		
17.0			38.3					
17.0	SILTY SAND, fine to medium grained, moist, dark gray and black, organic	SM	30.3					Color change tub from gray brown
	odor, weakly cemented with no HCl reaction.					38+50/5"		
					20	N =50/5" REC =10"		
-								
22.0	POORLY GRADED SAND WITH SILT,	SP-SM	33.3					
_	fine to coarse grained, wet, light gray, trace fine to medium shell fragments (2-5%), HCl reaction weak.			Ā		50		
					25	REC =10"		
	continued on next page				23			

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-312 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SP-SM  $\boxtimes$ 50/5" trace fine to medium shell fragments (5-10%), HCI reaction weak. N = 50/5" REC =5" -30 32.0 23.3 ELASTIC SILT with sand, wet, gray, МН trace organic matter and fine to medium shell fragments (2-5%), HCl reaction weak. 4+4+6 N = 10REC =15" -35 Rig chatter REC =0" Rig chatter 42.0 13.3 SILTY SAND, fine to coarse grained, SM wet, greenish gray and gray, trace fine to coarse shell fragments (15-20%), HCI reaction moderate. 4+6+12 N =18 REC =18" greenish gray and white. 6+8+14 N =22 REC =17" -50 greenish gray, trace fine to coarse shell fragments (10-15%). 6+5+8 N =13 REC =17" 57.0 -1.7 CLAYEY SAND, fine to medium SC grained, wet, greenish gray, trace fine to continued on next page

# Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

TEST Project: Calvert Cliffs Nuclear Power Plant B-312 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** medium shell fragments (2-5%), HCI SC reaction weak. 3+4+5 N = 9REC =15" 62.0 -6.7 SANDY FAT CLAY, wet, greenish gray, trace fine to coarse shell fragments СН (30-40%), HCI reaction strong. 5+7+11 N =18 REC =18" Rig chatter 67.0 -11.7 SILTY SAND, fine to coarse grained, SM wet, gray and white, with cemented sand, HCI reaction strong. 47+10+7 N = 1769.5 -14.2CLAYEY SAND, fine to coarse grained, SC REC =16" wet, greenish gray and white, trace fine to coarse shell fragments (30-40%), HCI reaction strong. fine to medium grained, greenish gray 17+26+29 and light gray, trace fine to medium N =55 shell fragments (5-15%), HCl reaction REC =18" moderate. 77.0 -21.7 SANDY ELASTIC SILT, wet, greenish MH gray, trace fine to coarse shell fragments (10-20%), HCl reaction moderate. 4+6+11 N = 17REC =17" greenish gray and white, trace fine to 7+8+13 medium shell fragments (5-10%), HCI N =21 **REC =18"** reaction weak. -85 with sand, trace fine to medium shell 7+9+12 fragments (2-5%). N =21 REC =20" -90 continued on next page

# Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: **B-312** Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG DEPTH (FT) **SAMPLING** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) DEPTH DATA MH 5+9+3 N =12 REC =20" PP=>4.5 tsf REC =12" -100 100.5 -45.2 BOTTOM OF BORING @ 100.5 FT.

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.



TEST BORING LOG **Project:** Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Boring Number: B-313

Contract Number: 06120048 Sheet: 1 of 5

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings

Drilling Method: Mud Rotary

Drilling Equipment: CME-750 (ATV)

Schnabel Representative: K. Megginson

Dates Started: 5/19/06 Finished: 5/22/06

**Location:** Northing: 217372.34 ft Easting: 960713.67 ft

**Ground Surface Elevation:** 50.7 (feet)

	Chican Fig. 5											
Groundwater Observations												
	Date	Time	Depth	Casing	Caved							
Encountered	5/19		8.7'									
Start of day	5/22		20.0'									
Start of day	5/23		0.0'									
Water Reading	7/27		20.3'									

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	s	AMPLING	TESTS	REMARKS
(FT)	01101111122001111 11011	02,100.	(FT)		DEPTH	DATA		i temi ti ti to
0.5	Forest litter, rootmat and topsoil.		50.2		IV	WOH+1+1	w=9.9%	
1	SILTY SAND, fine to coarse grained, moist, brown, contains root fragments.	SM				N =2 REC =13"		
2.0	Sandy SILTY CLAY, fine to medium grained, moist, light brown, trace organic matter, contains root fragments.	CL-ML	48.7			WOH+2+1 N =3 REC =10"	w=11.8% LL=19 PL=14	
4.5	FAT CLAY, moist, light orangeish brown and light brown, trace fine to medium sand.	СН	46.2		_ 5 _ 	2+4+4 N =8 REC =18"	w=27.6% LL=67 PL=21	
7.5	Sandy LEAN CLAY, light gray and orangeish brown, with fine to medium	CL	43.2	$\nabla$		3+4+6 N =10 REC =13"	w=15.1% LL=30 PL=17	
9.5	sand.	SM		_		REC = 13	*	
9.5	SILTY SAND, fine to medium grained, wet, grayish brown and brown.	ML	41.2		-10-		070/	
_	SANDY SILT, fine to medium, wet, light grayish brown and orangeish brown.					2+3+3 N =6 REC =17"	w=27% *	*Slight drill rig chatter from 11.5 to 13.5 f
_	light grayish brown, yellowish brown and orangeish brown, trace mica.					2+2+2 N =4 REC =16"	w=31.5%	
17.0	POORLY GRADED SAND, fine to	SP-SM	33.7		_			
4	medium grained, wet, light brown, with silt.	OI -OIVI						
_						4+11+15 N =26 REC =16"	w=23.1% *	
22.0			28.7					
-	SILTY SAND, fine to medium grained, wet, dark orangeish brown.	SM			_			
-						16+17+10 N =27 REC =15"	w=21.1% LL=NP PL=NP	
-	continued on next page				<b>25 </b> └-	1120 - 10		

- 1. Ground water observation well OW-313B installed in boring upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-313A installed at nearby location.

Schnabel

**TEST** BORING LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	S	AMPLING	TECTO	DEMARK
(FT)	STRATA DESCRIPTION	CLASS.	(FT)	WL	DEPTH	DATA	TESTS	REMARK
- - - -	gray, mostly fine to coarse shell fragments (±60%), strong HCl reaction, contains black particles (<1/16 inch).	SM				11+14+14 N =28 REC =16"	w=18.2% LL=NP PL=NP *	
32.0			18.7					
32.0	SANDY LEAN CLAY, moist, gray, with fine to medium sand, weak HCl reaction.	CL	10.7				00 40/	*Switched to 3-7/8" Tri-co
33.9	SILTY SAND, fine to medium grained, moist, gray, mostly strongly cemented sand (±95%), moderate HCl reaction.	SM	16.8		- 35- - 35-	50 REC =6"	w=28.1% LL=38 PL=21 *	roller bit beld 33.5 ft. *Very to extremely difficult rotar advancement from 34 to 3
-	wet, oliveish gray, little fine to coarse shell fragments (±30%), contains cemented sand pockets, strong HCl reaction.		0.7			24+50/4" N =50/4" REC =10"	w=17.1% *	ft (strong rig chatter). *Moderate difficulty with rotary advancement from 35.5 to 37.5 ft.
41.0	SANDY SILT, fine to medium grained, wet, gray, few fine to coarse shell fragments (±10%), contains silty sand pockets, weak HCl reaction.	ML	9.7		45	4+5+6 N =11 REC =18"	w=29.3% LL=34 PL=27 *	*Very difficurotary advancementer from 37.5 to ft (moderate strong rig chatter). *Moderate to difficult rotar advancementer from 40.5 to
47.0 -	SILTY SAND, fine to medium grained, wet, greenish gray and gray, few fine to coarse shell fragments (±10%), moderate HCl reaction.	SM	3.7			6+7+8 N =15 REC =18"	w=27.9% *	ft (moderate chatter).
52.0 -	SILTY SAND, fine to medium grained, wet, greenish gray and gray, weak HCl reaction, contains black particles (<1/16 inch).	SM	-1.3			5+6+9 N=15	w=31.5% LL=NP PL=NP	**Resumed
-	trace fine to medium shell fragments ( $\pm 5\%$ ) below 54.8 ft.				55  <u> </u>     	REC =18"	* *	drilling at 8:4 AM on 5/22/
-	continued on next page				<del> </del>			

- Ground water observation well OW-313B installed in boring upon completion.
   \* = See Appendix I for additional lab testing data.
   Ground water observation well OW-313A installed at nearby location.

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048 Sheet: 3 of 5

					0.4	MDLING		
OEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	· .	MPLING	TESTS	REMARK
-	light greenish gray and gray, trace fine to coarse shell fragments (±5%).	SM			X   <b>^</b>	DATA 3+5+9 N =14 REC =18"		
62.0 -	SANDY LEAN CLAY, fine to medium, wet, gray and light gray, mostly fine to coarse shell fragments (±60%), contains clayey sand pockets, strong HCl reaction.	CL	11.3		「	11+14+50/5" N =64/11" REC =17"	w=26.2% LL=33 PL=17 *	*Moderate to difficult rotar advancemer from 65 to 6
67.0	SILTY SAND, fine to medium grained, wet, gray, little fine to medium shell fragments (±20%), strong HCI reaction.	SM	16.3			6+13+22 N =35 REC =18"		(moderate to strong rig chatter).
72.0 -	SANDY SILT, fine to medium, moist, light greenish gray and gray, trace fine to coarse shell fragments (±5%), moderate HCl reaction.	ML	21.3			5+10+16 N =26 REC =18"	w=28.4% *	
77.0	CLAYEY SAND, fine to medium grained, moist, greenish gray, few fine to coarse shell fragments (±10%), contains cemented shell pockets and strongly cemented sand layer from 77.7 to 77.8 ft, strong HCI reaction.	SC	26.3			50/4" N =50/4" REC =4"		
82.0 -	SANDY ELASTIC SILT, fine to medium, moist, greenish gray, trace mica, weak HCI reaction.	MH	31.3		X   <b>r</b>	5+6+13 N =19 REC =18"	w=37.3% *	
87.0	ELATIC SILT, moist, light greenish gray, trace fine to medium sand, mica and fine to medium shell fragments (±1%), weak HCl reaction.	МН	36.3			7+9+12 N =21 REC =18"	w=55% LL=98 PL=47 *	
-	continued on next page				+ +			

- Ground water observation well OW-313B installed in boring upon completion.
   \* = See Appendix I for additional lab testing data.
   Ground water observation well OW-313A installed at nearby location.

TEST Project: Calvert Cliffs Nuclear Power Plant B-313 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 4 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** МН 92.0 -41.3 LEAN CLAY, gray, with fine to medium CL sand, trace mica, weak HCI reaction, trace fine to coarse shell fragments (±<5%). w=35.6% **REC =14"** \*Shelby tube LL=49 PL=25 sampler push -95 from 93.5 to PP=>4.5 tsf 94.7 ft. -46.3 97.0 SANDY SILT, moist, dark gray, some ML fine to coarse shell fragments (±40%), trace mica, weak HCl reaction. w=32.4% 8+13+18 LL=42 N =31 PL=28 REC =18" -100 102.0 -51.3 SANDY ELASTIC SILT, fine to medium, МН moist, dark greenish gray, trace fine to medium shell fragments (±<5%), trace mica, moderate HCI reaction. w=43.4% 6+8+12 LL=70 N =20 PL=45 REC =18" -105 w=57.7% trace fine to medium sand and mica, 6+10+11 LL=106 moderate HCI reaction. N =21 PL=55 REC =18" w=44.3% with fine to medium sand, trace mica 6+10+12 LL=72 N =22 and fine to coarse shell fragments PL=46 (±5%), moderate HCI reaction. REC =18" -115 \*Considered pushing tube at 118.5 ft, but drilling w=43.5% resistance weak HCl reaction. 5+8+11 LL=81 increased from N =19 PL=42 REC =18" 117.5 to 118.5 -120ft.

-71.3

\*Shelby tube

w=33.1%

REC =10"

SC

# Comments:

122.0

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Ground water observation well OW-313B installed in boring upon completion.
- 2. \* = See Appendix I for additional lab testing data.

pockets, weak HCl reaction.

3. Ground water observation well OW-313A installed at nearby location.

CLAYEY SAND, dark greenish gray,

trace mica, contains indurated sandy silt

continued on next page

Schnabel

**TEST** BORING LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

ark greenish gray, ns indurated sandy silt L reaction.	SC MH	ELEV. (FT)	WL	DEPTH -125	7+9+12 N =21 REC =18" 8+10+11 N =21 REC =18"	TESTS  LL=44 PL=26 PP=>4.5 tsf  w=66% LL=132 PL=60 *  w=69.1%	*Relatively slorotary advancement below 135 to
ns indurated sandy silt	MH			-125-   - 130-  	7+9+12 N =21 REC =18" 8+10+11 N =21	PL=26 PP=>4.5 tsf * w=66% LL=132 PL=60	*Relatively slorotary advancement
ns indurated sandy silt	MH	76.3			N =21 REC =18" 8+10+11 N =21	* w=66% LL=132 PL=60 *	*Relatively slo
ns indurated sandy silt	MH	70.3		N	N =21 REC =18" 8+10+11 N =21	LL=132 PL=60 *	rotary advancement
					N =21	w=69.1%	rotary advancement
				- -140-	7+8+12 N =20 REC =18"	w=62.9% LL=106 PL=51	
, moist, greenish gray, ım sand, and mica,	СН	91.3			7+11+14 N =25 REC =18"	w=49.1%	**
/, moderate HCI RING @ 150.0 FT.		99.3		  -150-	7+12+14 N =26 REC =18"	w=49.4% LL=103 PL=30	**Resumed observation well construction f SPT borehole at 7:00 AM or 5/23/06.
			00.2	00.2	00.3	00.2	N = 26

- Ground water observation well OW-313B installed in boring upon completion.
   \* = See Appendix I for additional lab testing data.
   Ground water observation well OW-313A installed at nearby location.



TEST BORING LOG

**Project:** Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Boring Number: B-314
Contract Number: 06120048

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Bender

Drilling Method: Mud Rotary

Drilling Equipment: CME-550X (ATV)

Schnabel Representative: K. Bell

Dates Started: 5/16/06 Finished: 5/17/06

**Location:** Northing: 217321.89 ft Easting: 960654.5 ft

Ground Surface Elevation: 52.8 (feet)

Groundwater Observations											
	Date	Time	Depth	Casing	Caved						
Encountered	5/16		3.5'								
Start of day	5/17		10.5'								

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL		SAMPL	ING	TEST	s	REMARKS
(FT)	STRATA DESCRIPTION	CLASS.	(FT)	***	DEPTI	1   1	DATA	1231	•	KLWAKKS
0.4	ROOTMAT AND TOPSOIL.  SILTY SAND, fine to medium grained, moist, yellowish brown, trace silt and root fragments.	SM	52.4			WOH N = \ REC	NOH/18"	w=9.7	%	
3.5	fine to coarse grained, wet, trace gravel.		49.3	Ā		2+2+ N =7		w=14.1 LL=NI PL=N	P	
_	FAT CLAY with sand, moist, orangeish brown and gray, trace root fragments.	СН			- 5 -	1+2+ N =5	-3	w=35° LL=7; PL=2	% 3 5	
_					   - 10	2+4+ N =9 REC		w=41.2 LL=59 PL=2 *	2% 5/ 9 7: 1 Co	
-					 	5+7+ N =1 REC		w=26.2 LL=7; PL=2: *	2% gr 3 ft.	ellow/brown ay below 10
13.5	CLAYEY SAND, moist, light gray and gray.	SC	39.3		 15	REC	=12"	w=25.9 LL=54 PL=1 PP=>4.5	4 1 5 tsf	
17.0	SILTY SAND, fine to medium grained, wet, greenish gray and white, trace fine to medium shell fragments (5%), HCl reaction weak.	SM	- 35.8		  [	26+5 N =5 REC		w=24.2	at	arder drilling 16.5 ft.
22.0 -	SILTY SAND, fine to medium grained, wet, light gray and white, trace fine to medium shell fragments (5-10%), HCI reaction moderate .	SM	30.8		  [	29+5 N =5 REC		w=22.6 LL=NI PL=N	P	

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-314 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SM 25.8 27.0 SILTY SAND, fine to coarse grained, SM wet, gray and white, with fine to coarse shell fragments (60-70%), HCl reaction w=20.3% strong. 10+10+17 N =27 REC =15" -30 32.0 20.8 Sandy LEAN CLAY with sand, moist, CL greenish gray. w=25.4% 3+4+6 LL=42 N = 10PL=22 REC =20" -35 Rig chatter at 36.5 ft. 37.0 15.8 SILTY SAND, fine to medium grained, SM wet, gray and greenish gray, trace fine to coarse shell fragments (25-30%), HCI w=26.8% reaction strong, (50-60% medium to 5+5+50/3" LL=NP coarse grained shell fragments from N =55/9" PL=NP REC =19" 39.9-40.0 ft). w=31.9% 4+4+7 N =11 REC =16" w=25.4% 5+9+7 N =16 ∐ REC =18" 52.0 8.0 SILTY SAND, fine to medium grained, SM wet, gray and greenish gray, trace fine to medium shell fragments (2-5%), HCI w=32.8% reaction weak. 4+4+6 LL=NP N =10 PL=NP REC =18" -55

-4.2

SP

# Comments:

57.0

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

POORLY GRADED SAND, trace silt,

fine to medium grained, wet, gray and continued on next page

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048 Sheet: 3 of 4

	el Engineering LOG				0445	Sheet: 3 of 4	
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	SAMPL	TESTS	REMARK
-	greenish gray, trace fine to medium shell fragments (2-5%), HCl reaction weak.	SP	()		DEPTH D 3+4+6 N = 10 REC	LL=NP	
62.0	SANDY FAT CLAY with sand, wet, greenish gray and white, trace fine to coarse shell fragments (35-45%), HCI reaction strong.	СН	9.2		3+5+8 3+5+8 N = 13 REC	B LL=59	
67.0	SANDY SILT, fine to coarse grained, wet, greenish gray and white, trace fine to medium shell fragments (10-15%), HCl reaction moderate.	ML	14.2		5+11-   5+11- N = 28 -70   REC	B LL=NP	Rig chatter a 67.5 ft.
- - - -	fine to medium grained, gray and greenish gray, trace fine to medium shell fragments (2-5%), HCl reaction weak.				     8+13-   N =29   REC	) LL=NP	
-	greenish gray and white, trace fine to medium shell fragments (20-30%), HCl reaction moderate.				13+50 N = 50 N = 60 REC	)/5"   LL=NP	
83.5	SANDY ELASTIC SILT, trace fine to medium shell fragments (15-20%), HCI reaction moderate.	МН	-30.7		5+7+ N =18 REC	3 LL=57	
87.0	SANDY FAT CLAY, wet, greenish gray and, trace fine to medium shell fragments (<5%), HCl reaction weak, (strongly cemented lense at 89.6 ft exhibits strong HCl reaction).	СН	34.2		8+10- N =28 REC	5   LL=68	
+	continued on next page						

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.

**TEST B-314** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA CH 92.0 -39.2 SILTY SAND, fine to medium grained, SM wet, greenish gray, trace fine to medium shell fragments (5-10%), HCl reaction moderate. w=36.4% 7+12+15 N =27 REC =18" greenish gray and white, trace fine to medium shell fragments (20-30%), trace organic matter, HCl reaction strong. w=31% 7+9+14 N =23 REC =18" 100.0 -100--47.2BOTTOM OF BORING @ 100.0 FT.

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

chnabel Schnabel Engineering

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-315 Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Bender Drilling Method: Mud Rotary Drilling Equipment: CME-550X (ATV) Schnabel Representative: K. Bell

Dates Started: 5/19/06 Finished: 5/22/06

**Location:** Northing: 217184.68 ft Easting: 960559.43 ft

Ground Surface Elevation: 65.5 (feet)

	Groundy	water Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	5/22		14.0'		

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	SAMPLING	TESTS	REMARKS
(FT)		OLAGO.	(FT)		DEPTH DATA	.2010	- CENTAL CO
0.8	ROOTMAT AND TOPSOIL.  POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, yellowish brown and orangeish brown, trace root fragments.  trace gravel.	SP-SM	64.7		1+1+1 N =2 REC =12" - \sqrt{3+4+4} N =8 REC =17"		
-					4+6+8 N =14 REC =17"		
-					6+6+7 N =13 REC =14"	w=5.6%	
10.0	SILTY SAND, fine to coarse grained, moist, yellowish brown and orangeish brown, trace gravel.	SM	55.5		-10- - 8+8+9 N =17 REC =16"		Description
-	fine to medium grained, wet, gray.			Δ	4+7+6 N =13 REC =15"	w=28.3%	Resumed drilling on 5/22/06 at 8:30am.
17.0	CLAYEY SAND, moist, gray, trace sand.	SC	- 48.5		4+7+8 N =15 REC =18"	w=28.3%	
- - -					REC =14"	w=23.3% LL=41 PL=11	
	continued on next page				<b>25 ■</b>		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-315 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** 40.5 25.0 PP=>4.5 tsf SILTY SAND, fine to medium grained, SM wet, gray and white, trace fine to coarse shell fragments (30-40%), HCl reaction moderate. w=27.6% 26+21+22 N =43 **REC =18"** -30 38+44+42 N =86 REC =14" -35 w=22.2% fine to coarse grained, light gray and 14+16+16 LL=NP white, with fine to coarse shell N =32 PL=NP fragments (60-70%), HCI reaction REC =14" strong. 23.5 42.0 SILTY SAND, fine to medium grained, SM moist, greenish gray and gray, trace organic matter. 3+4+4 N =8 REC =18" Rig chatter at 46.5 ft.  $\boxtimes$ strong cementation, HCI reaction 50 strong. REC =6" -50 53.5 12.0 w=25.6% SANDY SILT, light gray and white, trace ML5+7+8 LL=NP fine to coarse shell fragments (10-20%), N =15 PL=NP HCI reaction moderate. REC =17" -55

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

continued on next page

TEST Project: Calvert Cliffs Nuclear Power Plant B-315 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** ML trace fine to coarse shell fragments 6+8+8 (35-45%), HCI reaction strong. N =16 REC =16" Rig chatter at 61 ft. 63.5 2.0 w=29.4% POORLY GRADED SAND WITH SILT, SP-SM 5+5+9 LL=NP greenish gray, trace fine to medium N =14 PL=NP REC =15" shell fragments (5-10%), HCl reaction weak. 4+4+6 N = 10REC =18" 73.5 -8.0 w=36.3% SANDY FAT CLAY, trace fine to CH 4+5+6 LL=58 medium shell fragments (20-30%), HCI N = 11PL=18 reaction moderate, green. REC =20" 77.0 -11.5 SILTY SAND, fine to coarse grained, SM wet, light gray and white, trace fine to coarse shell fragments (20-30%), strong HCI reaction, cemented layer from 79' to 16+41+9 79.9 ft. N = 50REC =18" w=29.6% fine to medium grained, greenish gray, 7+10+10 LL=NP trace fine to medium shell fragments N = 20PL=NP (2-5%), HCl reaction weak. REC =19" -85 87.0 -21.5 SANDY ELASTIC SILT, wet, greenish МН gray and white, trace fine to medium shell fragments (20-30%), HCl reaction moderate. 6+7+13 N = 20REC =18" -90

# Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

2. \* = See Appendix I for additional lab testing data.

continued on next page

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

**TEST B-315** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA MH 92.0 -26.5 SILTY SAND, fine to medium grained, SM wet, greenish gray, trace fine to medium shell fragments (2-5%), HCl reaction weak. w=35.6% 5+7+11 N =18 REC =18" 7+11+12 N =23 REC =19" -34.5 -100-100.0 BOTTOM OF BORING @ 100.0 FT.

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

Schnabel Engineering

TEST BORING LOG

**Project:** Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Boring Number: B-316

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Reese

Drilling Method: Mud Rotary

Drilling Equipment: CME-75

Schnabel Representative: M. Arles

Dates Started: 5/3/06 Finished: 5/3/06

**Location:** Northing: 216767.16 ft Easting: 960864.35 ft

**Ground Surface Elevation:** 108.1 (feet)

	Date   Time   Depth   Casing   Caved							
	Date	Time	Depth	Casing	Caved			
Encountered	5/4		24.0'					

F									
[	EPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	SA DEPTH	MPLING DATA	TESTS	REMARKS
F	0.5	ROOTMAT AND TOPSOIL.		407.0			2+3+4		Auger
	0.5	POORLY GRADED SAND WITH CLAY, fine to medium grained, moist, brown, contains root fragments.	SP-SC	107.6		1    X	N =7 REC =18"		, age.
	2.5	SANDY LEAN CLAY, moist, brown.	CL	105.6		1    X	2+2+2 N =4 REC =16"	w=19.1% LL=35 PL=16 PP=2.00 tsf	changed to 3 7/8" roller bit
	- -					\	2+1+2 N =3 REC =11"		
	-	fine to coarse grained, moist, brown.				1    X	2+1+1 N =2 REC =10"	w=14.5% *	
	10.5	SILTY SAND, fine to medium grained, moist, yellowish brown.	SM	97.6			2+3+2 N =5 REC =12"		
3EL.GDT 3/6/08	13.5	POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, brownish orange.	SP-SM	94.6		1    X    -	6+8+8 N =16 REC =12"		
PT 300 & 400.GPJ SCHNAE	18.5	CLAYEY SAND, fine to coarse grained, moist, orangeish white.	SC	- 89.6		1    X    -	3+3+4 N =7 REC =12"		
TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08	23.5	POORLY GRADED SAND WITH SILT, fine to medium grained, wet, orangeish brown, .  continued on next page	SP-SM	- 84.6	Ā	  	3+4+5 N =9 REC =15"	w=20% LL=NP PL=NP	

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**B-316** Project: **Boring Number:** hnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SP-SM 3+5+3 brownish orange, 1" clay seam 1" clay seam N =8 REC =12" -30 w=20.1% 2+3+3 LL=43 N =6 PL=17 REC =18" -35 69.6 38.5 w=28.5% SANDY LEAN CLAY, moist, dark gray. CL 1+3+2 N =5 REC =18" w=28.6% REC =24" with sand. LL=44 PL=16 PP=2.00 tsf 48.5 59.6 w=38.0% SANDY ELASTIC SILT, moist, dark МН 3+4+4 PP=1.50 tsf N =8 gray, trace sand. REC =18" -50 53.5 54.6 w=26.2% LEAN CLAY, moist, dark gray, with CL REC =24" LL=33 sand. PL=11 -55 PP=3.25 tsf continued on next page

Calvert Cliffs Nuclear Power Plant

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

**TEST** 

Schnabel

**TEST** BORING LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

Schnab	el Engineering LOG						et: 3 of 4	
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL		AMPLING	TESTS	REMARKS
58.5	CLAYEY SAND, fine to medium	SC	49.6		DEPTH	<b>DATA</b> 5+5+6 N =11	w=24.4%	
_ - - -	grained, moist, dark gray.  greenish gray, trace cemented sand.				60-  \  	N = 11 REC = 18"	w=31.3%	changed to 2 15/16" roller b
- - - -						N =23 REC =17"	*	Harder drilling
68.5	SILTY SAND, fine to medium grained, moist, gray, with silt, trace fine to medium shell fragments, moderate HCI reaction.	SM	39.6			42+50/4" N =50/4" REC =10"	w=19.8% *	softer drilling
73.5	POORLY GRADED SAND, fine to medium grained, moist, gray, trace fine to medium shell fragments, trace clay, moderate HCl reaction.	SP	34.6			50/5.5" N =50/5.5" REC =6"	w=21.2% *	
- - - -	with fine to coarse shell fragments, strong HCl reaction.					50/2" N =50/2"		
- - - - -	with fine to coarse shell fragments, strong HCl reaction, 1" cemented sand frag.					50/3" N =50/3" REC =1"		Rig chatter
_	trace fine to medium shell fragments, moderate HCl reaction.					50/3" N =50/3" REC =1"		
1	continued on next page				Γ 1 Ι			

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.

**TEST B-316** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SP 93.5 14.6 w=32% CLAYEY SAND, fine to medium SC 5+5+7 Easier drilling grained, moist, grayish green, with silt, with fine to coarse shell fragments, moderate HCI reaction. N =12 REC =18" w=27.7% trace medium to coarse shell fragments, 6+5+8 weak HCl reaction. N =13 REC =18" -100-100.0 8.1 BOTTOM OF BORING @ 100.0 FT.

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

chnabel Schnabel Engineering

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Reese Drilling Method: Mud Rotary **Drilling Equipment: CME-75** Schnabel Representative: M. Arles Dates Started: 5/4/06 Finished: 5/8/06

**Location:** Northing: 217094.7 ft Easting: 961249.2 ft

Ground Surface Elevation: 94.4 (feet)

	Groundy	water Obs	ervations
1	1	1	1

	Groundy	valer Obs	ervations		
	Date	Time	Depth	Casing	Caved
Start of day	5/8		21.0'	4.5'	
	Start of day	Date	Date Time	Date Time Depth	

DEPTH (FT)	STRATA DESCRIPTION	CLASS	ELEV.	WL		SAMPLING	TESTS	REMARKS
(E-1)			(51)		DEPTH	1		Hollow stars
0.5	ROOTMAT AND TOPSOIL.	CD CC	93.9		\	2+2+2 N =4		Hollow stem auger
2.0	POORLY GRADED SAND WITH CLAY, trace fine gravel, fine to coarse grained, moist, brown, contains root fragments.	SP-SC	92.4			REC =12"		dagoi
-	CLAYEY SAND, fine to coarse grained, moist, orangeish brown.	SC				1+1+1 N =2 REC =12"		
4.5	POORLY GRADED SAND, with fine	SP	89.9		_			
-	gravel, medium to coarse grained, moist, orangeish brown.				5 -	1+2+3 N =5 REC =12"		
7.0	DOODLY CDADED CAND WITH OILT	SP-SM	87.4					
_	POORLY GRADED SAND WITH SILT, trace gravel, fine to coarse grained, moist, brownish orange.	3P-3IV				2+5+7 N =12 REC =14"		
9.5	OLANEN CAND with silifing to soone	00	84.9					
-	CLAYEY SAND, with siltfine to coarse grained, moist, brownish orange.	SC			10	4+5+6 N =11 REC =12"		
12.5	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, brownish orange.	SP-SM	81.9		 			
_					—15— 			
-					 			
-	fine to coarse grained, orange.				20	6+7+7 N =14 REC =12"		1" clay layer Finer sand
22.0	SANDY SILT, fine to medium, moist,	ML	72.4					
-	orange.					2+2+3	w=28.4%	
24.5			69.9		「	N =5	PP=1.25 tsf	
-	SANDY LEAN CLAY, fine to medium, continued on next page	CL			—25— <sup>[</sup>	REC =18"		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing dat.

**TEST B-317** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA PP=1.5, 1.2 CL moist, gray. tsf lean clay w=31.7% REC =24" dark gray. LL=27 PL=19 -30 PP=2.25 tsf 32.0 62.4 SANDY FAT CLAY, fine to medium, СН moist, dark gray, Pockets of more/less sand. w=30.2% 2+3+3 PP=1.25,1.0 N =6 tsf REC =18" -35 PP=3.50 tsf REC =24" dark gray, trace sand. PP=3.5,3.75 gray. 4+6+7 tsf N =13 REC =18" 47.0 47.4 SANDY LEAN CLAY, fine to medium CL grained, moist, grayish green. w=22.8% REC =22" LL=35 PL=17 -50 51.0 43.4 POORLY GRADED SAND WITH SILT, SP-SM contains cemented sand, fine to medium grained, moist, dark brownish orange.  $\boxtimes$ 50/4" N = 50/4" REC =1" -55 2 15/16" OD roller bit

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing dat.

continued on next page

TEST Project: Calvert Cliffs Nuclear Power Plant B-317 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SP-SM w=26% light orangeish brown. 16+12+50/4" N =62/10" REC =14" -60 61.0 33.4 CLAYEY SAND, fine to medium SC grained, moist, gray. 28+50/4" N = 50/4" REC =5" -65 trace shell fragments, contains cemented sand, shell frag fine to coarse size, moderate HCl reaction. 5+50/1" Harder drilling N =50/1" REC =4" w=22.3% wet, greenish white, with fine to coarse 8+50/5" N = 50/5" shell fragments, strong HCl reaction. **REC =11"** -75 77.0 17.4 SILTY SAND, fine to medium grained, SM moist, green, 15% medium to coarse shell frag, strong HCl reaction. 4+6+7 N = 13REC =18" contains cemented sand, 25% medium 9+10+13 to coarse shell frag, strong HCl reaction. N =23 **REC =18"** -85 87.0 7.4 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, moist, green, trace shell fragments, 5% f-m shell frag. 5+6+8 N =14 REC =18" -90

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing dat.

continued on next page

**TEST B-317** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG DEPTH **SAMPLING** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SP-SM 3+5+5 N =10 REC =18" 20-30% medium to coarse shell frag, 9+11+20 moderate HCl reaction. N =31 REC =18" 100.0 -100--5.6 BOTTOM OF BORING @ 100.0 FT.

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
 \* = See Appendix I for additional lab testing dat.



**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-318 Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 7

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings Drilling Method: Mud Rotary Drilling Equipment: CME-750 (ATV) Schnabel Representative: M. Arles Dates Started: 6/2/06 Finished: 6/5/06

**Location:** Northing: 217019.3 ft Easting: 961227.2 ft

**Ground Surface Elevation:** 97.8 (feet)

	Groundy	vater Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	6/2		20.0'	0.0'	
Start of day	6/3		0.0'	0.0'	
Start of day	6/4		31.0'	0.0'	
Start of day	6/5		31.0'	0.0'	
Start of day	6/5		28.0'	0.0'	

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	s	AMPLING	TESTS	REMARKS
(FT)	51151171 B 2501111 11011	02,100.	(FT)		DEPTH	DATA	12010	
0.5	CRUSHED STONE.	00.00	97.3		l M	5+5+8		
20	POORLY GRADED SAND WITH CLAY, fine to coarse grained, dry, brown.	SP-SC	05.0			N =13 REC =15"		
2.0	POORLY GRADED SAND, fine to coarse grained, moist, orange, trace gravel.	SP	95.8			5+6+5 N =11 REC =15"		
	yellowish orange				5 -	5+5+5 N =10 REC =12"		
7.0	POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, yellowish orange.	SP-SM	90.8			4+6+6 N =12 REC =12"		
_ _ _	with gravel, 1/8" orange layers with more silt.				-10-	5+7+8 N =15 REC =16"		
- - -					- - 15-	11+18+7 N =25 REC =14"		
18.0	FINE TO COARSE SANDY SILT, wet, orange.	ML	79.8	፟፟፟፟፟		5+6+7 N =13 REC =12"		
- - -	moist, mottled orange and gray.					2+1+1 N =2		
_	continued on next page				-25-V	REC =18"		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- Downhole Geophysical Testing Performed on 6/5/2006.
   \* = See Appendix I for additional lab testing data.

B-318 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 7 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA ML27.0 70.8 FINE TO MEDIUM SANDY LEAN CL CLAY, moist, dark gray. 2+2+3 N =5 **REC =18"** 33.0 64.8 FAT CLAY, moist, dark gray, with sand. СН 3+4+4 N =8 REC =18" -35 4+4+4 N =8 REC =18" 3" Clayey sand layer 4+8+9 N =17 REC =18" 7+8+12 N =20 REC =18" 50' Start of day 6/3 53.0 44.8 CLAYEY SAND, fine to medium SC grained, moist, dark gray. 5+8+9 N =17 REC =18" Cemented sand lenses 55-58' 57.0 40.8 POORLY GRADED SAND, fine to SP medium grained, moist, reddish orange, continued on next page

Calvert Cliffs Nuclear Power Plant

### Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

**TEST** 

Project:

- Downhole Geophysical Testing Performed on 6/5/2006.
   \* = See Appendix I for additional lab testing data.

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Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

Schnab	pel Engineering LOG						Sheet	3 of 7	
DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL			AMPLING	TESTS	REMARKS
(FT)			(FT)		DEPT	Н	DATA		
_	1/4" red lenses.	SP			60 	×	50/2" N =50/2" REC =2"		
63.0	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, gray.	SP-SM	34.8		  65-	×	50/2" N =50/2" REC =2"		
67.0	POORLY GRADED SAND, fine to medium grained, moist, gray, 1/8" and smaller clay lenses.	SP	30.8		 		50/5"		
- - -					70 70		N =50/5" REC =5"		
73.0	CLAYEY SAND, fine to medium grained, moist, gray, with silt, contains cemented sand, 80% cemented sand.	SC	24.8		 75-	$\boxtimes$	50/3" N =50/3" REC =2"		
77.0	SILTY SAND, fine to medium grained, moist, green and white, with fine to coarse shell fragments, strong HCI reaction, 60-70% shell frag.	SM	- 20.8		  - 80 -		15+8+15 N =23 REC =18"		
- - - -	green, 15-25% shell frag.				  85		5+8+12 N =20 REC =18"		
87.0	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, green, strong HCI reaction, 15-20% shell frag.	SP-SM	10.8		  - 90-		7+11+16 N =27 REC =18"		
1	continued on next page				<u> </u>				

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   Downhole Geophysical Testing Performed on 6/5/2006.
   \* = See Appendix I for additional lab testing data.

B-318 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 4 of 7 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SP-SM trace fine to coarse shell fragments, 6+10+12 moderate HCl reaction, 5-10% shell N =22 REC =18" frag. -95 97.0 0.8 SILTY SAND, fine to medium grained, SM moist, green, trace fine to medium shell fragments, moderate HCI reaction, 0-5% shell frag. 5+6+11 N =17 REC =18" -100 green and white, with fine to coarse 10+13+33 104' thicker shell fragments, strong HCI reaction, N =46 shell beds 75-80% shell frag. REC =18" 107.0 -9.2 SP-SM POORLY GRADED SAND WITH SILT, with fine to coarse shell fragments, , fine to medium grained, moist, green, strong HCI reaction, 50-60% shell frag. 13+22+30 N =52 REC =18" 7+12+19 25-35% shell frag. N =31 REC =18" 117.0 -19.2SILTY SAND, fine to medium grained, SM moist, green, with fine to coarse shell fragments, strong HCI reaction, 10-20% shell frag. 9+12+14 N =26 REC =18" -120 6+10+13 trace fine to coarse shell fragments, continued on next page

Calvert Cliffs Nuclear Power Plant

### Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

TEST

Project:

- 2. Downhole Geophysical Testing Performed on 6/5/2006.
- 3. \* = See Appendix I for additional lab testing data.

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Schnabel Engineering

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

Schnab	pel Engineering LOG						Sheet	5 of 7	
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL			MPLING	TESTS	REMARKS
(1 1)			(1 1)		DEPT		DATA		
	moderate HCl reaction, 0-5% shell frag.	SM				XII	N =23 REC =18"		
					125	<u>'</u>	INEC - 10		
4					<u> </u>				
1					ГТ				
4									
					L J	MI:	8+11+12		
						XII :	N =23 REC =18"		
-					130-	<u>'</u>	KLC - 10		
4					<u> </u>				
1					Γ 1				
4									
	with fine to coarse shell fragments, strong HCl reaction, 10-20% shell frag.				<u> </u>	M	8+10+12		
7	strong HCl reaction, 10-20% shell frag.				]	X    1	N =22 REC =18"		
$\dashv$					135-		NEO = 10		
4					<u> </u>				
1					1				
4									
	45-55% shell frag.				L	M	10+17+15		
						X    1	N =32 REC =18"		
-					140-	<u>'</u>	NLC - 10		
4					-				
]									
+					F 1				
4	trace fine to medium shell fragments, weak HCl reaction, 0-5% shell frag.				L 4	M:	5+7+10		
	weak HCl reaction, 0-5% shell trag.					Mi	N =17 REC =18"		
					145		0		
4									
					L J				
]									
+					F +				Shelby tube
4	contains shell fragments.				-		REC =3"		pushed
					150				150' Start of
					150-				day 6/4
4									
					<u> </u>				
4					r 1				
4					├ -	M	6+8+10 N =18		
_					155		N =18 REC =18"		
					135-				
+					+ +				
1			1		<u> </u>				
	continued on next page								

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   Downhole Geophysical Testing Performed on 6/5/2006.
   \* = See Appendix I for additional lab testing data.

**TEST B-318** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 6 of 7 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA 157.0 -59.2 FINE TO MEDIUM SANDY SILT, moist, MLgreen, trace fine to medium shell fragments, weak HCl reaction, 0-5% shell frag. 4+5+7 N =12 REC =18" 4+7+8 N =15 REC =18" 167.0 -69.2ELASTIC SILT, moist, green, trace MH sand. 6+7+12 N =19 REC =18" 4+8+13 with clay. N =21 -175 moist, green, with clay. 4+8+9 N = 17REC =18" 180 182.0 -84.2 LEAN CLAY, with silt, moist, green. CL 6+10+13 N =23 REC =18" **-185** 187.0 -89.2 ELASTIC SILT, moist, green. МН 4+5+10 N =15 REC =18" -190-

### Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. Downhole Geophysical Testing Performed on 6/5/2006. 3. \* = See Appendix I for additional lab testing data.

continued on next page

**TEST** Project: **B-318** Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 7 of 7 Schnabel Engineering LOG DEPTH (FT) **SAMPLING** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) DEPTH DATA МН 8+9+13 oliveish green, trace sand. N =22 REC =18" -195 5+6+9 with sand. N =15 REC =18" -200 200.0 --102.2 BOTTOM OF BORING @ 200.0 FT.

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   Downhole Geophysical Testing Performed on 6/5/2006.
   \* = See Appendix I for additional lab testing data.



Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-319 Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings Drilling Method: Mud Rotary Drilling Equipment: CME-750 (ATV) Schnabel Representative: K. Megginson Dates Started: 5/5/06 Finished: 5/8/06

**Location:** Northing: 216963.62 ft Easting: 961123.01 ft

Ground Surface Elevation: 102.9 (feet)

Date   Time   Depth   Casing   Caved												
	Date	Time	Depth	Casing	Caved							
Encountered	5/5		10.5'									
Start of day	5/8		26.0'									

DEPTH			ELEV.		SAMPLING		
(FT)	STRATA DESCRIPTION	CLASS.	(FT)	WL	DEPTH DATA	TESTS	REMARKS
0.3	ROOTMAT AND TOPSOIL.		102.6		3+4+2		
0.5		SP-SM	102.0		N =6		
1	POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, brown,				REC =12"		
4	contains clayey sand pockets.						
	, , ,				3+3+4	w=5.7%	
1					Γ	*	
4							
5.0	POORLY GRADED SAND, wet, brown	SP	97.9		├- 5 <del>-</del>		
_					L _  X   N =12		
+							
					5+5+8	w=4.7%	
7					X   N =13	LL=NP PL=NP	
+					REC =11"	*	
10.0			92.9		_10_		
10.0	POORLY GRADED SAND WITH SILT,	SP-SM	92.9	$\nabla$			
4	light yellowish brown and light grayish				M 6+6+7		
	brown				N =13 REC =10"		
1							
4							
					5+5+7	w=7.6%	
1						*	
_							
+							
7							
+							
	orangeish brown, trace fine gravel.				8+9+8		
	, , , , , , , , , , , , , , , , , , , ,				Γ		
_					REC =7"		
7					[		
4							
23.5			79.4		t <u> </u>		
23.5	CLAYEY SAND, trace gravel, yellowish	SC	19.4		5+3+2	w=19.8%	
24.8	brown, contains clayey sand lenses (<1/4 inch thick).		78.1		N =5 REC =15"		
24.0	continued on next page		10.1		-25-KEC -15		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

TEST Project: Calvert Cliffs Nuclear Power Plant B-319 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SANDY FAT CLAY, fine to medium, CH wet, light gray and dark brown. 75.9 27.0 CLAYEY SAND, fine to medium SC grained, wet, mottled yellowish brown and light gray (high percentage of w=24.5% fines). WOH/18" N = WOH/18" 29.5 73.4 SANDY LEAN CLAY, fine to medium, CL **REC =18"** -30 wet, gray, trace mica. \*Shelby tube sampler push w=29.2% from 33.5 to REC =24" LL=49 35.5 ft. PL=12 -35 PP=2.75 tsf 37.0 65.9 FAT CLAY, moist, gray, trace sand, and CH w=27.9% WOH+3+5 N =8 REC =18" \*Shelby tube sampler push w=32.1% REC =20" from 43.5 to LL=58 45.2 ft. PL=13 -45 PP=3.25 tsf w=38.6% light gray. 4+4+8 LL=79 N =12 PL=27 REC =18" -50 \*Shelby tube sampler push PP=4.25 tsf REC =4" from 53.5 to 54.3 ft. -55 57.0 45.9 FINE TO MEDIUM SILT, with sand, MLmoist, gray and dark greenish gray, continued on next page

### Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. Downhole Geophysical Testing Performed on 6/5/2006.
- 3. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-319 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** trace mica, contains indurated lean clay ML w=26.7% 7+10+17 LL=40 N =27 PL=32 REC =18" 40.9 62.0 SILTY SAND, fine to medium grained, SM moist, brown.  $\boxtimes$ 50/5" N = 50/5" REC =1" -65  $\bowtie$ 50/4" gray, trace mica. N =50/4" REC =1" w=17.5% wet, gray and light gray, mostly fine to coarse shell fragments (±80%), strong 31+36+50/3" N =86/9" \*\*Resumed HCl reaction, (shell fragments up to 1/2 **REC =13"** -75 drilling at 8:30 inch in size). AM on 5/8/06.  $\boxtimes$ 50/5" light gray, mostly strongly cemented sand (±>90%), weak HCl reaction. N = 50/5" REC =1" -80 \*Slight to moderate drill rig vibrations at 82 ft. w=18.2% light oliveish gray and light gray, few 32+43+50/3" fine to coarse shell fragments (±10%), N =93/9" \*Moderately moderate HCI reaction, strong **REC =11"** difficult drilling -85 cementation. below 85 ft. w=29.8% 6+6+9 PP=0.25 tsf N =15

REC =18"

-90

### Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. Downhole Geophysical Testing Performed on 6/5/2006.

continued on next page

3. \* = See Appendix I for additional lab testing data.

**TEST B-319** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SM 6+7+11 N =18 REC =18" moderate HCI reaction. w=30% 6+7+11 LL=NP N =18 PL=NP REC =18" -100-100.0 2.9 BOTTOM OF BORING @ 100.0 FT.

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.



Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-320 Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 5

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Reese Drilling Method: Mud Rotary Drilling Equipment: CME-75 (Truck) Schnabel Representative: M. Arles Dates Started: 5/8/06 Finished: 5/8/06

**Location:** Northing: 216943.5 ft Easting: 961044.1 ft

**Ground Surface Elevation:** 106.4 (feet)

	Ground	water Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	5/8		28.0'	3.5'	
Start of day	5/9		11.3'	3.5'	

DEPTH	OTD 1 T 1 DE CONTROL	01.55	ELEV.		S	AMPLING		DEL D
(FT)	STRATA DESCRIPTION	CLASS.	(FT)	WL	DEPTH	DATA	TESTS	REMARKS
0.5	ROOTMAT AND TOPSOIL.		105.9			1+2+2		
0.5	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, brown, contains root fragments.	SP-SM	105.9		<u> </u> 	N =4 REC =18"		
_	no observable root fragments.					2+3+3 N =6 REC =18"	w=10.4%	
4.5	CLAYEY SAND, fine to coarse grained,	SC	101.9		_			
	moist, brownish orange, with fine gravel.				- 5 - 	3+3+5 N =8 REC =16"		
7.0	POORLY GRADED SAND, fine to	SP	99.4					
_	coarse grained, moist, brownish orange.					5+6+7 N =13 REC =13"	w=6.3%	
-	with gravel.				—10— ∏	5+7+8		
-						N =15 REC =14"		
-	reddish orange.				  15-	6+8+7 N =15 REC =12"		
-								
- - -	orange.					10+12+10 N =22 REC =14"	w=9.1%	
-					 	0.44.44		
-	orangeish white.					8+14+11 N =25 REC =15"		
-	continued on next page				<b>−25</b> −  <u>└</u>	1120 - 13		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-320 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SP 27.0 79.4 SP-SM POORLY GRADED SAND WITH SILT, fine to coarse grained, wet, orange.  $\overline{\Delta}$ 7+5+4 N =9 29.5 76.9 SILTY SAND, fine to medium grained, SM **REC =18"** -30 wet, orange. 32.0 74.4 CLAYEY SAND, moist, dark gray. SC w=26.1% WOH+1+2 LL=33 N = 3PL=18 -35 w=29.4% REC =24" with sand. LL=36 PL=16 PP=1.50 tsf 42.0 64.4 SANDY FAT CLAY, moist, dark gray, CH with sand. w=30% 2+2+3 LL=56 N =5 PL=19 REC =18" fine to medium grained, moist, dark gray. w=34.4% REC =18" LL=59 PL=19 -50 trace sand. w=34.9% 5+6+7 LL=69 N =13 PL=24 REC =18" 57.0 49.4 SILTY SAND, fine to medium grained, SM moist, greenish gray. continued on next page

### Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-320 **Boring Number:** hnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SM 5+7+7 N =14 REC =18" 62.0 44.4 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, moist, reddish gray, contains snail shell fragments. 13+24+20 64 0 42.4 POORLY GRADED SAND, fine to SP N = 4464.5 41.9 REC =18" medium grained, moist, orangeish red, SP-SM trace silt, 10% fine to medium shell fragments. POORLY GRADED SAND, fine to 67.0 medium grained, moist, greenish gray, 39.4 SM SILTY SAND, fine to medium grained, moist, brownish yellow.  $\bowtie$ 50/3" N =50/3" REC =2" w=18.8% 35+50/2" grayish green, contains cemented sand, 30-40% fine to medium shell fragments, N = 50/2"HCI+. REC =8" -75 50/2" 5% fine to medium shell fragments. N = 50/2"REC =2" 50/1" N = 50/1" REC =0" -85 87.0 19.4 CLAYEY SAND, fine to medium SC grained, moist, gray, 50% cemented sand. 50/2" N = 50/2"REC =0" -90 continued on next page

### Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

Schnabel

**TEST** BORING LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

	el Engineering LOG					SAMPLING TEXTS	
DEPTH (FT)	STRATA DESCRIPTION	CLASS. ELEV. (FT) WL			l .	LING TES	TS REMARKS
+		SC			DEFIR	DATA	
92.0	SILTY SAND, fine to medium grained, moist, green, trace silt, with 10-20% fine to coarse shell fragments, HCI+.	SM	14.4		X   N =2	0+12 w=25. 22 * ==18"	4%
	fine to medium grained.				6+6- N = 1 REC	+9 5 :=18"	
- - - - -	fine to medium grained, moist, dark green, with silt.				3+5- 3+5- N = 1 REC	w=29. 0 ==18"	2%
- - - -	20-30% fine to coarse shell fragments, HCl+ below 109.7.				4+5- 4+5- N =1 REC	+5 0 : =18"	
112.0	SANDY LEAN CLAY, fine to medium grained, wet, dark green and white, contains cemented sand, 25-35% fine to coarse shell fragments, HCl+.	CL	-5.6		20+/ N = 3 REC	18+14	14
119.5	20-30% fine to coarse shell fragments.  SILTY SAND, fine to medium grained, moist, dark green, 0-5% fine to medium shell fragments.	SM	13.1		X   N =2	14+14 28 : =18"	
-	continued on next page					+12	

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant Schnabel BORING Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

Schnab	el Engineering LOG		,,	,				5 of 5	0120048
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	DEPT		AMPLING DATA	TESTS	REMARKS
124.5	ELASTIC SILT, fine to medium grained, moist, green, with silt, 25-35% fine to coarse shell fragments, HCI+.	МН	-18.1			M	N =19 REC =18"		
- - -	dark green.				 130-	X	7+8+10 N =18 REC =18"	w=34.1% LL=50 PL=30 *	
132.0	CLAYEY SAND, fine to medium grained, moist, dark green.	SC	25.6				7+7+9		
_					 135- 	X	N =16 REC =18"		
137.0	SILTY SAND, fine to medium grained, moist, dark green, 0-10% fine to medium shell fragments.	SM	-30.6		  -140-	X	4+6+8 N =14 REC =18"		
- - -					  -145-	X	5+6+6 N =12 REC =18"		
150.0	10-30% fine to coarse shell fragments.  BOTTOM OF BORING @ 150.0 FT.		43.6		  -150-	X	5+7+7 N =14 REC =18"	w=37% *	

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.



**Project:** Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Boring Number: B-321

Contract Number: 06120048 Sheet: 1 of 5

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Bender

Drilling Method: Mud Rotary

Drilling Equipment: CME-550

Schnabel Representative: K. Bell

Dates Started: 6/5/06 Finished: 6/6/06

**Location:** Northing: 217152.5 ft Easting: 960333.2 ft

**Ground Surface Elevation:** 70.7 (feet)

	Ground	water Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	6/5		13.5'		
Start of day	6/6		15.0'		

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	SAMPLING		TESTS	REMARKS
(FT)		OLAGO.	(FT)	***	DEPTH	DATA	12010	KLINAKK
0.5	ROOTMAT AND TOPSOIL.  CLAYEY SAND, trace gravel, fine to medium grained, moist, yellowish	SC	70.2		<del> </del>	1+2+2 N =4 REC =12"		
	brown, trace wood fragments, trace root fragments.					3+3+4 N =7 REC =17"	w=9.7% *	
4.5	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, orangeish brown, trace root fragments.	SP-SM	66.2		5 -	7+7+8 N =15 REC =18"	w=7.4%	
7.0	SANDY LEAN CLAY, moist, orangeish brown and gray, trace root fragments.	CL	63.7			3+2+2 N =4 REC =18"	w=25.2%	
10.0	SANDY FAT CLAY, moist, orangeish brown and gray.	CH	60.7		10- 	1+1+2 N =3 REC =18"	w=36.2% LL=55 PL=20 *	
13.0	CLAYEY SAND, fine to medium grained, wet, gray.	SC	57.7	⊻		1+2+3 N =5 REC =18"	w=30% *	
- - - -						2+4+7 N =11 REC =18"	w=29.7% *	
23.5	LEAN CLAY, moist, gray	CL	47.2		  25	REC =18"	w=26.2% LL=45 PL=18	
	continued on next page				23			

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-321 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** PP=3.50 tsf CL 27.0 43.7 SILTY SAND, wet, gray. SM w=27% 3+4+7 LL=47 N =11 PL=29 **REC =18"** -30 33.0 37.7 POORLY GRADED SAND WITH SILT, SP-SM w=30.9% fine to coarse grained, wet, gray, strong 39+50/3" N =50/3" cementation, platty structure. REC =10" -35 w=27.1% white, with fine to coarse shell 15+17+31 fragments, 50-60%, HCI reaction N =48 strong. **REC =16"** w=26% 9+9+7 N =16 REC =18" 47.0 23.7 ELASTIC SILT with sand, gray, trace MH fine to medium shell fragments, 2-5%, HCl reaction weak X 4+4 N =4 w=35.1% -50 52.0 18.7 SILTY SAND, fine to medium grained, SM wet, light gray and greenish gray, contains fine to coarse shell fragments, w=25% 20-30%, HCl reaction strong, weak 30+11+10 LL=NP cementation. N =21 PL=NP REC =18" -55 fine to medium grained, wet, greenish gray, trace fine to coarse shell

### Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

continued on next page

Schnabel

**TEST** BORING LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

Schnab	el Engineering LOG						et: 3 of 5	
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	l .	AMPLING	TESTS	REMARKS
,	fragmants 5 400/ LICI regetion	CM	(,		DEPTH	DATA		
-  -	fragments, 5-10%, HCl reaction moderate.	SM			I II X II	4+4+6 N =10 REC =18"	w=27.4%	
-	gray and white, trace fine to coarse shell fragments, 20-30%, HCI react strong, strong cementation.	ion			I II X II	8+9+14 N =23 REC =18"	w=27.6% *	
-	trace fine to medium shell fragments 2-5%, HCl reaction weak.	5,			I II X II	4+7+9 N =16 REC =18"	w=28.4%	
-						REC =24"	w=28.5% LL=NP PL=NP PP=3.75 tsf	
- - - -					I II X II	4+6+12 N =18 REC =18"	w=34.9%	
-	fine to medium grained, wet, light g and white, contains fine to medium stragments, 20-30%, HCl reaction strong, strong cementation.	ray shell			I II X II	22+16+9 N =25 REC =17"	w=20.6%	
-	fine to medium grained, wet, gray, tr fine to medium shell fragments, 2-56 HCl reaction weak.	race %,			I II X II	6+12+18 N =30 REC =18"	w=31% *	
4	continued on next page				- I			

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 4 of 5

Schnab	el Engineering LOG		1		1	Sheet	: 4 of 5	I
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	DEPTH	SAMPLING DATA	TESTS	REMARKS
92.0	CLAYEY SAND, wet, gray, trace fine to medium shell fragments, 2-5%, HCl reaction weak.	SM SC	21.3			4+8+12 N =20 REC =18"	w=36.9% LL=59 PL=26	
97.0	SILTY SAND, wet, greenish gray.	SM	26.3		100	4+9+13 N =22 REC =18"	w=36.1%	
- - - -	Remarks 105 ft:Resumed Drilling on 6/6/06 @ 7:15 am				-105	7+10+13 N =23 REC =17"	w=58.2%	Resumed Drilling on 6/6/06 @ 7:15 am
- - - -						5+7+11 N =18 REC =18"	w=42.6%	
- - - -					- - -115	5+4+9 N =13 REC =18"	w=34.6%	
- - - -					-120	5+8+13 N =21 REC =18"	w=39.8%	
-	continued on next page					6+9+15	w=43.1%	

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

	el Engineering LOG					'	: 5 of 5		
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	l .	AMPLING	TESTS	REMARKS	
,		SM	(- ',		DEPTH	DATA N =24	*		
125.0			-54.3		_ <sub>125</sub>	REC =18"			
123.0	SANDY ELASTIC SILT, wet, greenish gray, trace fine to medium shell fragments, 5-10%, HCl reaction	MH	-54.5		123				
-	gray, trace fine to medium shell fragments, 5-10%. HCl reaction				F 1				
	moderate								
+					F 1				
					L 1M	8+11+15	w=49.5%		
					l IXI	N =26 REC =17"			
-					<del>-</del> 130-	KLC - II			
4					<b>├</b>				
1									
4									
						5+7+11	w=42.3%		
1						N =18	*		
-					<del>-</del> 135	REC =18"			
1	ELASTIC SILT, moist, greenish gray,				h 1				
4	trace sand				L 4 1				
						6+7+11	w=39.7%		
1						N =18	*		
-					<u> </u>	REC =18"			
					LJ				
+					h				
4					L 4 1				
						7+10+14	w=60.2%		
1						N =24	*		
-					-145-L	REC =18"			
7									
+					+ +				
						7+12+15	w=66%		
1						N =27	*		
150.0	DOTTOM OF DODING @ 450.0 57		-79.3		150-	REC =18"			
	BOTTOM OF BORING @ 150.0 FT.								
		1	1		1 1		1		

Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
 \* = See Appendix I for additional lab testing data.

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Schnabel Engineering

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings Drilling Method: Mud Rotary Drilling Equipment: CME-750 (ATV) Schnabel Representative: K. Megginson Dates Started: 5/18/06 Finished: 5/18/06

**Location:** Northing: 217170.03 ft Easting: 960202.65 ft

**Ground Surface Elevation:** 89.9 (feet)

	Groundy	vater Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	5/18		10.5'		

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	s	AMPLING	TESTS	REMARKS
(FT)		5 100.	(FT)		DEPTH	DATA	3. 3	
0.4	Forest litter, rootmat and topsoil.	SM	89.5		l M	1+2+2		
4	SILTY SAND, fine to medium grained,	SIVI			Ň	N =4 REC =14"		
	moist, brown.					INCO - 14		
1								
4					⊦ -lM	3+3+4 N =7		
					l M	REC =13"		
7								
$\dashv$	stratified brown and light brown				<u> </u>	3+3+4	*	
	Stratified brown and light brown				L JIXI	N =7		
7						REC =10"		
7.0	CLAYEY SAND, fine to coarse grained,	SC	82.9		<del> </del>			
	moist, brown, contains fat clay pockets.				L JM	2+4+4		
					X	N =8		
+					$\vdash \dashv \sqcup$	REC =12"		
9.5	SILTY SAND, fine to medium grained,	SM	80.4		-10-			
	wet, dark yellowish brown, contains lean			$\overline{\Delta}$	'0  _	5.0.40		
+	clay lenses (<1/8 inch).				├   Y	5+8+10 N =18		
						REC =15"		
4					F 1			
	dark yellowish brown and yellowish				L JM	4+4+5		
	brown.				l IXI	N =9 REC =13"		
-					-15- <sup>[]</sup>	KLC -13		
4					L			
17.0	CLAYEY SAND, fine to medium	SC	72.9		F 1			
4	grained, wet, mottled dark yellowish				L -			
	brown and light gray.					WOH/18"		
1						N = WOH/18"		
_					L20-L	REC =18"		
7					Γ 1			
22.0	SANDY LEAN CLAY, fine to medium,	CL	67.9		<b>├</b>			
	moist, gray, trace mica.	OL						
7	- •							
4					├ - M	2+2+4 N =6		
					25	REC =18"		
	continued on next page	1			25   -			

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-322 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA CL \*Shelby tube sampler push PP=2.75 tsf from 28.5 to REC =28" with fine to medium sand. 30.5 ft. -30 32.0 57.9 FAT CLAY, moist, light greenish gray СН and gray, trace fine to medium sand and mica, contains silty sand lenses. 2+3+5 N =8 REC =18" -35 37.0 52.9 SILTY SAND, fine to medium grained, SM \*Shelby tube wet, gray. sampler push PP=NP tsf REC =27" 38.5 from 39.9 47.9 42.0 ELASTIC SILT, moist, light greenish MH gray, trace fine sand, and mica. PP=3.50 tsf 5+7+9 N =16 REC =18" 47.0 42.9 CLAYEY SAND, fine to medium SC grained, moist, gray, trace mica. \*Shelby tube sampler push PP=NP tsf REC =10" from 48.5 to 49.3 ft. -50 37.9 52.0 SANDY SILT, fine to medium, moist, ML \*Switched to gray, trace mica. 3-7/8" O.D. Tri-cone roller 19+34+50/5" bit below 53.5 N =84/11" REC =17" -55 \*Sampler

32.9

SM

refusal at 54.9 ft. \*Difficult to very difficult rotary

advacement

### Comments:

57.0

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

SILTY SAND, fine to medium grained,

wet, gray, trace fine to medium shell continued on next page

TEST Project: Calvert Cliffs Nuclear Power Plant B-322 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** from 55.5 to 56 fragments (±5%), contains black SM particles (1/16 inch), strong HCl reaction 31+50 \*Moderate to (strong HCl reaction with shell N =50 difficult rotary fragments only). REC =10" -60 advancement below 57 ft. 62.0 27.9 LEAN CLAY, moist, gray, trace fine to CL medium sand, and mica, weak HCI reaction. 6+7+9 N =16 REC =18" with fine to medium sand. 3+4+6 N = 10REC =18" \*Moderate to difficult rotary advancement 72.0 17.9 below 72 ft CLAYEY SAND, fine to medium SC (moderate to grained, moist, greenish gray, trace fine strong rig to coarse shell fragments (±5%), chatter). contains indurated clayey sand layers  $\boxtimes$ 50/5" \*Very difficult from 73.5 to 73.8 ft, strong HCl reaction. N = 50/5" rotary contains strongly cemented sand layer from 73.8 to 74 ft. REC =5" advancement -75 from 75 to 76 ft (strong rig chatter). \*Moderately difficult rotary advancement from 76 to 78 ft. 78.5 11.4 \*Very difficult SILTY SAND, fine to medium grained, SM 7+9+11 rotary wet, gray, few fine to coarse shell N = 20fragments (±10%), strong HCl reaction. REC =18" advancement from 78 to 78.5 ft (strong rig chatter). dark greenish gray, little fine to coarse 12+13+13 shell fragments (±20%), moderate HCI N =26 **REC =18"** reaction. -85

7+11+14

N =25 REC =18"

-90

### Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

reaction.

light greenish gray, trace fine to medium shell fragments (±5%), weak HCl

continued on next page

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**TEST** BORING LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

Schnab	el Engineering LOG		1	1			•	4 of 4	
DEPTH (FT)	STRATA DESCRIPTION	ON CLASS.	ELEV. (FT)	WL			MPLING	TESTS	REMARKS
()		SM	()		DEPTI	H	DATA		
92.0			-2.1						
52.6	CLAYEY SAND, fine to mediu	m SC weak							
1	grained, wet, gray, trace mica, HCl reaction.	Wount			Ι 1,	_			
4					F -1	M	5+7+14 N =21		
					-95-V	∐∣i	REC =18"		
1					1				
4									
					L				
	blueish gray and gray trace fir	ne to					1+5+11		
1	blueish gray and gray, trace fir coarse shell fragments (±5%).				Γ 1	<u>1</u>   X	4+5+11 N =16		
100.0	BOTTOM OF BORING @ 100		-10.1		-100-l	<u>/</u>    F	REC =18"		
	20110M OF BORNIO W 100								
	2'								

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.



Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048 Sheet: 1 of 7

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings Drilling Method: Mud Rotary Drilling Equipment: CME-750 (ATV) Schnabel Representative: M. Arles Dates Started: 6/7/06 Finished: 6/14/06

**Location:** Northing: 217027.97 ft Easting: 960060.86 ft

**Ground Surface Elevation:** 107.5 (feet)

	Groundy	vater Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	6/7		18.5'	0.0'	
Start of Day	6/8		0.0'	0.0'	
Start of day	6/12		20.0'	0.0'	
Start of Day	6/13		0.0'	0.0'	

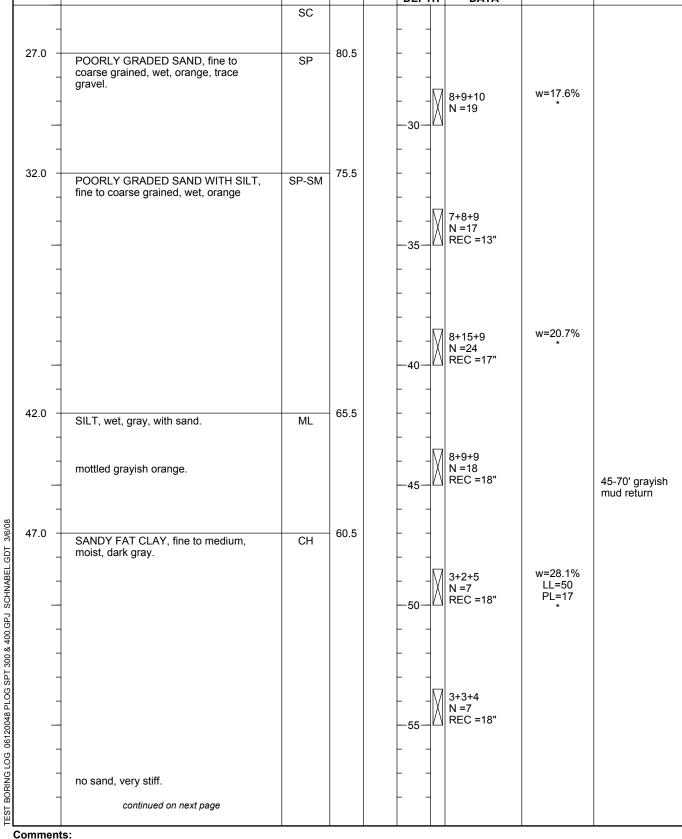
DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	SA	AMPLING	TESTS	REMARKS
(FT)			(FT)		DEPTH	DATA		
	POORLY GRADED SAND, fine grained, moist, orange.	SP			L ⊿IXII	1+1+3 N =4 REC =16"		0-4' drag bit
-	fine to coarse, with gravel.					3+3+6 N =9 REC =13"	w=5%	
4.5	POORLY GRADED SAND WITH SILT, moist, orange	SP-SM	103.0		I II X II	7+9+8 N =17 REC =12"		
-						9+11+10 N =21 REC =14"	w=13% *	
10.0 -	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, yellow.	SP-SM	97.5		I IIXII	7+9+11 N =20 REC =15"		
- - -						6+9+9 N =18	w=16.2%	15-45' orango mud return
17.0	SILTY SAND, fine to coarse grained, wet, orange and brown, with silt, 1/8"	SM	90.5					
-	color lenses.			Ā		10+20+20 N =40 REC =17"	w=11.9% LL=NP PL=NP *	
22.0	CLAYEY SAND, fine to coarse grained, wet, orange and red, 1/4" pink clay	SC	85.5					
-	lenses.					2+2+2 N =4		
-	continued on next page				<u> </u>	REC =16"		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

- 2. Downhole Geophysical Testing Performed on 6/14/2006
  3. \* = See Appendix I for additional lab testing data.
  4. Ground water observation well OW-323 installed at nearby location.

**TEST** Project: Calvert Cliffs Nuclear Power Plant chnabel **BORING** Calvert County, Maryland Schnabel Engineering LOG Sheet: 2 of 7 ELEV. **SAMPLING DEPTH** STRATA DESCRIPTION CLASS. WL (FT) (FT) **DEPTH** 

**B-323 Boring Number:** Contract Number: 06120048 **TESTS REMARKS** DATA w=17.6%



- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

- 2. Downhole Geophysical Testing Performed on 6/14/2006
  3. \* = See Appendix I for additional lab testing data.
  4. Ground water observation well OW-323 installed at nearby location.

TEST Project: Calvert Cliffs Nuclear Power Plant chnabel **BORING** Calvert County, Maryland Schnabel Engineering LOG Sheet: 3 of 7 **SAMPLING** ELEV. STRATA DESCRIPTION CLASS. WL

B-323 **Boring Number:** Contract Number: 06120048 **DEPTH TESTS REMARKS** (FT) (FT) **DEPTH DATA** CH w=35.1% 1+4+6 LL=65 N =10 PL=22 REC =18" with sand. 6+10+12 N =22 REC =18" 67.0 40.5 CLAYEY SAND, fine to medium SC grained, moist, green. w=29% 8+12+12 LL=46 N =24 PL=24 70' greenish mud return REC =18" 71' harder 71.0 36.5 POORLY GRADED SAND WITH SILT, SP-SM drilling fine to coarse grained, moist, dark green, with fine to coarse shell fragments, strong HCl reaction. 34+50/3" N = 50/3" REC =6" -75 77.0 30.5 FINE TO MEDIUM SANDY LEAN CL CLAY, moist, green, with fine to coarse shell fragments, strong HCI reaction, 60-70% shell frag. 5+5+7 N = 12FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08 REC =18" trace sand, no shells. moist, green, contains fine to coarse shell fragments, moderate HCI reaction. w=36.2% REC =16" LL=42 PL=20 -85

19.5

30+33+15

REC =18"

N = 48

-90

SM

### Comments:

0.88

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. Downhole Geophysical Testing Performed on 6/14/2006

SILTY SAND, fine to medium grained,

moist, green, with fine to coarse shell

fragments, strong HCI reaction, 50-60%

continued on next page

3. \* = See Appendix I for additional lab testing data.

shell frag

4. Ground water observation well OW-323 installed at nearby location.

Schnabel

**TEST** BORING

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

Schnab	el Engineering LOG					Sheet: 4 of 7	
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	SAMPLI DEPTH D	NG TESTS	REMARKS
-		SM			24+16 N =49 REC =	w=26.3% LL=NP	
- - - -	30-40% shell frag.				4+8+1 N =19 REC =		
102.0 +	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, green, with fine to coarse shell fragments, strong HCI reaction, 20-30% shell frag.	SP-SM	5.5		8+12+ N =26 REC =	LL=NP	
107.0 +	SILTY SAND, fine to medium grained, moist, green, trace fine to medium shell fragments, moderate HCl reaction, 0-5% shell frag.	SM	0.5		3+6+9 N =15 REC =		110' more sandy drilling
- - - -					4+7+1 N =19 REC =	2 w=30.2% *18"	116' hard lay shells
- - - - -	with fine to coarse shell fragments, strong HCI reaction, 70-80% shell frag.				50/5" N =50 -120- REC =	/5" =5"	118.5 switch roller bit 118.5 rig chatter
-	continued on next page				 N 10+50	w=19.4%	

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   Downhole Geophysical Testing Performed on 6/14/2006
   \* = See Appendix I for additional lab testing data.
   Ground water observation well OW-323 installed at nearby location.

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048 Sheet: 5 of 7

	pel Engineering LOG						5 of 7	
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	l .	MPLING	TESTS	REMARKS
( . ,		CM4	(,		DEPTH	DATA I =50/5"	*	
		SM				REC =11"		125' start of d 6/8/06
- - - -	trace fine to coarse shell fragments, moderate HCl reaction, 0-10% shell frag.				X   N	+15+25 I =40 REC =18"		
- - - -	with fine to coarse shell fragments, strong HCl reaction, 10-20% shell frag.				X   N	+12+15 I =27 REC =18"	w=33.1% *	
138.0	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, green, trace fine to medium shell fragments, weak HCl reaction, 0-5% shell frag.	SP-SM	-30.5		X   N	+9+20 I =29 REC =18"		
142.0	SANDY ELASTIC SILT, fine to medium grained, moist, green, trace fine to medium shell fragments, weak HCl reaction, 0-5% shell frag.	МН	34.5		X   N	+10+13 I =23 REC =18"	w=48.3% LL=73 PL=38 *	144.5 switch drag bit
- - - -					X   N	0+12+15 I =27 REC =18"		
153.0	SILT with sand, fine to medium grained, moist, green, with fine to coarse shell fragments, strong HCl reaction, 60-70% shell frag.	ML	45.5			1+17+27 I =44 REC =18"	w=31.3% LL=39 PL=30 *	
			1		1 1 1			

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   Downhole Geophysical Testing Performed on 6/14/2006
   \* = See Appendix I for additional lab testing data.
   Ground water observation well OW-323 installed at nearby location.

TEST Project: Calvert Cliffs Nuclear Power Plant B-323 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 6 of 7 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** MLtrace fine to coarse shell fragments, 6+10+12 0-10% shell frag. N =22 REC =18" -160 163.0 -55.5 FINE TO MEDIUM SANDY ELASTIC MH w=54.2% SILT, moist, green. 7+12+16 N =28 REC =18" 167.0 -59.5 SILTY SAND, fine to medium grained, SM moist, green, with fine to coarse shell fragments, strong HCI reaction, 10-20% shell frag. 7+8+13 N =21 REC =18" 172.0 -64.5 SANDY FAT CLAY, moist, green, with CH sand, moderate HCl reaction. w=44% 6+8+13 LL=97 N =21 PL=31 -175 REC =0" 179.2 -71.7 SAND, fine to coarse grained, moist, SP-SM 180' Start of grayish green, with silt. 180 day 6/12/06 182.0 -74.5 FAT CLAY, trace sand, moist, green. СН w=68.3% 8+11+16 LL=124 N =27 PL=33 REC =18" **-185** 7+11+12

> N =23 REC =18"

-190-

### Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. Downhole Geophysical Testing Performed on 6/14/2006
- 3. \* = See Appendix I for additional lab testing data.
- 4. Ground water observation well OW-323 installed at nearby location.

continued on next page

Schnabel TEST BORING

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

Schnab	pel Engineering LOG	Calvert Cou	inty, ivia				Sheet	act Number: 06 : 7 of 7	5120048
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL			AMPLING	TESTS	REMARKS
		СН	(/		DEPT	Ή	DATA		
-									
-					_		7,44,44	w=58.1%	
95.0			-87.5		 -195-	X	7+11+14 N =25 REC =18"	LL=116 PL=36	
_	SANDY ELASTIC SILT, trace fine to medium shell fragments, 0-5% shell frag.	MH							
						$\bigvee$	7+11+12 N =23 REC =18"	w=52.9% LL=97 PL=62	
0.00	BOTTOM OF BORING @ 200.0 FT.		-92.5		-200-	٦		*	

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   Downhole Geophysical Testing Performed on 6/14/2006
   \* = See Appendix I for additional lab testing data.
   Ground water observation well OW-323 installed at nearby location.



Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: W. Wolfe Drilling Method: Mud Rotary Drilling Equipment: CME-550 (ATV) Schnabel Representative: K. Bell

Dates Started: 7/12/06 Finished: 7/14/06

**Location:** Northing: 216906.4 ft Easting: 960114.44 ft

**Ground Surface Elevation:** 105.2 (feet)

Groundwater Observations											
Date Time Depth Casing Caved											
Encountered	7/13		27.0'								
Start of Day	7/14		25.0'								

EPTH (ET)	STRATA DESCRIPTION	CLASS.	ELEV.	WL	S	AMPLING	TESTS	REMARKS
(FT)			(FT)		DEPTH	DATA		
0.6	ROOTMAT AND TOPSOIL.  POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, yellowish	SP-SM	104.6			1+2+1 N =3		
-	brown, trace gravel.					REC =10" 2+2+2		
	yellowish brown and reddish brown					N =4 REC =13"		
					- 5 -	2+2+3 N =5 REC =12"		
_						3+4+4 N =8 REC =15"		
12.0			93.2		10	1+1+3 N =4 REC =11"		
-	SILTY SAND, fine to coarse grained, moist, orangeish brown, trace gravel.	SM	30.2			4+4+5 N =9 REC =16"		
17.0			88.2		15	3+4+5 N =9 REC =16"		
	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, yellowish brown and orangeish brown, trace gravel.	SP-SM				5+7+7 N =14 REC =10"		
19.5	SILTY SAND, fine to coarse grained, moist, orangeish brown and yellowish brown, trace gravel.	SM	85.7		20-	3+4+7 N =11 REC =15"		
22.0	CLAYEY SAND, fine to medium grained, wet, orangeish brown and reddish brown.	SC	83.2			5+4+5 N =9 REC =9"		
_	continued on next page				-25			

### Comments:

2. \* = See Appendix I for additional lab testing data.

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

SC	hnabel
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Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048 Sheet: 2 of 4

DEPTH	PTH STRATA DESCRIPTION CLASS ELEV. WI SAMPLING			AMPLING	TESTS DEA			
(FT)	STRATA DESCRIPTION	CLASS.	(FT)	WL	DEPTH	DATA	TESTS	REMARKS
		SC				3+2+2		
_						N =4		
				$\Box$		REC =10"		Resumed
-	Remarks			$\bar{\Delta}$				drilling on 7-13-06 @ 7:0
	27 ft:Resumed drilling on 7-13-06 @					2+2+3		am
1	7:00 am					N =5		
4					$\vdash \dashv \sqcup$	REC =11"		
30.0	POORLY GRADED SAND WITH SILT,	SP-SM	75.2		-30-	3+4+5		
_	fine to medium grained, wet, orangeish					N =9		
	brown.					REC =7"		
-								
					L JM	4+6+7		
						N =13		
4					누 귀의	REC =10"		
34.5	CLAYEY SAND, fine to coarse grained,	SC	70.7		05			
$\dashv$	wet, orangeish brown and yellowish				-35-	6+6+10		
_	brown.				L JIXII	N =16		
						REC =12"		
- 1								
	orangeish brown and reddish brown,				L JM	3+5+7		
38.5	trace gravel		66.7		X	N =12		
- 4	SANDY FAT CLAY, moist, orangeish	CH			누  띡	REC =18"		
	brown and reddish brown, iron staining,				40			
	strong cementation.				<del>-40</del>	1+2+3		
_	_gray				├ -  X	N =5		
						REC =18"		
1								
_					L JM	2+2+3		
					l IXI	N =5 REC =18"		
-					├ <b>┤</b> └┤	REC = 10		
					-45-J			
					43  M	2+2+3		
-					├ -   <u>`</u>	N =5 REC =18"		
						REC = 10		
1					r 1 <u> </u>			
4					Ļ - M	3+3+3		
						N =6 REC =18"		
†								
					-50-			
	black cemented sand lenses					2+4+4 N =8		
+					⊦ HM	N =8 REC =18"		
52.0			53.2		L ] <u>"</u>	•		
J2.0	SILTY SAND, fine to medium grained,	SM	JJ.2			40 45 55		
4	wet, gray.				⊦ - M	10+18+28 N =46		
					/	N =46 REC =18"		
54.5			50.7		r   <u>'</u> '	- · <del>-</del>		
J <del>-</del> 7.5	FAT CLAY, moist, gray, trace sand.	CH	30.7		-55-			
						3+4+5 N =9		
4					t tM	N =9 REC =18"		
7								
_	continued on next page				- 4M	3+4+7		
							i .	

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.

B-324 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH **DATA** CH N =11 N = 11 REC =18" -60 PP=>4.5 tsf REC =21" 62.5 42.7 SANDY LEAN CLAY, wet, gray. CL 4+5+7 N =12 REC =18" 64.5 40.7 SANDY FAT CLAY, moist, light gray. СН -65 5+6+10 N =16 REC =18" 67.0 38.2 SILTY SAND, fine to medium grained, SM wet, gray, strong cementation. 13+36+50/4" N =86/10" REC =16" REC =22" gray and white, with fine to coarse shell 23+16+26 fragments, 50-60%, HCl reaction N = 42**REC =18"** strong 74.5 30.7 SANDY ELASTIC SILT, wet, gray and MH -75 white, contains fine to coarse shell 4+7+9 fragments, 30-40%, HCl reaction N =16 **REC =18"** greenish gray, trace sand, trace fine to 4+5+6 medium shell fragments, 2-5%, HCI N = 11REC =18" reaction weak -80 4+5+6 N = 11REC =18" trace organic matter 3+3+4 N =7 REC =18" 20.7 84.5 SILTY SAND, fine to medium grained, SM -85 wet, greenish gray and white, with fine 50/5" to coarse shell fragments, 50-60%, N =50/5" strong cementation, HCI reaction REC =5" REC =3" strong. contains fine to coarse shell fragments, 19+12+13 40-50%, strong cementation, HCI N =25 reaction strong REC =18" 9+19+50/4" N =69/10" continued on next page

Calvert Cliffs Nuclear Power Plant

### Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

TEST

Project:

2. \* = See Appendix I for additional lab testing data.

**TEST B-324** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA ⊠ REC =16" SM contains fine to coarse shell fragments, 5+7+9 30-40% N =16 REC =18" -95 contains fine to coarse shell fragments, 5+6+11 N =17 20-30%, HCl reaction moderate REC =18" gray and white, contains fine to coarse shell fragments, 10-20% 9+13+16 N =29 REC =18" -100-4+6+10 N =16 REC =18" 101.5 3.7 BOTTOM OF BORING @ 101.5 FT.

### Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

<sup>2. \* =</sup> See Appendix I for additional lab testing data.

chnabel Schnabel Engineering

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Bender Drilling Method: Mud Rotary Drilling Equipment: CME-550X (ATV) Schnabel Representative: K. Bell

Dates Started: 5/23/06 Finished: 5/23/06

**Location:** Northing: 216948.98 ft Easting: 960549.73 ft

Ground Surface Elevation: 85.0 (feet)

	Groundwater Observations								
	Date	Time	Depth	Casing Caved					
Encountered	5/23		23.5'						

L	Ground	Surface Elevation: 85.0 (feet)							
	DEPTH (FT)	STRATA DESCRIPTION	CLAS	s. ELEV			AMPLING	TESTS	REMARKS
ŀ	`	ROOTMAT AND TOPSOIL.				DEPTH	DATA		
	0.6	POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, yellowish brown, trace root fragments, trace gravel.	SP-S	84.4 M			1 REC =12" 3+2+2		
	4.0	orangeish brown.		81.0			N =4 REC =18"		
	-	SILTY SAND, fine to coarse grained, moist, orangeish brown and reddish brown, trace gravel.	SM			L JIXII	2+2+3 N =5 REC =18"		
	-	orangeish brown and gray, fine to medium grained.				I   X	3+2+3 N =5 REC =17"		
	-	trace root fragments.				<u> </u>	3+3+3 N =6 REC =11"		
NABEL.GDT 3/6/08	- - -	gray and orangeish gray.				I    X	3+3+3 N =6 REC =17"		Color change in tub from orangeish brown to gray at 14.5 ft.
TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08	17.0 -	FAT CLAY, moist, gray and greenish gray, trace sand.	СН	68.0			2+3+3 N =6 REC =18"		
TEST BORING LOG 0612	-	wet.  continued on next page			Ā		2+3+4 N =7 REC =18"		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-325 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA CH 27.0 58.0 SILTY SAND, fine to medium grained, SM wet, gray and black. 3+4+10 N =14 **REC =16"** 32.0 53.0 FAT CLAY, moist, gray, trace sand. СН 4+7+10 N =17 REC =18" -35 37.0 48.0 CLAYEY SAND, fine to medium SC grained, moist, greenish gray and gray. 6+9+17 N =26 REC =18" Harder drilling 43.0 42.0 SILTY SAND, fine to coarse grained, SM at 42 ft. moist, gray, trace fine to medium shell fragments (5-10%), HCl reaction weak. 31+50 N =50 REC =12" wet, gray and white 31+50 N =50 REC =12" -50 trace fine to coarse shell fragments (50-60%), HCI reaction strong. 17+26+18 N =44 REC =14"

28.0

МН

## Comments:

57.0

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

SANDY ELASTIC SILT, wet, gray and

greenish gray, trace fine to medium continued on next page

TEST Project: Calvert Cliffs Nuclear Power Plant B-325 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** shell fragments (2-5%), HCl reaction МН 2+4+6 N =10 REC =16" Rig chatter at 60.5 ft. 62.0 23.0 CLAYEY SAND, fine to medium SC grained, wet, light gray and greenish gray, trace fine to coarse shell fragments (20-30%), HCl reaction 36+10+12 moderate. N =22 REC =18" 67.0 18.0 SILTY SAND, fine to coarse grained, SM wet, gray and greenish gray, trace fine to coarse shell fragments (10-20%), HCI reaction moderate. 7+7+7 N =14 REC =18" 7+10+9 N =19 REC =17" fine to medium grained, trace fine to 6+7+10 medium shell fragments (<5%), HCI N = 17reaction weak. REC =17" trace fine to medium shell fragments, 4+7+10 2-5%, HCl reaction weak. N =17 **REC =18"** -85 87.0 -2.0 SANDY ELASTIC SILT, wet, gray and МН white, trace fine to coarse shell fragments (15-25%), HCI reaction moderate. 5+5+7 N =12 REC =18"

-90

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST B-325** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA MH 92.0 -7.0 SILTY SAND, fine to medium grained, SM wet, light gray and, trace fine to coarse shell fragments (30-40%), HCl reaction moderate. 8+6+8 N =14 ∐ REC =18" gray, trace fine to medium shell fragments (2-5%), HCl reaction weak. 6+10+9 N =19 REC =16" -100-100.0 -15.0 BOTTOM OF BORING @ 100.0 FT.

## Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

chnabel Schnabel Engineering

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-326 Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings Drilling Method: Mud Rotary Drilling Equipment: CME-750 (ATV) Schnabel Representative: K. Megginson Dates Started: 5/4/06 Finished: 5/4/06

**Location:** Northing: 216859.22 ft Easting: 960652.25 ft

**Ground Surface Elevation:** 103.1 (feet)

		_			
	Groundy	water Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	5/4		13.5'		

STRATA DESCRIPTION  Forest litter, rootmat and topsoil.  POORLY GRADED SAND WITH SILT, ine to medium grained, moist, light brown, contains root fragments.  Ine to coarse grained.  Ine to medium grained, stratified light brown and light orangeish brown.  Ine to coarse grained, yellowish brown and grayish brown, trace fine gravel.  Ine to medium grained, light orangeish brown below 8.5 ft.	SP-SM	(FT) 102.6	WL	DEPTH	2+2+2 N =4 REC =18" 3+2+4 N =6 REC =13" 4+4+3 N =7 REC =11"	W=8.2%	REMARKS
POORLY GRADED SAND WITH SILT, ine to medium grained, moist, light brown, contains root fragments.  Ine to coarse grained.  Ine to medium grained, stratified light brown and light orangeish brown.  Ine to coarse grained, yellowish brown and grayish brown, trace fine gravel.  Ine to medium grained, light orangeish brown below 8.5 ft.	SP-SM	102.6		5 -	N =4 REC =18" 3+2+4 N =6 REC =13" 4+4+3 N =7 REC =11"	w=8.2%	
ine to medium grained, moist, light brown, contains root fragments.  ine to coarse grained.  ine to medium grained, stratified light brown and light orangeish brown.  ine to coarse grained, yellowish brown and grayish brown, trace fine gravel.  ine to medium grained, light orangeish brown below 8.5 ft.	SP-SM			   5 -   5	3+2+4 N =6 REC =13" 4+4+3 N =7 REC =11"	w=8.2%	
ine to medium grained, stratified light brown and light orangeish brown.  ine to coarse grained, yellowish brown and grayish brown, trace fine gravel. ine to medium grained, light orangeish brown below 8.5 ft.				\ - 5 - \ 3 \	N =6 REC =13" 4+4+3 N =7 REC =11"	w=8.2%	
ine to coarse grained, yellowish brown and grayish brown, trace fine gravel. ine to medium grained, light orangeish brown below 8.5 ft.				5 -  	N =7 REC =11"	w=8.2% *	
and grayish brown, trace fine gravel. ine to medium grained, light orangeish brown below 8.5 ft.							
ine to coarse grained					7+6+11 N =17 REC =11"		
				10 	10+9+10 N =19 REC =12"		
ine to medium grained, wet, light ellowish brown.			Ā	  15-	5+5+6 N =11 REC =11"	w=12.2% *	
orangeish brown and dark brown.					10+12+8 N =20 REC =10"		
CII TV SAND fine to ecoree grained	SM	79.6			5+2+2 N =4 REC =16"	w=22.7%	
	angeish brown and dark brown.  TY SAND, fine to coarse grained, t, light orangeish brown and light ayish brown.	TY SAND, fine to coarse grained, t, light orangeish brown and light ayish brown.	TY SAND, fine to coarse grained, t, light orangeish brown and light ayish brown.	TY SAND, fine to coarse grained, t, light orangeish brown and light ayish brown.	TY SAND, fine to coarse grained, t, light orangeish brown and light	TY SAND, fine to coarse grained, t, light orangeish brown and light ayish brown.  N = 20 REC = 10"  79.6	TY SAND, fine to coarse grained, t, light orangeish brown and light ayish brown.  N = 20 REC = 10"  79.6

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-326 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SM 28.5 74.6 SANDY LEAN CLAY, fine to medium, CL 2+1+2 wet, gray, contains silt pockets and N = 3mica. **REC =18"** -30 \*Shelby tube sampler push w=27.6% REC =24" from 33.5 to moist, with sand. LL=41 35.5 ft. PL=16 -35 PP=2.00 tsf 38.5 64.6 FAT CLAY, moist, gray, trace fine to CH 2+4+5 medium sand and mica. N =9 REC =18" \*Shelby tube sampler push 43.5 59.6 w=33.9% ORGANIC CLAY, moist, gray, trace fine OH REC =24" from 43.5 to LL=63 to medium sand and mica, contains fine 45.5 ft. PL=22 to medium clayey sand pockets. PP=2.25 tsf 48.5 54.6 FAT CLAY, moist, gray and light gray, CH 4+6+8 trace fine to medium, mica and organic N =14 matter (±1%). -50 \*Shelby tube sampler push 53.5 49.6 PP=2.25 tsf SANDY LEAN CLAY, fine to medium, CL REC =24" from 53.5 to wet, gray, trace mica. 55.5 ft. -55

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048 Sheet: 3 of 4

DEDT!!	•		EL EV			•	AMPLING		
DEPTH   (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	DEPT		DATA	TESTS	REMARK
		CL			DEPT	П		PP=2.00 tsf	
59.5			43.6				17+8+28 N =36	FF-2.00 (SI	
-	SILTY SAND, fine to medium grained, moist, gray, trace mica, contains	SM	40.0		60-	Ш	REC =16"		
	cemented sand pockets.				_				
Ī									
63.5			39.6		-				
-	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, gray	SP-SM					50/3" N =50/3"		
_	o tooutum gramou,oto, gray				65		REC =1"		
1									
68.5			34.6		-				
00.0	SILTY SAND, fine to medium grained, wet, gray, trace fine to medium shell	SM	34.0		-		50/5" N =50/5"		
	fragments (±<5%), strong HCl reaction				—70—		N =50/5 REC =1"		
1									
+					-				
4									
	little fine to coarse shell fragments				<u> </u>	M	19+24+23		
	(±25%), contains clayey sand pockets.				7.	$\  \mathbb{M} \ $	N =47 REC =12"		
					<del></del> 75				
+									
+									
4					-				
	moist, light gray, mostly moderately				L _	$\boxtimes$	50/3"		*Rotary advancemer
	cemented sand, weak HCl reaction.						N =50/3" REC =4"		considerably slower below
					<del></del> 80		0 1		78.5 ft
+					-				(Moderately difficult rotar
4									advancemer
					<u> </u>				advancemer
	wet, oliveish gray and gray, trace fine to						23+13+50/4"		comparative easier from 8
1	coarse shell fragments (±5%), strong						N =63/10"		to 83 ft; moderately
-	HCI reaction.				<del></del> 85		REC =14"		difficult rotar
4									advancemer below 83 ft.
_					ļ _				
									*Switched to 3-7/8" 0.D.
88.5	CLAVEY SAND fine to modium	60	14.6				0+7+12		Tri-cone rolle
+	CLAYEY SAND, fine to medium grained, wet, gray, trace fine to coarse	SC			-		9+7+12 N =19		DIT DEIOM 88
-	shell fragments (±5%), strong HCl reaction.				-90-		REC =18"		
_					<u> </u>				
	continued on next page								

Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
 \* = See Appendix I for additional lab testing data.

**TEST B-326** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SC 93.5 9.6 SILTY SAND, fine to medium grained, SM 7+7+12 wet, gray, trace fine to medium shell N =19 ∐ REC =18" fragments (±5%), strong HCl reaction. SILTY SAND, fine to medium grained, 6+8+12 wet, gray, trace fine shell fragments N =20 (±1%), weak HCl reaction. REC =16" 100.0 -100-3.1 BOTTOM OF BORING @ 100.0 FT.

## Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.



Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 5

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Bender Drilling Method: Mud Rotary **Drilling Equipment:** CME-550 Schnabel Representative: K. Bell

Dates Started: 5/25/06 Finished: 5/26/06

**Location:** Northing: 216865.7 ft Easting: 960573.37 ft

**Ground Surface Elevation:** 86.9 (feet)

	Ground	water Obs	ervations	i	
	Date	Time	Depth	Casing	Caved
Encountered	5/25		28.0'		
Start of day	5/26		38.0'		

DEPTH   (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL		MPLING	TESTS	REMARKS
` _			` ,		DEPTH	DATA		
0.5	ROOTMAT AND TOPSOIL.  SILTY SAND, fine to coarse grained, moist, brown and yellowish brown, trace	SM	86.4			+3+3 I =6 REC =11"		
2.0	root fragments.  POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, yellowish brown and orangeish brown, trace root fragments.	SP-SM	84.9		2	+3+3 I =6 REC =3"		
4.5	CLAYEY SAND, fine to coarse grained, moist, orangeish brown and reddish brown, trace root fragments.	SC			_   X   \	+5+6 I =11 REC =12"		
7.0	SILTY SAND, fine to medium grained, moist, orangeish brown and gray.	SM	79.9			+4+3 I =7 REC =18"		
-						+2+1 I =3 REC =18"		
13.0	CLAYEY SAND, fine to medium grained, moist, gray.	SC	73.9			+4+3 I =7 REC =17"		
17.0	SANDY LEAN CLAY, moist, gray.	CL	69.9		_ ]			
-						+3+3 I =6 REC =18"		
22.0	SILTY SAND, fine to medium grained, moist, gray and light gray.	SM	64.9		 	±2±4		
_	continued on next page					+3+4 I =7 REC =18"		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-327 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SM  $\nabla$ 4+5+5 N =10 REC =18" -30 33.0 53.9 FAT CLAY, moist, light gray, trace sand. СН 5+6+4 N = 10REC =18" -35 37.0 49.9 SANDY SILT, moist, greenish gray and ML gray. 4+4+5 N =9 REC =16" Harder drilling 43.9 43.0 SILTY SAND, fine to medium grained, SM moist, gray and white, trace fine to 27+50 medium shell fragments, 15-25%, HCI N =50 reaction weak. REC =12" trace fine to medium shell fragments, >5%, HCl reaction weak, platty structure. Rig chatter 13+50 N =50 REC =11" -50  $\boxtimes$ 50/5" N = 50/5" REC =5" -55 57.0 29.9 SANDY LEAN CLAY, moist, gray and CL greenish gray, trace fine to medium

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-327 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** shell fragments, 2-5%, HCI reaction CL 4+4+7 N = 11REC =18" Rig chatter 62.0 24.9 SILTY SAND, fine to medium grained, SM moist, greenish gray and gray, trace fine to medium shell fragments, 2-5,  $\boxtimes$ cementation, HCl reaction strong. 50/4" N = 50/4" REC =2" -65 wet, trace fine to coarse shell 5+5+7 fragments, 20-30%, HCI reaction N =12 REC =18" moderate. 7+8+8 N =16 REC =17" Rig chatter 77.0 9.9 ELASTIC SILT wet, greenish gray, trace fine to medium shell fragments, 2-5%, МН HCI reaction weak. 5+5+8 N =13 REC =16" 4+4+8 N =12 **REC =18"** -85 87.0 -0.1 SILTY SAND, fine to medium grained, SM wet, greenish gray, trace fine to coarse shell fragments, 20-30%, HCl reaction moderate. 4+8+12 N = 20REC =17" -90

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-327 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 5 Schnabel Engineering LOG ELEV. **SAMPLING DEPTH** STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** Rig chatter SM 20+17+13 fine to coarse grained, light gray and white, with fine to coarse shell N = 30fragments, 50-60%, strong cementation, HCl reaction strong. ∐ REC =18" -95 Rig chatter 6+15+18 N = 33REC =16" -100 6+12+19 N =31 REC =18" -20.1 107.0 FAT CLAY, wet, greenish gray, trace CH fine to medium shell fragments, 2-5%, HCI reaction weak. 5+7+12 N =19 REC =18" w=44.3% **REC =9"** LL=60 PL=24 -115 PP=>4.5 tsf 5+7+11 N =18 REC =18" -120 122.0 -35.1 SILTY SAND, fine to coarse grained, SM wet, light gray and white, trace fine to coarse shell fragments, 30-40%, strong |¤| <sub>50/3"</sub> cementation, HCI reaction strong. continued on next page

## Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048 Sheet: 5 of 5

Schnab	el Engineering LOG	_	,	ı		Shee	t: 5 of 5	T
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	DEPTH	SAMPLING DATA	TESTS	REMARKS
		SM			-125-	N =50/3" REC =2"		
-								
-						1 5.7.44		Resumed drilling on 5/26/06 @
-					130-	5+7+11 N =18 REC =0"		7:20am
-								
-	fine to medium grained, maint, graenish					5+6+11		
-	fine to medium grained, moist, greenish gray and gray, trace fine to medium shell fragments, 2-5%, HCl reaction weak.				135	N =17 REC =18"		
_						REC =10"	PP=>4.5 tsf	
-					140	10		
-								
	trace fine to medium shell fragments, 5-10%, HCl reaction weak.					3+5+7		
_	5-10%, HCl reaction weak.				145	N =12 REC =18"		
-								
-						5+7+10 N =17		
150.0	BOTTOM OF BORING @ 150.0 FT.		-63.1			N =17 REC =18"		

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.



Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048 Sheet: 1 of 5

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Bender Drilling Method: Mud Rotary Drilling Equipment: CME-550 Schnabel Representative: K. Bell

Dates Started: 6/19/06 Finished: 6/20/06

**Location:** Northing: 216828.86 ft Easting: 960493.21 ft

**Ground Surface Elevation:** 76.3 (feet)

	Ground	water Obs	ervations	i	
	Date	Time	Depth	Casing	Caved
Encountered	6/19		9.0'		
Start of day	6/20		9.0'		

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	s	AMPLING	TESTS	REMARKS
(FT)		52,300.	(FT)		DEPTH	DATA		
0.2	ROOTMAT AND TOPSOIL.	SP-SM	76.1		$ \Box $	2+1+2		
-	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, yellowish brown, trace root fragments.					N =3 REC =16"		
-						2+2+4 N =6 REC =15"	w=4.5% LL=NP PL=NP *	
4.5	SANDY LEAN CLAY, moist, orangeish	CL	71.8		_			
	brown and gray, trace root fragments.				5 -	2+3+3 N =6 REC =18"		
7.0	SANDY FAT CLAY, trace sand, wet,	CH	69.3					
-	gray.	On		$\overline{\sum}$		2+2+2 N =4 REC =18"	w=30%	
					-10-			
-						3+3+4 N =7 REC =18"	w=28.8% LL=59 PL=17	start of mud rotary drilling
13.0			63.3					color change
10.0	FAT CLAY, trace sand, moist, gray.		00.0			2+3+4		mud tub from orangeish
1						N =7 REC =18"		brown to gray
					<del></del> 15 └-	10		
-								
-					-			
18.5	ELASTIC SILT, gray	МН	57.8		L - M	5+4+6 N =10	w=35.1% LL=64	
					L <sub>20</sub> _	REC =18"	PL=36	
7								
23.5	EAT OLAY I I	611	52.8			4.0.0	w=33%	
+	FAT CLAY, dark green	CH			├ <u>-</u>   \	4+6+9 N =15	LL=77	
4	continued on next page				<u> </u>	REC =18"	PL=28	

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.
   Ground water observation well OW-328 installed at nearby location.

TEST Project: Calvert Cliffs Nuclear Power Plant **B-328 Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** CH 49.3 27.0 CLAYEY SAND, contains shells, moist, SC gray and black. w=30.5% 7+9+14 LL=40 N =23 PL=21 **REC =18"** -30 Harder drilling 32.0 44.3 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, wet, gray, contains fine to coarse shell fragments, w=18.2% 30-40%, HCI reaction strong. 33+34+50/4" N =84/10" REC =16" -35  $\boxtimes$ w=22.6% 50/4" N = 50/4" REC =4" w=24.2% gray and white, with fine to coarse shell fragments, 50-60%. 3+15+10 LL=NP N =25 PL=NP REC =18" 47.0 29.3 CLAYEY SILT, moist, greenish gray, ML strong cementation, HCI reaction strong. w=25.8% 10+15+50/1" N = 65/7" REC =12" -50 harder drilling/ heavy rig chatter 52.0 24.3 SILTY SAND, fine to medium grained, SM wet, greenish gray, contains fine to coarse shell fragments, 25-35%, HCI w=24% reaction strong. 5+5+21 N =26 REC =18" -55

Rig chatter

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-328 installed at nearby location.

TEST Project: Calvert Cliffs Nuclear Power Plant **B-328 Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SM 5+5+8 N =13 REC =18" 61.0 15.3 ORGANIC SILT, wet, greenish gray, contains fine to coarse shell fragments, ОН 25-35%, HCl reaction, strong. w=44.2% REC =24" LL=72 PL=41 -65 67.0 9.3 SILTY SAND, fine to medium grained, SM wet, greenish gray, trace fine to medium shell fragments, 2-5%, HCl reaction w=29.4% weak. 4+6+9 LL=NP N =15 PL=NP REC =18" w=32.2% 4+4+7 LL=NP N = 11PL=NP REC =18" greenish gray and white, with fine to 8+18+28 coarse shell fragments, 50-60%, strong N =46 cementation, HČI reaction strong. REC =18" Rig chatter w=21.2% contains fine to coarse shell fragments, 8+16+50/5" LL=NP 30-40% N =66/11" PL=NP **REC =16"** 85.0 -8.7 -85 SANDY ELASTIC SILT, green МН Rig chatter w=34% 9+10+16 LL=47 N =26 PL=31 REC =18" -90 continued on next page

## Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-328 installed at nearby location.

TEST Project: Calvert Cliffs Nuclear Power Plant **B-328 Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 4 of 5 ELEV. **SAMPLING DEPTH** STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** МН REC =13" -95 w=38.2% 5+6+12 LL=53 N =18 PL=34 REC =18" -100 softer drilling -25.7 102.0 SILTY SAND, wet, greenish gray, trace SM fine to medium shell fragments, 2-5%, HCI reaction weak. w=62.7% 6+9+12 N =21 REC =18" 5+8+13 N =21 Resumed REC =18" drilling on 6/20/06@ 7:30am 112.0 -35.7 SANDY ELASTIC SILT, fine to medium МН grained, wet, greenish gray, contains fine to coarse shell fragments, 20-30%, w=30.5% HCI reaction strong. 6+7+14 N =21 REC =18" 117.0 -40.7 ELASTIC SILT, moist, greenish gray, МН trace fine to medium shell fragments, 5-10%, HCl reaction weak. w = 44.7%5+6+8 N =14 REC =18" -120softer drilling w=45.6% REC =11" continued on next page

## Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-328 installed at nearby location.

**TEST B-328** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 5 of 5 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA LL=72 МН PL=45 125 PP=>4.5 tsf oliveish gray 5+7+10 N =17 REC =18" -130w=48.2% 6+6+9 LL=70 N =15 PL=51 REC =18" -135 6+7+9 N =16 REC =18" w=59.3% 5+7+8 N =15 ∐ REC =18" 6+8+11 N =19 REC =18" w=74.8% LL=134 PL=100 150.0 -73.7 -150-BOTTOM OF BORING @ 150.0 FT.

## Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-328 installed at nearby location.



Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Bender Drilling Method: Mud Rotary **Drilling Equipment:** CME-550 Schnabel Representative: K. Bell

Dates Started: 6/13/06 Finished: 6/15/06

**Location:** Northing: 216800.38 ft Easting: 960379.43 ft

**Ground Surface Elevation:** 74.8 (feet)

	Groundy	water Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	6/13		33.5'		
Start of day	6/14		28.0'		
Start of Day	6/15		30.0'		

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	s	AMPLING	TESTS	REMARKS
(FT)	JIMIA DEGGINI HON	OLAGO.	(FT)		DEPTH	DATA	120.0	T LINE THE
0.5	ROOTMAT AND TOPSOIL.	SP-SM	74.3			2.2.2		
2.5	POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, yellowish brown, trace root fragments.	25-2M	70.0			2+2+2 N =4 REC =5"		
2.5	CLAYEY SAND, fine to medium grained, moist, orangeish brown.	SC	72.3			3+4+4 N =8 REC =10"		
4.5	SILTY SAND, fine to medium grained, moist, orangeish brown.	SM	70.3		_ 5 -	3+4+4		
7.0			67.8			N =8 REC =18"		
7.0	SANDY FAT CLAY, moist, gray.	CH	07.0			3+3+3 N =6 REC =18"		
_					10 	1+4+6 N =10 REC =18"		
-					  15-	2+3+3 N =6 REC =18"		Softer drilling
17.0			57.8					_
	ELASTIC SILT with sand, moist, gray.	MH						
_						3+4+5 N =9 REC =18"		
22.0	SANDY SILT, moist, gray.	ML	52.8			4+6+8		
-						N =14 REC =18"		
-	continued on next page				25			

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-329 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA ML5+8+13 N =21 **REC =18"** 32.0 42.8 SILTY SAND, fine to medium grained, SM wet, light gray.  $\overline{\nabla}$ 13+27+33 N =60 REC =18" -35 gray and white, contains fine to medium 18+21+31 shell fragments, 10-20%, HCl reaction N =52 REC =13" moderate 32.8 42.0 CLAYEY SILT, moist, gray, trace fine to ML medium shell fragments, 2-5%, HCl reaction weak. 3+4+6 N =10 REC =18" 47.0 27.8 SILTY SAND, fine to coarse grained, SM wet, gray, with fine to coarse shell Rig chatter fragments, 40-50%, srong cementation, HCI reaction strong. 50/4" N = 50/4" REC =2" -50 52.0 22.8 CLAYEY SAND, fine to medium SC grained, wet, light gray, with fine to coarse shell fragments, 40-50%, srong cementation, HCl reaction strong. 11+30+33 N =63 REC =17" 57.0 17.8 SILTY SAND, fine to medium grained, SM wet, greenish gray, contains fine to

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST B-329** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering Sheet: 3 of 4 LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA coarse shell fragments, 20-30%, HCI SM reaction moderate. 4+5+6 N =11 REC =18" REC =22" -65 Resumed drilling on 6/14/06 @ 7:00am 5+5+10 N =15 REC =18" REC =24" -75  $\boxtimes$ with fine to coarse shell fragments, 50/3" N = 50/3"60-70%, strong cementation, HCI reaction strong REC =2" Rig chatter contains fine to coarse shell fragments, 14+50 N =50 30-40% REC =10" -85 87.0 -12.2 CLAYEY SAND, fine to medium SC grained, wet, greenish gray, trace fine to medium shell fragments, 5-10%, HCl Resumed drilling on6/15/06 @ reaction moderate. 10+12+24 N = 367:00am REC =18" -90

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST B-329** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SC greeninsh gray and white, contains fine to medium shell fragments, 30-40%, 5+10+14 N =24 REC =16" HCl reaction strong. 6+8+13 N =21 REC =18" 100.0 -25.2 -100-BOTTOM OF BORING @ 100.0 FT.

# Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion. 2.  $\star$  = See Appendix I for additional lab testing data.

chnabel Schnabel Engineering

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-330 Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings Drilling Method: Mud Rotary Drilling Equipment: CME-750 (ATV) Schnabel Representative: M. Arles Dates Started: 5/25/06 Finished: 5/26/06

**Location:** Northing: 216715.4 ft Easting: 960523.7 ft

**Ground Surface Elevation:** 85.5 (feet)

	Ground	water Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	5/25		10.0'	0.0'	

					04450 010		l .
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	SAMPLING	TESTS	REMARKS
0.3	ROOTMAT AND TOPSOIL		85.2		DEPTH DATA WOH+2+2		
2.0 -	POORLY GRADED SAND, fine to coarse grained, moist, yellowish orange, trace gravel.	SP	83.5		N =4 REC =13"		
-	POORLY GRADED SAND WITH SILT, trace gravel, fine to coarse grained, moist, orangeish yellow.	SP-SM	00.0		5+4+6 N =10 REC =18"		
5.0 —	POORLY GRADED SAND, fine to coarse grained, moist, yellow, with gravel, contains cemented sand.	SP	80.5		2+4+4 N =8 REC =10"		
7.0 - -	POORLY GRADED SAND WITH SILT, trace gravel, fine to coarse grained, moist, brownish orange.	SP-SM	78.5		2+3+3 N =6 REC =10"		
-	wet, dark orange, with gravel.			Ā	10 4+6+9 N =15 REC =15"		
13.0 - - -	SANDY LEAN CLAY,fine to medium, moist, dark gray.	CL	72.5		1+2+3 N =5 REC =18"		
- - - -					3+3+3 N =6 REC =18"		
- - -	with sand.  continued on next page				4+5+6 N =11 REC =18"		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-330 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA CL 27.0 58.5 CLAYEY SAND, fine to medium SC grained, moist, dark gray. REC =0" -30 32.0 53.5 LEAN CLAY, moist, gray, trace sand. CL 5+8+9 N = 17REC =18" -35 37.0 48.5 CLAYEY SAND, fine to medium SC grained, moist, greenish gray. 6+6+8 N =14 REC =18" 43.5 42.0 POORLY GRADED SAND, fine to SP medium grained, moist, greenish gray, with clay, with fine to coarse shell fragments, strong HCl reaction, 10-15% 34+50/5" shell frag. N = 50/5" REC =8"  $|\boxtimes|$ 50/5" fine to coarse grained, grayish green. N = 50/5" REC =5" -50 fine to medium grained, with fine to 42+50/3" medium shell fragments, strong HCI N = 50/3" REC =10" reaction. -55

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

B-330 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA 58.0 27.5 CLAYEY SAND, fine to medium SC grained, moist, grayish green. 4+3+5 N =8 with fine to coarse shell fragments, REC =18" 25-30% shell frag.  $\boxtimes$ with fine to coarse shell fragments, 50/5" strong HCl reaction, 10-20% shell frag. N = 50/5" REC =5" -65 67.0 18.5 SILTY SAND, fine to medium grained, SM wet, green, with fine to coarse shell fragments, strong HCl reaction, 15-25% shell frag. 6+4+9 N =13 REC =18" 9+11+10 N =21 REC =18" trace fine to coarse shell fragments, 6+7+14 moderate HCl reaction, 5-10% shell N =21 REC =18" frag. 0-5% shell frag. 5+6+12 N =18 **REC =18"** -85 with fine to coarse shell fragments, 6+11+18 strong HCl reaction, 20-30% shell frag. N =29 REC =18" -90 continued on next page

Calvert Cliffs Nuclear Power Plant

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

**TEST** 

Project:

2. \* = See Appendix I for additional lab testing data.

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**TEST** BORING LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

B-330 **Boring Number:** Contract Number: 06120048

Schnab	el Engineering LOG		,	Sheet: 4 of 4				
DEPTH (FT)	STRATA DESCRIPTIO	ON CLASS.	ELEV. (FT)	WL	S DEPTH	AMPLING	IESIS	REMARKS
92.0	POORLY GRADED SAND, fine medium grained, moist, green, to coarse shell fragments, with strong HCl reaction, 40-50% sh contains cemented sand.	s to SP-SM with fine silt, ell frag,	-6.5		   95 -			
100.0	10-25% shell frag.  BOTTOM OF BORING @ 100.	0 FT.	14.5			8+12+15 N =27 REC =18		

Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
 \* = See Appendix I for additional lab testing data.

chnabel Schnabel Engineering

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Encountered** 

**B-331 Boring Number:** 

Depth

14.0'

**Groundwater Observations** 

Time

5/24

Contract Number: 06120048 Sheet: 1 of 4

Casing

Caved

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Bender Drilling Method: Mud Rotary **Drilling Equipment:** CME-550X (ATV) Schnabel Representative: K. Bell

Dates Started: 5/24/06 Finished: 5/24/06

**Location:** Northing: 216970.57 ft Easting: 960481.79 ft

Ŭ			
Ground Surface Elevation: 68.3 (feet)			

EPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	DEPTH	SAMPL	ING DATA	TEST	s	REMARKS
	ROOTMAT AND TOPSOIL.		07.0			1				
0.7	POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, orangeish brown, trace root fragments, trace wood fragments.  yellowish brown.	SP-SM	67.6			1/18" N =1/ REC 4+3+ N =6 REC	/18" =18" 3			
4.5	LEAN CLAY, moist, orangeish brown and gray, trace sand, trace root fragments.	CL	63.8		5 -	3+4+ N =10 REC	0	w=20.2 LL=4: PL=1:	3	
-	sandy.					3+2+ N =9 REC				
11.5	SILTY SAND, fine to medium grained, wet, gray.	SM	- 56.8		10 	7+9+ N =18 REC	8			
14.2	FAT CLAY, moist, gray, trace sand.	СН	54.1	∑		5+6+ N =1: REC	2			
21.5	SANDY SILT, moist, gray.	ML	- 46.8			REC	=24"	w=30.8 LL=5 PL=2 PP=>4.8	7	
- - -	continued on next page	IVIL				7+12 N =2 REC	8			

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048 Sheet: 2 of 4

DEDTIL			EI EV			AMPLING		
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	DEPTH	DATA	TESTS	REMARK
-		ML	-		DEPIR	DATA		
_		1						
26.5	POORLY GRADED SAND WITH SILT,	SP-SM	41.8					
1	fine to coarse grained, moist, gray and white, trace fine to coarse shell	J. 01VI			r 1			
4	white, trace fine to coarse shell				-			
	fragments (20-30%), HCl reaction strong, weak cementation.					30+50		
1	outeng, wound come maner.					N =50		
_					-30-	REC =12"		
7								
4								
7							W-24 00/	
4	fine to medium shell fragments (40-50%).					31+40+50/4" N =90/10"	w=21.9% *	Rig chatter a 34 ft.
	( <del></del> 000 /0).				_35-	REC =16"		J4 IL.
٦					-35-			
4								
					<u> </u>			
7					]			
+								
	wet, fine to coarse shell fragments.					11+8+12		
	-				X	N =20 REC =18"		
$\dashv$					H40-	NEC = 10		
					Ļ			
41.5	SILTY SAND, fine to medium grained,	SM	26.8					
1	moist, gray and greenish gray, trace fine	JIVI						
4	to medium shell fragments (2-5%), HCI							
	reaction weak.					3+4+7	w=31.6%	
1						N =11	*	
4					<u> </u>	REC =18"		
					_			
7					[			
4								
					<u> </u>			
						0.0.7		Die I "
+						8+6+7 N =13		Rig chatter a 49 ft.
						REC =18"		10 10.
+								
					Ļ			
1								
_	white, fine to coarse shell fragments				L 1MI	6+5+5		
	(15-25%).				<u>-</u>    <u> </u>	N =10 REC =17"		
$\dashv$					-55-L			
4								
1								
4								
	continued on next page		1					

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.

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**TEST** BORING LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

	el Engineering LOG						Sheet: 3 of 4	
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	DEPTH	AMPLING	TESTS	REMARK
-		SM			F -M	3+4+10 N =14 REC =18"	w=26.6%	
- - - - -	greenish gray, fine to medium shell fragments (2-5%), HCl reaction weak.				X	5+6+8 N =14 REC =16"		
- - - -					X	3+4+6 N =10 REC =18"		
- - - - -	fine to coarse shell fragments (35-45%), HCI reaction strong.					3+5+12 N =17 REC =18"	w=35.8%	
- - - -						6+6+6 N =12 REC =18"		
- - - -	fine to medium shell fragments (2-5%), HCl reaction weak.				X	7+11+12 N =23 REC =16"		
	fine to coarse shell fragments (5-10%), cementation with strong HCl reaction .				X	5+7+16 N =23 REC =18"	w=32.7%	
1	continued on next page							

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.

**TEST B-331** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SM 5+7+10 N =17 REC =18" 96.5 -28.2 CLAYEY SAND, fine to medium SC grained, wet, greenish gray, trace fine to coarse shell fragments (5-10%), HCl reaction moderate. 7+10+17/5" N =27/11" REC =18" 100.0 -31.7 -100 BOTTOM OF BORING @ 100.0 FT.

## Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.



**Project:** Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Boring Number: B-332

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Bender

Drilling Method: Mud Rotary

Drilling Equipment: CME-550

Schnabel Representative: K. Bell

Dates Started: 6/1/06 Finished: 6/2/06

**Location:** Northing: 217127.42 ft Easting: 960400.52 ft

Ground Surface Elevation: 65.4 (feet)

Groundwater Observations											
	Date	Time	Depth	Casing	Caved						
Encountered	6/1		13.5'								
Start of day	6/2		10.0'								

	` ,		1				
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	SAMPLING DEPTH DATA	TESTS	REMARKS
0.4	ROOTMAT AND TOPSOIL.		65.0		DEPTH DATA		
- -	CLAYEY SAND, fine to coarse grained, moist, yellowish brown, trace root fragments.	SC	03.0		1+1+2 N =3 REC =5"		
4.0 -	fine to medium grained, moist, orangeish brown and reddish brown, trace wood fragments, cemented sand gravel size.	СН	61.4		22+2+3 N =5 REC =16"		
-	FAT CLAY, moist, orangeish brown and gray, trace sand.				2+2+3 N =5 REC =14"		
8.0 -	SANDY SILT, moist, gray.	ML	57.4		3+3+4 N =7 REC =18"		
-					2+5+7 N =12 REC =18"		
13.0 - - -	SILTY SAND, fine to medium grained, wet, dark gray.	SM	52.4	Ā	1+2+3 N =5 REC =18"		
- 17.0 -	ELASTIC SILT, moist, light gray, trace	MH	48.4				
- -	sand.				4+6+10 N = 16 REC = 18"		
22.0	SILTY SAND, fine to coarse grained, moist, greenish gray and gray, weak	SM	43.4				
-	cementation.				3+6+11 N =17 REC =16"		
_	continued on next page				-25-LINEC - 10		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

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**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048 Sheet: 2 of 4

EPTH			ELEV.		5	AMPLING		
(FT)	STRATA DESCRIPTION	TA DESCRIPTION CLASS. (FT) WL DEPTH DATA		TESTS	REMARKS			
		SM			DEFIN	DATA		
		0			L l			
4					F -			
7								
4	fine to medium grained, wet, dark gray and white, contains fine to medium shell				├ - X	32+50/5" N =50/5"		
	fragments, 20-30%, HCl reaction strong.					REC =8"		
٦					-30-			
4					<b>├</b>			
٦					Γ			
4					<b>├</b>			
	with fine to coarse shell fragments,					16+15+16		
7	60-70%					N =31		
-					<u> </u>	REC =16"		
1					Γ 1			
37.0 +	CLAVEV CAND fine to modium	SC	28.4					
	CLAYEY SAND, fine to medium grained, wet, gray and white, with fine to	SC						
1	coarse shell fragments, 40-50%, HCI				Γ 1 <u>.</u>			
4	reaction strong.					7+8+15		
					,,   /	N =23 REC =16"		
					-40-V	,		
4								
			00.4					
12.0 +	SANDY SILT, wet, greenish gray, trace	ML	23.4		Γ			
4	organic matter.				<b>├</b>			
						3+3+5		
]						N =8		
-					-45-L	REC =18"		
					L			
+					F -			rig chatter
						50/0.5"		
+					+ +	50/0.5" N =50/0.5"		
					-50-	35,5.5		
+					h 1			
_					L l			ria obattor
								rig chatter
+					<del> </del>			
	white, contains fine to coarse shell				L 1	5+6+7		
	fragments, 20-30%, HCl reaction				X	N =13 REC =18"		
$\dashv$	strong.				-55-L	KEC = 16		
					L J			
57.0 +	SILTY SAND, fine to medium grained,	SM	8.4		<del> </del>			
	SILIT OF WILD, MINE TO MICUIGIN GRAINEU,	JIVI	1	1	1 1	I	1	1
	wet, greenish gray and white, contains				L ]			

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant **B-332 Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** fine to coarse shell fragments, 20-30%, SM strong cementation, HCl reaction 6+9+50/5" strong. N =59/11" REC =16" rig chatter trace fine to medium shell fragments, 5+6+11 N = 172-5%, HCl reaction weak. REC =18" 4+4+8 N =12 REC =18" resumed driling on 6/2/06 @ REC =13" 7:15am -75 harder drilling light gray and white, with fine to medium shell fragments, 40-50%, strong 38+17+15 N = 32cementation, HCI reaction strong. REC =18" trace fine to medium shell fragments, 8+12+21 2-5%, HCl reaction weak. N = 33**REC =18"** -85 87.0 -21.6 SANDY SILT, wet, greenish gray, trace ML fine to medium shell fragments, 10-20%, HCl reaction moderate. 6+8+18 N =26 REC =18"

-90

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST B-332** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG DEPTH **SAMPLING** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA  $\mathsf{ML}$ HCI reaction weak 6+8+14 N =22 REC =17" 7+12+14 N =26 REC =18" 100.0 -34.6 -100-BOTTOM OF BORING @ 100.0 FT.

# Comments:

Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
 \* = See Appendix I for additional lab testing data.

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Schnabel Engineer	ring

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-333 Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings Drilling Method: Mud Rotary Drilling Equipment: CME-750 (ATV) Schnabel Representative: K. Megginson Dates Started: 5/17/06 Finished: 5/17/06

**Location:** Northing: 216657.04 ft Easting: 960386.24 ft

**Ground Surface Elevation:** 89.5 (feet)

Groundwater Observations									
	Date	Time	Depth	Casing	Caved				
Encountered	5/17		10.5'						

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	s	AMPLING	TESTS	REMARKS
(FT)	JIMIA DEGGINI IIGI	JEAGG.	(FT)	***	DEPTH	DATA	12010	INE WATER
0.5	Forest litter, rootmat and topsoil.	00.01:	89.0			1+4+3		
-	POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, brown, contains root fragments.	SP-SM			<u> </u>	N =7 REC =17"		
-	fine to medium grained.					2+3+5 N =8 REC =13"	w=6.2% *	
	fine to coarse grained, light brown, contains clayey sand pockets.				5 -	3+4+4 N =8 REC =10"		
-	fine to medium grained.					5+5+6 N =11 REC =11"	w=4.8% *	
-	fine to coarse grained, wet, brown.			Ā		4+8+8 N =16 REC =10"		
-	dark yellowish brown, trace fine gravel.				  15-	2+3+5 N =8 REC =17"		
17.0 +	CLAYEY SAND, fine to coarse grained, wet, dark orangeish brown and dark yellowish brown, contains fine to medium cemented sand pockets, moderate HCl reaction.	SC	72.5		-	12+10+10 N =20		
19.5	FAT CLAY, moist, mottled yellowish brown and light gray, trace fine to medium sand, contains fine to medium clayey sand pockets.	CH	70.0		20  \  _ -	REC =14"		
-	gray, trace mica.					2+2+3 N =5 REC =18"	w=32% LL=57 PL=33	
	continued on next page				25   -			

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant **B-333 Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** CH moist, gray, trace fine to medium sand. \*Shelby tube sampler push from 28.5 to w=38.9% REC =24" LL=52 30.5 ft. PL=19 -30 PP=2.25 tsf 4+4+6 gray and dark gray, trace mica. N = 10REC =18" -35 moist, gray, with fine to medium sand, trace mica. \*Shelby tube sampler push w=39.7% REC =24" from 38.5 to LL=61 40.5 ft. PL=23 PP=4.00 tsf 43.5 46.0 w=26.1% SILTY SAND, fine to medium grained, SM 5+8+8 moist, dark blackish gray, trace fine to N =16 medium shell fragments (±1%), contains REC =18" fine to medium moderately cemented sand pockets, weak HCI reaction.

41.0

36.0

SC

SM

\*Shelby tube sampler push

from 48.5 to

48.8 ft

w=25.2%

LL=34

PL=13

w=20.9%

REC =4"

18+32+33

REC =16"

N =65

-50

-55

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

48.5

53.5

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

CLAYEY SAND, wet, gray, some fine to

coarse shell fragments (±30%), contains

clayey sand and lean clay pockets,

SILTY SAND, moist, gray, with fine to

medium sand, trace fine to medium

shell fragments (±5%), moderate HCl

continued on next page

strong HCI reaction.

reaction, trace mica.

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Schnabel Engineering

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

	el Engineering LOG				Sheet			
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	SAMPLING DEPTH DATA		TESTS	REMARK
		SM				4+4+6 N =10 REC =18"	w=34.5%	
62.0	SANDY SILT,fine to medium, moist, gray, contains strongly cemented sand pockets and indurated silt pockets, weak HCl reaction, trace fine to medium shell fragments (±1%).	ML	27.5		  	22+12+15 N =27 REC =8"		*Slight to moderate difficulty in rotary advancement below 62 ft. *Slight to moderately difficult drilling as rotary advanced
67.0	SILTY SAND, with gravel, fine to medium grained, wet, light oliveish gray and greenish gray, contains thin (1 inch) shell bed layer and strongly cemented sand pockets, trace fine to coarse shell fragments (±5%), strong HCI reaction.	SM	22.5			50 REC =6"	w=19.3% *	below 65.5 ft *Switched tt 3-7/8" Tri-corroller bit belefes.5 ft. *Moderate difficultly in rotary advancement below 68 ft (moderate do rig chatter).
- - - -	gray, few fine to coarse shell fragments (±10%), weak HCl reaction, (weak HCl reaction applicable to test area where no shell fragments were observed).				ا	8+9+14 N =23 REC =18"		*Difficult to v difficult rotar advancemer from 69.5 to ft (moderate strong rig chatter).
78.5	POORLY GRADED SAND WITH SILT, trace fine to medium shell fragments (±5%).	SP-SM	11.0		X  ı	5+8+12 N =20 REC =18"	w=28.7% LL=NP PL=NP *	
87.0	light greenish gray and gray, trace fine to medium shell fragments (±1%), contains silt pockets, weak HCl reaction.				Γ ∃IXII i	4+6+7 N =13 REC =18"		
	SILTY SAND, fine to medium grained, wet, light greenish gray and gray, trace fine to medium shell fragments (±1%), moderate HCl reaction.	SM	2.5		ا	6+6+11 N =17 REC =18"		
-	continued on next page							

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant **B-333 Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SM \*Moderate to light gray and gray, mostly fine to coarse shell fragments (±50%), contains w=16.1% 11+39+50/5" dufficult rotary N =89/11" advancement fine to medium sandy lean clay pockets, strong HCl reaction, strong REC =17" below 95.5 ft (moderate to strong rig chatter at 95.5, cementation, contains black particles (<1/8 inch). 97, and 98 ft).  $\boxtimes$ 98.8 -9.3 50/4" mostly moderately cemented sand below 98.7 ft. BOTTOM OF BORING @ 98.8 FT. N = 50/4" REC =4"

## Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

chnabel Schnabel Engineering

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Evans Drilling Method: Mud Rotary **Drilling Equipment:** Failing-1500 Schnabel Representative: R. Vinzant Dates Started: 5/23/06 Finished: 5/24/06

**Location:** Northing: 216515.53 ft Easting: 960556.61 ft

**Ground Surface Elevation:** 86.8 (feet)

		000				
	Groundy	vater Obs	ervations			
	Date	Time	Depth	Casing	Caved	
Encountered	5/23		11.0'			
Start of day	eart of day 5/24		4.0'			

EPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	SAMPLING	TESTS	REMARKS
(FT)	OTTATA DESCRIPTION	JEAGG.	(FT)	772	DEPTH DATA		KEMMIKK
-	POORLY GRADED SAND WITH SILT, fine to medium grained, wet, dark brown, and organic matter.	SP-SM			1+1+2 N =3 REC =18"	w=9.6% *	
-	Yellowish brown, contains root fragments.				1+1+1 N =2 REC =18"		
5.0	SILTY SAND, light brown	SM	81.8		4+2+2 N =4 REC =12"	w=15.9%	
7.5	LEAN CLAY, moist, oliveish gray, with sand, Fine-med. sand.	CL	79.3		1+1+1 N =2 REC =18"		
9.5	SILTY SAND, fine to medium grained, wet, light gray.	SM	77.3	∑	10 	w=15.6% LL=NP PL=NP *	
- - -	Orangeish brown, Med coarse sand.				4+7+7 N =14 REC =18"		
18.5	SANDY LEAN CLAY, moist, greenish gray, contains mica.	CL	68.3		1+1+2 N =3 REC =18"	w=31.3%	
23.0	FAT CLAY with sand, moist, dark greenish gray	СН	63.8		REC =24"	w=35.3% LL=51 PL=16	
_	continued on next page				25	PP=2.00 tsf	

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing.

TEST Project: Calvert Cliffs Nuclear Power Plant B-334 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA CH w=42.5% 3+5+5 N =10 REC =18" -30 No PP due to 33.0 53.8 w=32.6% LEAN CLAY, moist, gray CL bent tube **REC =13"** LL=47 PL=13 -35 38.5 48.3 SILTY SAND, fine to medium grained, SM 6+6+7 moist, greenish gray, contains mica. N =13 REC =18" w=27% 10+15+24 N =39 REC =18" w=27.2% 15+27+50/2" N = 77/8" REC =14" -50 Start of drilling for the day, 53.5 33.3 w=21.4% POORLY GRADED SAND WITH SILT, SP-SM 16+26+36 harder drilling fine to medium grained, wet, light gray, shell fragments, moderate HCl reaction, N =62 REC =18" -55 40% fine-med. shell. 56.0 30.8 SILTY SAND, fine to medium grained, SM wet, light gray, shell fragments, strong HCl reaction, 40% shell.

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

continued on next page

2. \* = See Appendix I for additional lab testing.

TEST Project: Calvert Cliffs Nuclear Power Plant B-334 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SM 12+12+9 N =21 REC =18" 61.0 25.8 SILTY GRAVEL with sand, fine to GM medium grained, wet, greenish gray, shell fragments, contains cemented sand, weak HCI reaction, 5% med. coarse shell. w=19%  $\boxtimes$ 50/5" LL=NP N = 50/5" PL=NP REC =5" -65 66.0 20.8 SILTY SAND, fine to medium grained, wet, greenish gray, shell fragments, SM contains cemented sand, weak HCI reaction, 5% fine - med. shell. 7+7+7 N =14

REC =18"

10+11+15 N =26

REC =18"

5+7+13 N =20

4+6+10 N =16 REC =18"

4+7+12 N =19 REC =18"

-85

-90

REC =18"

w=27.3%

w=28%

Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

2. \* = See Appendix I for additional lab testing.

25% med. - coarse shell.

continued on next page

Moderate HCI reaction, 15% med. -

coarse shell.

3% med. - coarse shell.

3% fine - med. shell.

**TEST B-334** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SM 21+50/5" N =50/5" Light gray, strong HCI reaction, 40% med. - coarse shell. REC =11" -95 w=28.9% Light gray, 25% med. - coarse shell. 9+14+22 N =36 REC =18" 100.0 -100--13.3BOTTOM OF BORING @ 100.0 FT.

## Comments:

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

<sup>2. \* =</sup> See Appendix I for additional lab testing.

chnabel Schnabel Engineering

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-335 Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings **Drilling Method:** Mud Rotary **Drilling Equipment:** CME-750 Schnabel Representative: B. Bradfield Dates Started: 5/2/06 Finished: 5/3/06

**Location:** Northing: 216732.7 ft Easting: 960703.3 ft

**Ground Surface Elevation:** 99.5 (feet)

	Ground	water Obs	ervations	i	
	Date	Time	Depth	Casing	Caved
Encountered	5/2		19.0'		

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	SAMPLING	TESTS	REMARKS
(FT)	5113(17( B255)(11 115)(	0271001	(FT)		DEPTH DATA	.20.0	112111711111
0.4	ROOTMAT AND TOPSOIL.	CD CM	99.1		2+3+3		
2.5	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, orangeish brown, trace root fragments.	SP-SM	97.0		N =6 REC =15"		
2.J - -	LEAN CLAY with sand, moist, orangeish brown, trace root fragments.	CL	97.0		1+3+4 N =7 REC =13"		
5.0 —	SILTY SAND, fine to medium grained, moist, orangeish brown.	SM	94.5		1+2+1 N =3 REC =8"		
7.5 - -	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, brown and orangeish brown.	SP-SM	92.0		4+5+10 N =15 REC =16"		
10.5	SILTY SAND, fine to medium grained, moist, brown and orangeish brown.	SM	89.0		10   12+12+7 N =19 REC =14"		
13.5 - -	POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, white and orangeish brown.	SP-SM	86.0		7+8+13 N =21 REC =12"		
	wet, orange and brownish yellow.			Ā	7+9+10 N =19 REC =18"		
23.5 24.5	CLAYEY SAND, fine to coarse grained, moist, brown and reddish yellow, trace fine gravel.	SC SM	76.0 75.0		7+7+2 N =9		
	continued on next page				20		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-335 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SILTY SAND, trace fine gravel, fine to SM coarse grained, wet, yellow and orangeish brown. 28.5 71.0 CL WOH+WOH LEAN CLAY with sand, moist, gray. Resumed +9 drilling on 5/3/06, drilling mud @ ground N =9 -30 REC =18" surface PP=2.50 tsf REC =24" 33.5 66.0 СН WOH+3+3 FAT CLAY with sand, moist, gray. N =6 REC =18" -35 PP=2.50 tsf REC =24" 56.0 43.5 LEAN CLAY with sand, moist, gray. CL 4+4+5 N =9 REC =18" PP=>4.5 tsf gray and light gray. 4+4+5 N =9 REC =18" continued on next page

## Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

B-335 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** CL tube refusal at 58.8 40.7 REC =1" 13 inches POORLY GRADED SAND WITH SILT. SP-SM 30+50/2" bent tube fine to coarse grained, moist, gray and N =50/2" -60 light gray, trace fine to medium shell REC =13" fragments, moderate HCl reaction. hard pan encountered 63.5 36.0 SILTY SAND, moist, light gray, trace fine to medium shell fragments, SM 15+18+21 N = 39REC =18" moderate HCl reaction. fine to coarse shell fragments, strong 18+20+20 HCI reaction. N = 40REC =17" 73.5 26.0 PP=1.50 tsf LEAN CLAY with sand, moist, light gray CL 10+50/2" and white, trace fine to medium shell N = 50/2" fragments, strong HCl reaction. REC =17" Changed to -75 roller bit 78.5 21.0 POORLY GRADED SAND WITH SILT, SP-SM 8+8+24 79.2 20.3 fine to coarse grained, moist, light gray N = 32SM and white, with fine to coarse shell REC =18" fragments, strong HCI reaction. SILTY SAND, fine to medium grained, moist, light gray and grayish brown, with fine to coarse shell fragments, strong HCI reaction. gray and white. 6+8+7 N =15 **REC =18"** -85 dark gray and white. 5+3+5 N =8 REC =18" -90 continued on next page

Calvert Cliffs Nuclear Power Plant

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

TEST

Project:

2. \* = See Appendix I for additional lab testing data.

**TEST B-335** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SM wet, gray and greenish gray, trace fine to coarse shell fragments. 4+5+5 N =10 REC =18" SILTY SAND, fine to medium grained, SM 5+7+9 wet, gray and greenish gray, trace shell N =16 fragments. REC =18" 100.0 -100 -0.5 BOTTOM OF BORING @ 100.0 FT.

## Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.



Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-336 Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings Drilling Method: Mud Rotary Drilling Equipment: CME-750 (ATV) Schnabel Representative: K. Megginson Dates Started: 5/12/06 Finished: 5/15/06

**Location:** Northing: 216632.91 ft Easting: 960750.27 ft

**Ground Surface Elevation:** 96.9 (feet)

		Sileet.	1 01 4		
	Ground	vater Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	5/12		10.5'		
Start of day	5/15		12.8'		

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	s	AMPLING	TESTS	REMARKS
(FT)	0.13177. D200111 11011		(FT)		DEPTH	DATA		
0.3	Forest litter, rootmat and topsoil.	FILL	96.6			3+4+3		*NWJ rods
	Silty sand PROBABLE FILL, fine to coarse grained, moist, brown, FILL.	1166			<u> </u>	N =7 REC =18"		used.
-	fine to medium grained.					2+2+2 N =4 REC =11"		
-	brown and grayish brown.				- 5 -	WOH+1+2 N =3 REC =12"		
-	brown.					1+1+1 N =2 REC =10"		
10.5	Clayey sand PROBABLE FILL, fine to medium grained, wet, brown, contains	FILL	86.4	$\bar{\triangle}$	10 	WOH+WOH		
11.5	leaf fragments.  CLAYEY SAND, fine to medium grained, moist, brown.	SC	85.4			N =6 REC =16"		
-	light blueish gray.					2+6+4 N =10 REC =14"	w=11.4%	
17.0	SANDY LEAN CLAY, fine to medium, moist, light blueish gray and light	CL	79.9					
-	orangeish brown.					WOH+3+6 N =9 REC =14"	PP=2.00 tsf	
22.0	SANDY SILT, fine to medium, wet,	ML	74.9					
-	yellowish brown and light gray.				 M	1+2+1 N =3	PP=1.00 tsf	
_	continued on next page				25_			

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.
   Ground water observation well OW-336 installed at nearby location.

TEST Project: Calvert Cliffs Nuclear Power Plant **B-336 Boring Number:** hnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** ML 69.9 27.0 FAT CLAY, moist, gray, trace fine to CH medium sand and mica. w=26.9% 1+3+4 N =7 **REC =18"** PP=2.25 tsf REC =27" trace fine sand. -35 37.0 59.9 ELASTIC SILT, moist, light greenish MH gray and gray, trace fine sand and mica. 3+4+6 N =10 REC =18" 42.0 54.9 CH FAT CLAY, moist, gray, trace fine sand and mica. PP=3.25 tsf REC =27" 47.0 49.9 SANDY LEAN CLAY, fine to medium, CL moist, gray, trace mica. w=25.9% 6+6+7 N =13 \*\*Resumed REC =18" drilling at 8:45 AM on 5/15/06. 52.0 44.9 CLAYEY SAND, fine to medium SC grained, moist, gray, contains clayey sand pockets. PP=NA tsf REC =19" -55 \*Relative difficultly in 56.0 40.9 POORLY GRADED SAND WITH SILT, SP-SM rotary fine to medium grained, trace coarse advancement gravel, contains clayey sand pockets, below 56 ft. moist, gray. continued on next page

## Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-336 installed at nearby location.

TEST Project: Calvert Cliffs Nuclear Power Plant **B-336 Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SP-SM 33+50 N =50 REC =12" -60 62.0 34.9 SILTY SAND, fine to medium grained, SM moist, gray, trace fine to medium shell fragments (±5%), weak HCl reaction.  $\boxtimes$ 50/5" N = 50/5" REC =4" -65 w=19.6% wet, gray, little fine to coarse shell fragments (±20%), strong HCl reaction. 20+17+20 N =37 REC =14" \*Moderate to difficult rotary  $\bowtie$ moist, light gray, mostly moderately 50/3" advancement N = 50/3" cemented sand layers, weak HCI below 73.5 ft. reaction. REC =2" \*Slight to -75 moderate difficultly in rotary advancement below 75 ft.  $\bowtie$ 50/3" wet, oliveish gray and light gray, few fine to coarse shell fragments (±10%), N = 50/3"moderate HCI reaction, moderate REC =4" cementation w=27.3% gray, trace fine to coarse shell 6+7+12 fragments (±5%), strong HCl reaction, N =19 (strong HCl reaction with shell **REC =18"** -85 fragments only). weak HCl reaction. 7+6+14 N = 20REC =18" -90 continued on next page

## Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-336 installed at nearby location.

**TEST** Project: Calvert Cliffs Nuclear Power Plant **B-336 Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SM gray, trace fine to medium shell fragments (±5%), contains contains clayey sand layers, weak HCl reaction. 7+7+11 N =18 ∐ REC =18" 97.0 -0.1 CLAYEY SAND, fine to medium SC grained, wet, gray, trace fine to medium shell fragments (±1%), weak HCl reaction. w=32.1% 4+6+7 N = 13REC =18" 100.0 -100--3.1 BOTTOM OF BORING @ 100.0 FT.

## Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-336 installed at nearby location.



**Project:** Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Boring Number: B-33

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Bender
Drilling Method: Mud Rotary
Drilling Equipment: CME-550
Schnabel Representative: K. Bell

Dates Started: 6/6/06 Finished: 6/7/06

**Location:** Northing: 217257.88 ft Easting: 960264.41 ft

**Ground Surface Elevation:** 71.8 (feet)

	Groundy	vater Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	6/6		9.0'		
Start of day	6/7		10.0'		

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	s	AMPLING	TESTS	REMARKS
(FT)		JEAGG.	(FT)	***	DEPTH	DATA	12010	I CHIAINO
0.8	ROOTMAT AND TOPSOIL.		71.0					
2.5	POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, yellowish brown and orangeish brown, trace root fragments.	SP-SM	69.3			1+2+2 N =4 REC =9"		
4.5	CLAYEY SAND, fine to coarse grained, moist, orangeish brown, trace root fragments, trace wood fragments.	SC	67.3			3+3+4 N =7 REC =15"		
4.5	POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, orangeish brown.	SP-SM	07.3		- 5 - \	3+3+2 N =5 REC =7"		
7.0	SILTY SAND, fine to medium grained, wet, gray.	SM	64.8	$\bar{\Delta}$		2+3+3 N =6 REC =16"		
_ - -					10- 	3+3+6 N =9 REC =18"		
13.0	SANDY ELASTIC SILT, wet, gray.	MH	58.8			2+3+4 N =7 REC =18"		resumed drilli on 6/7/06 @ 7:30am
17.0	SILTY SAND, fine to medium grained,	SM	54.8					
- - -	wet, gray.					5+7+7 N =14 REC =18"		
22.0	FAT CLAY, moist, gray, trace sand.	СН	49.8					
						4+5+7 N =12 REC =18"		
-	continued on next page				<u> </u>	1.0 = 10		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-337 **Boring Number:** hnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** CH 27.0 44.8 CLAYEY SILT, moist, gray, trace sand. ML 4+6+6 N =12 **REC =18"** w=29% 9+19+50 N =69 REC =16" -35 37.0 34.8 SILTY SAND, fine to medium grained, SM moist, gray and white, contains fine to medium shell fragments, 20-30%, weak cementation, HCl reaction strong. 29+50/4" N = 50/4" REC =9" wet, with fine to coarse shell fragments, 13+17+17 40-50%. N =34 REC =15" 47.0 24.8 CLAYEY SAND, moist, greenish gray, SC trace fine to medium shell fragments, 2-5%, HCl reaction weak. w=39.9% 3+5+5 N =10 REC =18" w=25.7% REC =13" LL=38 PL=19 -55 PP=2.00 tsf

14.8

SM

## Comments:

57.0

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

SILTY SAND, fine to medium grained,

wet, greenish gray, contains fine to continued on next page

TEST Project: Calvert Cliffs Nuclear Power Plant B-337 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** coarse shell fragments, 20-30%, HCI SM reaction strong. 21+20+10 N = 30REC =18" 62.0 9.8 LEAN CLAY with sand, wet, greenish CL gray, trace fine to coarse shell fragments, 10-20%, HCl reaction weak. 5+8+10 N =18 REC =18" 67.0 4.8 SILTY SAND, fine to medium grained, SM wet, greenish gray and white, trace fine to medium shell fragments, 5-10%, HCI reaction weak. 4+6+9 N =15 REC =18" w=30.9% 5+5+9 N =14 REC =18" 4+5+8 N =13 REC =18" Rig chatter  $|\boxtimes|$ 50/5" fine to coarse grained, gray and white, N = 50/5" with fine to coarse shell fragments, 50-60%, strong cementation, HCI REC =4" -85 reation strong. Rig chatter w=21% 12+14+50/5" contains fine to coarse shell fragments, 10-20%. N =64/11" □ REC =16" -90

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

continued on next page

**TEST B-337** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SM 92.0 -20.2 SANDY SILT, wet, greenish gray, trace fine to medium shell fragments, 5-10%, ML HCI reaction weak. 4+7+12 N =19 REC =18" 4+5+7 N =12 REC =18" 100.0 -28.2 -100-BOTTOM OF BORING @ 100.0 FT.

## Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion. 2.  $\star$  = See Appendix I for additional lab testing data.

chnabel Schnabel Engineering

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Bender Drilling Method: Mud Rotary **Drilling Equipment:** CME-550 Schnabel Representative: K. Bell

Dates Started: 6/8/06 Finished: 6/13/06

Location: Northing: 217121.1 ft Easting: 960150.1 ft

**Ground Surface Elevation:** 98.0 (feet)

	Groundy	vater Obs	ervations								
	Date	Time	Depth	Casing	Caved						
Encountered	6/8		25.0'								
Start of day	6/13		35.0'								

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	S	AMPLING	TESTS	REMARKS
(FT)		JLAGO.	(FT)	***	DEPTH	DATA	12010	KEMAKKO
0.5	ROOTMAT AND TOPSOIL.	SP-SM	97.5			3+3+3		
-	POORLY GRADED SAND WITH SILT,	3P-3IVI			H 11X	2+2+2 N =4		
4	fine to coarse grained, moist, yellowish brown.				L 1 <u>M</u>	REC =12"		
	orangeish brown and reddish brown.					3+3+3		
1	orangolon brown and roudion brown.					N =6		
4					├ <i>┤</i> Ľ\	REC =18"		
					_ 5 _			
	trace gravel.					3+4+5 N =9		
+						REC =16"		
4					<b>├</b>			
						5+6+7		
1						N =13		
-					├ <i>┤</i> └	REC =18"		
_					-10-			
	trace gravel.					7+8+9		
1	trace graver.				├   X	N =17		
4					├ <i>┤</i> ८	REC =18"		
						0.0.0		
+					$\vdash \exists \exists$	6+8+6 N =14		
					L_15-   <u> </u>	REC =16"		
1								
17.0	CLAYEY SAND, fine to coarse grained,	SC	81.0		-			
	wet, orangeish brown.							
						61410		resumed drilling on
-					H 11X	6+4+9 N =13		6/9/06 @ 7:0
_					<u> </u>	REC =18"		fat clay layer
7								
+					<del> </del>			
_					L ]			
						2+2+2		
1				_	X	N =4		
4	applianced or a sector as			$\overline{\Delta}$	-25- <sup>[/</sup>	REC =16"		
	continued on next page							

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST B-338** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SC 27.0 71.0 LEAN CLAY, moist, gray, with sand. CL color change in 1+2+2 mud tub from N =4 orangeish **REC =18"** brown to gray 32.0 66.0 FAT CLAY, moist, gray, with sand. СН 2+3+3 N =6 REC =18" -35 1+3+4 N =7 REC =18" 56.0 42.0 SANDY SILT, moist, gray. ML 3+3+4 N =7 REC =18" PP=>4.5 tsf REC =24" 49.5 48.5 ELASTIC SILT, moist, gray, trace sand. MH -50

41.0

ML

6+8+11 N =19 REC =18"

## Comments:

57.0

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

cementation.

SANDY SILT, moist, gray, weak

continued on next page

TEST Project: Calvert Cliffs Nuclear Power Plant **B-338 Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** ML9+11+14 N =25 REC =18"  $\boxtimes$ 50/5" N = 50/5" REC =5" -65 Rig chatter 67.0 31.0 SILTY SAND, fine to medium grained, SM wet, gray and white, contains fine to coarse shell fragments, 30-40%, HCl reaction strong, 1/2" clay lense. 10+17+19 N =36 REC =15" 72.0 26.0 LEAN CLAY, moist, greenish gray, trace CL sand, trace fine to medium shell fragments, 2-5%, HCI reaction weak. 5+5+7 N = 12REC =18" 77.0 21.0 CLAYEY SAND, fine to medium SC grained, moist, greenish gray, trace fine to coarse shell fragments, 2-5%, HCI reaction weak. 4+4+6 N = 10REC =18" Rig chatter 82.0 16.0 SILTY SAND, fine to coarse grained, SM wet, light gray, contains fine to coarse no shelby tube shell fragments, 20-30%, strong taken due to cementation, HCl reaction strong. 7+19+21 heavy rig N = 40chatter **REC =18"** Resumed -85 drilling on 6/13/06@ 7:00am greenish gray and white. 7+9+12 N =21 REC =18"

-90

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

continued on next page

**TEST B-338** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SM  $|\boxtimes|$ 50/4" with fine to coarse shell fragments, 50-60%, strong cementation. N = 50/4" REC =3" -95 REC =0" 3+6+6 contains fine to medium shell N =12 fragments, 10-20%, HCl reaction moderate. REC =18" PP=2.00 tsf REC =7" 99.6 -1.6 BOTTOM OF BORING @ 99.6 FT.

## Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.



**Project:** Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Boring Number: B-339

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Bender
Drilling Method: Mud Rotary
Drilling Equipment: CME-550
Schnabel Representative: K. Bell

Dates Started: 6/7/06 Finished: 6/8/06

**Location:** Northing: 217095.21 ft Easting: 960211.99 ft

**Ground Surface Elevation:** 92.0 (feet)

	Ground	water Obs	ervations	i	
	Date	Time	Depth	Casing	Caved
Encountered	6/7		15.0'		
Start of day	6/8		13.5'		

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	SAMPLING	TESTS	REMARKS
(FT)			(FI)		DEPTH DATA		
0.5	POORLY GRADED SAND, trace gravel, trace silt, fine to coarse grained,	SP	91.5		1+4+6 N =10 REC =15"		
_	moist, yellowish brown. orangeish brown.				3+2+3 N =5 REC =10"		
_					3+3+4 N =7 REC =16"	w=6.9% *	
_	reddish brown and orangeish brown.				5+6+6 N =12 REC =17"		
-					-10- - 4+6+6 N =12 REC =16"		
13.5	SILTY SAND, trace rock fragments, red-brown, 0.5" cemented sand lense	SM	78.5	Ā	7+11+9 N =20 REC =18"	w=19.9%	
17.0	CLAYEY SAND, fine to medium grained, wet, orangeish brown and gray.	SC	75.0		  		resumed drilli on 6/8/06 @
			70.0		N =3 REC =18"		7:30am
22.0	LEAN CLAY, wet, gray, with sand.	CL	70.0		1+3+6 N =9 REC =18"		
-	continued on next page	1			-25-    REC =18"		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

	el Engineering LOG	LOG CLASS ELEV. WI					t: 2 of 4			
OEPTH (FT)	STRATA DESCRIPTION	ATA DESCRIPTION CLASS. EL				MPLING	TESTS	REMARKS		
` ''		CL	,		DEPTH	DATA				
27.0			05.0							
27.0 +	SANDY FAT CLAY, wet, gray, with	СН	65.0		[ ] [					
-	sand.				<b>-</b> -					
_						2+2+3	w=31.5% LL=55			
						N =5 REC =18"	PL=19			
					-30		*			
4					F - 1					
_										
7							w=27%			
4					<b>├ -</b>     2	2+3+4 N =7	LL=62			
						REC =18"	PL=21			
1					[ ] [					
-					<b> </b>					
_										
						2+3+5	w=28.6%			
1					X   N	<b>√ =8</b>	LL=71 PL=17			
4					-40- ∐ F	REC =18"	*			
_										
1					[ ] [					
+					+ +					
4					<u> </u>	3+4+7	w=31% LL=60			
					45	N =11 REC =18"	PL=22			
$\neg$					_45		*			
4										
4										
48.5	CANDY I FAN OLAY J- I	01	43.5			1.0.7	w=27.8%			
-	SANDY LEAN CLAY, dark gray	CL			H	l+6+7 N =13	LL=40			
					I IIVII	1 10				
_						REC =17"	PL=20 *			
					1 11/ \11 =	REC =17"	PL=20 *			
-					1 11/ \11 =	REC =17"	PL=20 *			
					1 11/ \11 =	REC =17"	PL=20 *			
_ - - -					1 11/ \11 =	REC =17"	PL=20 *			
53.5	SILTY SAND, moist, greenish gray,	SM	- 38.5		-50-V) F	REC =17" 6+11+15	* w=30.8%			
53.5	SILTY SAND, moist, greenish gray, trace sand.	SM	- 38.5		-50 V F	REC =17" 6+11+15 N =26	*			
53.5	SILTY SAND, moist, greenish gray, trace sand.	SM	- 38.5		50 V F	REC =17" 6+11+15	* w=30.8% LL=48			
53.5	SILTY SAND, moist, greenish gray, trace sand.	SM	- 38.5		-50 V F	REC =17" 6+11+15 N =26	* w=30.8% LL=48			
- - -	trace sand.				-50 V F	REC =17" 6+11+15 N =26	* w=30.8% LL=48	Harder drillin		
53.5	SILTY SAND, moist, greenish gray, trace sand.  POORLY GRADED SAND WITH SILT, fine to medium grained, wet, gray and	SM SP-SM	- 38.5		-50 V F	REC =17" 6+11+15 N =26	* w=30.8% LL=48	Harder drillin		

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.

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Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

B-339 **Boring Number:** Contract Number: 06120048

Schnab	el Engineering LOG					SI	heet: 3 of 4	
DEPTH (FT)	STRATA DESCRIPTION	ON CLAS	CLASS. ELEV.			AMPLING	TESTS	REMARKS
-	white, contains fine to coarse s fragments, 10-20%, strong cementation, HCl reaction mod					28+50/5" N =50/5" REC =10"	w=28.1% LL=NP	
62.0	CLAYEY SAND, fine to coarse wet, gray and white, with fine to shell fragments, 60-70%, HCI strong.	coarse	30.0		65	8+8+7 N =15 REC =18"	w=25% LL=49 PL=21 *	
67.0	ELASTIC SILT, moist, gray and greenish gray, trace sand.	н мн	25.0			4+5+5 N =10	w=38.8% LL=53 PL=38	
72.0	SILTY SAND, fine to coarse grayet, gray, Strong cementation, reaction strong.	ained, SM HCI	20.0		70 -   \( \) \( \) 75	S0/2" N =50/2" REC =1"	****	No shelby tub taken due to heavy rig chatter
- - - -	fine to medium grained, gray an with fine to coarse shell fragme 40-50%.	nd white, ents,			80	21+22+15 N =37 REC =18"		
- - - -	greenish gray and white, conta to coarse shell fragments, 10-2 reaction moderate.	ins fine 0%, HCl				5+7+12 N =19 REC =18"	w=31.5% *	Rig chatter
88.5	POORLY GRADED SAND WIT contains shells, dark gray	TH SILT, SP-SI	3.5			7+7+14 N =21 REC =18"	w=29% *	
+	continued on next page				+ +			

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.

**B-339** Project: **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG DEPTH **SAMPLING** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SP-SM w=31.7% 5+6+10 N =16 REC =17" w=32.7% 4+5+8 N =13 REC =18" 100.0 -100--8.0 BOTTOM OF BORING @ 100.0 FT.

Calvert Cliffs Nuclear Power Plant

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion. 2.  $\star$  = See Appendix I for additional lab testing data.

**TEST** 



Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

B-340 **Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: T. Chew Drilling Method: Mud Rotary

Drilling Equipment: Diedrich D-50 (ATC) Schnabel Representative: B. Bradfield Dates Started: 8/3/06 Finished: 8/7/06

**Location:** Northing: 217171.34 ft Easting: 961225.22 ft

**Ground Surface Elevation:** 84.6 (feet)

	Ground	water Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	8/3		13.5'		

DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	SAMPLING	TESTS	REMARKS
0.4	TOPSOIL. SILTY SAND, fine to coarse grained,	SM	84.2		DEPTH DATA  3+5+5  N =10  REC =18"		0-15'- Used 6 1/4" HSA to enlarge hole for
_	moist, orangeish brown, trace root fragments, trace gravel, PROBABLE FILL.				3+3+2 N =5 REC =18"		taking Pitcher samples
	brown, trace gravel.				2+2+2 N =4 REC =18"		
_					4+2+2 N =4 REC =18"		
_	grayish brown.				10   5+5+5 N =10 REC =18"		
13.0 -	CLAYEY SAND, fine to coarse grained, wet, orangeish brown.	SC	71.6	Ā	4+9+9 N =18 REC =16"		15'- Start of d 8/4/06
- 17.0 -	CIL TV CAND fine to copyed grained	SM	67.6				15'- Begin mu rotary
- -	SILTY SAND, fine to coarse grained, wet, orangeish brown.	SIVI			4+6+6 N =12		
-					20   REC =13"		
22.0 -	SANDY FAT CLAY, fine to medium, moist, dark gray.	СН	62.6				
_	continued on payt page				4+2+4 N =6 REC =18"		
	continued on next page				25		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-340 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA CH 3+3+4 with sand, contains mica. N =7 **REC =18"** 4+6+8 gray. N =14 REC =18" -35 37.0 47.6 CLAYEY SAND, fine to medium SC grained, wet, dark gray, contains mica. 5+7+9 N =16 REC =18" 42.0 42.6 POORLY GRADED SAND WITH SILT, SP-SM fine to coarse grained, wet, dark orangeish brown, trace cemented sand, weak cementation. 8+8+8 N =16 45'- Driller REC =18" noted harder drilling 29+34+50/4" fine to medium grained, light brownish N =84/10" white. REC =0" -50 light gray. 31+50/5" N = 50/5" REC =7" -55 27.6 57.0 FINE TO MEDIUM SANDY FAT CLAY, CH moist, gray and brownish white, 0-10%

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

continued on next page

TEST Project: Calvert Cliffs Nuclear Power Plant B-340 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH **DATA** fine to medium shell fragments, СН moderate HCl reaction, HCl reaction 4+4+20 localized to decomposed shell N = 24fragments. REC =18" 62.0 22.6 CLAYEY SAND, fine to medium SC grained, wet, light gray and brownish white, 20-30% fine to coarse shell fragments, some cemented sand, 7+13+15 strong HCl reaction, moderate N =28 cementation, HCl reaction localized to REC =18" decomposed shell fragments. 66'- Pitcher 1' zone of strongly cemented sand and fine to coarse shell fragments, strong sample; HCl reaction, gray weak cementation, HCl reaction 68'- Start of day localized to decomposed shell 6+8+12 8/7/06 N =20 fragments. REC =11" 20-30% fine to coarse shell fragments, 7+14+40 with cemented sand, strong HCI N = 54reaction, moderate cementation, 1" of REC =12" highly cemented sand at tip of shoe. 77.0 7.6 POORLY GRADED SAND WITH CLAY, SP-SC fine to medium grained, wet, dark gray and brownish white, 0-10% fine to medium shell fragments, moderate HCI 4+7+9 reaction, HCl reaction localized to shell N =16 fragments. REC =16" dark gray, 0-10% fine to medium shell 4+7+14 fragments, weak HCl reaction, HCl N = 21reaction localized to shell fragments. **REC =13"** -85 87.0 -2.4 CLAYEY SAND, fine to medium SC grained, wet, greenish gray and brownish white, 30-40% fine to coarse shell fragments, strong HCI reaction, 4+8+11 HCl reaction generally localized to shell N =19 fragments. REC =18" -90 continued on next page

## Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST B-340** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SC light gray and brownish white, 30-40% 7+10+46 fine to coarse shell fragments, with N =56 cemented sand, strong HCl reaction, strong cementation. REC =15" 97.0 -12.4 POORLY GRADED SAND WITH CLAY, SP-SC wet, dark gray, 0-10% fine to medium shell fragments, weak HCl reaction, HCl reaction localized to very small shell 14+15+27 fragments. N = 42REC =14" 100.0 -15.4 -100 BOTTOM OF BORING @ 100.0 FT.

## Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

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Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-341 Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Evans Drilling Method: Mud Rotary

Drilling Equipment: Failing-1500 (Truck) Schnabel Representative: K. Megginson Dates Started: 7/11/06 Finished: 7/12/06

**Location:** Northing: 217036.4 ft Easting: 961104.48 ft

**Ground Surface Elevation:** 98.2 (feet)

	Ground	water Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	7/11		13.5'		

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	s	AMPLING	TESTS	REMARKS
(FT)	STRATA DESCRIPTION	CLASS.	(FT)	WL	DEPTH	DATA	12313	KEWIAKKS
0.5	Poorly graded sand FILL, fine to coarse grained, moist, light brown, trace silt, contains black filter fabric fragment at 0.5 ft.	FILL	97.7			2+5+7 N =12 REC =10"		
- -	SILTY SAND, fine to coarse grained, moist, brown yellowish brown and light brown. stratified below 3.8 ft					3+4+5 N =9 REC =12"		
-	stratified brown and yellowish brown, trace fine gravel				- 5 -	4+5+6 N =11 REC =12"		
-	yellowish brown.					3+4+4 N =8 REC =13"		
 - -	trace fine to coarse gravel.				10 	5+8+11 N =19 REC =12"		
-	wet, yellowish brown and light orangeish brown. stratified below 14.7 ft.			Ā	  15-	6+10+11 N =21 REC =11"		
-	Sudulieu Delow 14.7 IL							*5.4" O.D. Dra bit from 0 to
- - -	brown and light brown.					3+7+10 N =17 REC =11"		18.5 ft. *Switched to 4-3/4" O.D. Drag bit below 18.5 ft.
-					 			
-	fine to medium grained, light brownish gray, yellowish brown, and orangeish brown, contains clayey sand layer below continued on next page					1+3+2 N =5 REC =4"		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-341 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** 24.7 ft. SM 27.0 71.2 SANDY LEAN CLAY, fine to medium, CL wet, yellowish brown and light grayish brown, contains clayey sand pockets. 2+3+3 gray, trace mica below 29 ft. N =6 **REC =18"** 32.0 66.2 FAT CLAY, moist, brownish gray and СН dark gray, trace fine to medium sand and mica, contains fine to medium clayey sand pockets. 2+2+4 N =6 REC =18" -35 brownish gray and gray, contains fat 2+4+4 clay with fine to medium sand pockets. N =8 REC =18" trace organic matter (±1%), (soil may 3+5+7 lab classify as MH). N =12 REC =18" 47.0 51.2 ELASTIC SILT, moist, gray, trace fine to MH medium sand and mica, contains silty sand and clayey sand pockets and lenses. 6+8+12 N =20 REC =18" 52.0 46.2 CLAYEY SAND, fine to medium SC grained, moist, gray, trace mica. 8+15+27 N = 42REC =18" grayish brown and dark reddish brown, little fine to coarse oxidized shell fragments (±20%), contains silty sand pockets below 54.5 ft. 57.0 41.2 POORLY GRADED SAND WITH SILT, SP-SM

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

fine to medium grained, moist, dark continued on next page

TEST Project: Calvert Cliffs Nuclear Power Plant B-341 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** 'Switched to 5" SP-SM brown and brown. O.D. Tri-cone 40+50/4" roller bit below N = 50/4" 58.5 ft. REC =10" -60 62.0 36.2 POORLY GRADED SAND, trace silt, SP fine to medium grained, moist, gray. \*Switched to 4-3/4" O.D. Drag bit below  $\boxtimes$ 50 REC =5" 63.5 ft. -65 67.0 31.2 SILTY SAND, fine to medium grained, SM moist, gray, some fine to coarse shell Fragments (±40%), strong HCl reaction. 27+50/5" N =50/5" REC =9" \*Very difficult rotary advancement from 73 to 73.5 mostly strongly cemented sand layers 50/2" ft (slow rotary N = 50/2"advancement). (±80%), little fine to coarse shell fragments (±20%). REC =1" \*Very to -75 extremely difficult rotary advancement from 73.5 to 78.5 ft (very strong rig chatter). \*Switched to 5" 21+50/3" oliveish gray, mostly weak to strongly O.D. Tri-cone cemented sand pockets. N = 50/3" roller bit below REC =9" -80 73.5 ft. \*Extremely difficult rotary advancement fron 78.5 to 82.5 ft (very strong rig chatter). gray, trace fine to coarse shell 6+7+11 \*Switched to fragments (±5%), moderate HCI N =18 4-3/4" O.D. **REC =18"** Drag bit below reaction. -85 83.5 ft. \*Osterberg sampler tube push from 88.5 trace fine to medium shell fragments REC =24" (±<5%). to 90.5 ft -90

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

continued on next page

**TEST B-341** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SM very weak HCI reaction 5+8+11 N =19 ∐ REC =15" \*Osterberg sampler tube push from 98.5 to 100.5 ft 97.0 1.2 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, wet, gray, trace fine to medium shell fragments (±1%), moderate HCl reaction, (soil may lab REC =24" classify as SP). -100 100.5 -2.3 BOTTOM OF BORING @ 100.5 FT.

## Comments:

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

<sup>2. \* =</sup> See Appendix I for additional lab testing data.



Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

B-401 **Boring Number:** 

Contract Number: 06120048 **Sheet:** 1 of 13

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Evans Drilling Method: Mud Rotary

Drilling Equipment: Failing-1500 (Truck) Schnabel Representative: K. Megginson Dates Started: 6/19/06 Finished: 6/29/06

**Location:** Northing: 216344.12 ft Easting: 961516.81 ft

**Ground Surface Elevation:** 72.1 (feet)

Date   Time   Depth   Casing   Caved									
	Date	Time	Depth	Casing	Caved				
Encountered	6/19		33.5'						
Start of day	6/20		12.0'						
Start of day	6/22		35.0'						
Start of day	6/26		33.0'						

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	s	AMPLING	TESTS	REMARKS
(FT)	STRATA DESCRIPTION	CLASS.	(FT)	WL	DEPTH	DATA	15313	KEWAKKS
_	SILTY SAND, fine to coarse grained, moist, brown, contains root fragments.	SM				2+3+3 N =6 REC =13"		*Relatively difficult rotary advancement from 2 to 2.5 ft (difficult
-	stratified brown and light brown, trace fine gravel.					2+3+2 N =5 REC =14"	w=3.6%	advancement probably due to large root fragment).
_	fine to medium grained, light brown.				5 -	2+6+12 N =18 REC =13"		*5.4" O.D. Draç bit below 0 ft.
_	fine to coarse grained, brown.				L JM	5+6+7		
9.5	fine to medium grained, light grayish brown and light orangeish brown below 8.5 ft.	СН	62.6			N =13 REC =14"		
-	FAT CLAY, trace fine to medium sand, moist, light gray, yellowish brown and orangeish brown, contains root fragments.					2+4+5 N =9 REC =16"	w=26.6% LL=66 PL=20	*Slight rig chatter at 11 ft
- - -	light gray and yellowish brown, contains dark reddish brown pockets and subvertical planes.				 15-	2+4+4 N =8 REC =18"	w=34.2% LL=62 PL=20 *	
10.5			<b>5</b> 2.6		 			
18.5	SANDY ELASTIC SILT, with shells, gray, trace mica and organic matter (±1%).	МН	53.6			2+3+6 N =9 REC =18"	w=36.9% LL=70 PL=37	*4-3/4" O.D. Drag bit below 18.5 ft.
23.5			48.6		-		07.537	
	SANDY LEAN CLAY, with fine to medium sand, contains clayey sand lenses and pockets, moist, grayish continued on next page	CL	40.0		25	3+5+6 N =11 REC =18"	w=27.9% LL=47 PL=28	

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

- 2. Downhole geophysical logging performed on 6/29/06.

  3. \* = See Appendix I for additional lab testing data.

  4. Ground water observation well OW-401 installed at a nearby location.

TEST Project: Calvert Cliffs Nuclear Power Plant B-401 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG **Sheet:** 2 of 13 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** brown and dark yellowish brown, CL contains dark orangeish brown pockets. fine to medium sandy, gray and grayish 4+7+16 brown, contains dark orangeish brown N = 23pockets. **REC =18"** -30 32.0 40.1 POORLY GRADED SAND, fine to SP medium grained, trace silt, wet, light  $\overline{\nabla}$ brown w=20.8% 23+50/5" N = 50/5" REC =11" -35 37.0 35.1 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, wet, gray. 36+50/5" N = 50/5" REC =8" 30.1 42.0 SM SILTY SAND, fine to medium grained, wet, gray. \*Very to w=21.4% WOH+50/4" extremely moist, oliveish gray, mostly moderately cemented sand (±100%), moderate HCl N = 50/4" difficult rotary REC =4" advancement reaction below 44 ft. from 44 to 48 ft (moderate to strong rig chatter). \*\*Resumed drilling at 6:55 wet, gray, little fine to coarse shell 7+6+15 AM on 6/20/06. fragments (±15%), strong HCl reaction. N =21 \*Switched to 5" REC =18" O.D. Tri-cone roller bit below 48.5 ft. \*Moderate to difficult rotary advancement from 50 to 53.5 ft (moderate to w=31.6% trace fine to coarse shell fragments 4+7+10 strong rig (±5%), very weak HCl reaction. N =17 chatter). REC =18" \*Switched to -55 4-3/4" O.D. Drag bit below 53.5 ft.

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. Downhole geophysical logging performed on 6/29/06. 3. \* = See Appendix I for additional lab testing data.
- 4. Ground water observation well OW-401 installed at a nearby location.

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**TEST** BORING

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

Schnab	el Engineering LOG				ı	Shee	t: 3 of 13	1
DEPTH (FT)	STRATA DESCRIPTION	ON CLASS.	ELEV. (FT)	WL	S. DEPTH	AMPLING DATA	TESTS	REMARK
-	little fine to coarse shell fragme (±20%), weak HCl reaction. gray and light gray, some fine shell fragments (±30%), conta moderately cemented sand postrong HCl reaction below 59.8	to coarse ins ockets,				7+14+50 N =64 REC =18"	w=25%	
-	gray, trace fine to medium she fragments (±1%), very weak H reaction.	ell Cl				5+7+10 N =17 REC =13"		
- - - - -	weak HCl reaction.				  	REC =23"		*Osterberg sampler tube push from 6 to 70.5 ft
- - - - -	gray and light gray, some fine shell fragments (±40%), strong reaction.	to coarse g HCl			  	16+50/5" N =50/5" REC =11"		*Moderate to difficult rotar advancemer from 74 to 7 (moderate to strong rig chatter).
- - - -	gray and oliveish gray, mostly coarse shell fragments (±50% strongly cemented sand pocke	), contains			   80 -	5+20+27 N =47 REC =13"	w=17.5% *	
- - - -	gray and greenish gray, trace medium shell fragments (±1% organic matter (±<1%), weak treaction, contains clayey sand	), trace HCl			  85 -	5+9+13 N =22 REC =16"		
						9+12+17 N =29 REC =18"	w=35.3% *	
1	continued on next page	•						

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   Downhole geophysical logging performed on 6/29/06.
   \* = See Appendix I for additional lab testing data.
   Ground water observation well OW-401 installed at a nearby location.

TEST Project: Calvert Cliffs Nuclear Power Plant B-401 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG **Sheet:** 4 of 13 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SM 92.0 -19.9 МН ELASTIC SILT, moist, gray and light greenish gray, trace fine to coarse shell fragments (±<5%), weak HCl reaction. 6+11+16 N =27 REC =18" -95 \*Osterberg sampler tube w=50.5% REC =15" push from 98.5 LL=78 to 99.8 ft PL=48 -100 PP=>4.5 tsf 103.5 -31.4 SILTY SAND, fine to medium sandy, SM 5+9+22 light greenish gray, trace fine to coarse shell fragments (±5%) and organic N =31 REC =18" matter (±<1%), contains clayey sand w=35.6% 5+10+17 N =27 REC =13" 112.0 -39.9 LEAN CLAY, moist, gray and light greenish gray, with fine to medium sand, trace and fine to coarse shell CL w=46.1% fragments (±5%), strong HCl reaction. 4+8+10 N =18 REC =18" 117.0 -44.9 SILT, moist, gray and light greenish ML gray, with fine to medium sand, trace mica and fine to medium shell fragments (±5%), weak HCl reaction. 5+9+12 N =21 REC =18" -120 122.0 -49.9 ELASTIC SILT, moist, gray, trace fine to МН medium sand, mica, and fine to medium shell fragments (±1%), weak HCl \*Osterberg w=57.4% reaction. REC =16"

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. Downhole geophysical logging performed on 6/29/06.

  3. \* = See Appendix I for additional lab testing data.
- 4. Ground water observation well OW-401 installed at a nearby location.

TEST Project: Calvert Cliffs Nuclear Power Plant B-401 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG **Sheet:** 5 of 13 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** LL=85 sampler tube МН PL=54 push from 125 123.5 to 124.8 PP=>4.5 tsf ft 128.5 -56.4 w=43.8% SANDY SILT, gray and greenish gray, ML 5+6+11 with fine to medium sand, trace fine to N =17 medium shell fragments (±<5%), strong REC =18" -130-HCI reaction. fine to medium sandy, greenish gray, 7+9+11 very weak HCI reaction. N = 20∐ REC =18" -13<del>5</del> 137.0 -64.9 SANDY FAT CLAY, moist, greenish CH \*Osterberg gray, fine to medium sand, strong HCI sampler tube reaction. push from w=44.1% REC =23" 138.5 to 140.5 LL=80 ft PL=31 PP=>4.5 tsf 142.0 -69.9 ELASTIC SILT, moist, greenish gray, МН trace fine to medium sand, weak HCI reaction w=77.1% 7+9+11 LL=142 N = 20PL=104 REC =18" w=72.7% 8+10+12 trace mica. LL=150 N =22 PL=89 REC =18" -150-\*\*Resumed drilling at 6:55 AM on 6/21/06. w=68.8% 6+8+11 LL=142 N =19 PL=93 REC =18" -155

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. Downhole geophysical logging performed on 6/29/06.

  3. \* = See Appendix I for additional lab testing data.
- 4. Ground water observation well OW-401 installed at a nearby location.

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

DEPTH	·		EL EV		0	AMPLING		
(FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	DEPTH	DATA	TESTS	REMARK
- - - -	dark greenish gray.	MH				REC =10"	w=49.9% LL=81 PL=54 PP=>4.5 tsf	*Osterberg sampler tube push from 158.5 to 159. ft
- - - -	with fine to medium sand.				 165- 			
- - - -					  -170-	8+10+15 N =25 REC =18"	w=53.9% LL=103 PL=52 *	
172.0 -	FAT CLAY, trace fine sand, greenish gray.	CH	99.9			REC =11"	w=33.7% LL=57 PL=17 PP=>4.5 tsf	*Osterberg sampler tube push from 173.5 to 174 ft
- - -					- - -180-	4+10+21 N =31 REC =0"		
182.0	SILTY SAND, fine to medium grained, contains clayey sand pockets, wet, dark greenish gray, trace fine to medium shell fragments (±1%), moderate HCl reaction.	SM	109.9		  -185	7+15+22 N =37 REC =18"	w=31.2% *	
187.0	CLAYEY SAND, fine to medium grained, contains sandy lean clay pockets, wet, dark greenish gray and brownish gray, trace fine to medium shell fragments (±1%)	SC	114.9			5+9+19 N =28 REC =11"		

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   Downhole geophysical logging performed on 6/29/06.
   \* = See Appendix I for additional lab testing data.
   Ground water observation well OW-401 installed at a nearby location.

TEST Project: Calvert Cliffs Nuclear Power Plant B-401 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG **Sheet:** 7 of 13 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SC 192.0 -119.9 SANDY SILT, fine to medium, contains MLclayey sand pockets, moist, dark greenish gray, very weak HCl reaction w=49.2% 6+9+17 N =26 **REC =18"** -195 197.0 -124.9 SILTY SAND, fine grained, moist, SM \*Osterberg greenish gray, very weak HCL reaction, sampler tube trace mica. push from w=48.8% REC =22" 198.5 to 200.3 LL=82 PL=55 ft -200 PP=>4.5 tsf 202.0 -129.9 ELASTIC SILT, with fine to medium MH sand, trace mica and organic matter (±1%), moist, greenish gray, very weak w=58.4% HCI reaction. 5+8+13 LL=94 N =21 PL=69 **REC =18"** 205 w=62.7% trace fine to medium shell fragments 7+11+16 LL=113 N =27 (±1%). PL=74 \*\*Resumed REC =18" drilling at 7:00 AM on 6/22/06. 212.0 -139.9 ELASTIC SILT, trace fine to medium МН \*Osterberg sand, contains indurated silt pockets, sampler tube moist, greenish gray, very weak HCI push from PP=>4.5 tsf reaction. **REC =13"** 213.5 to 214.6 215 w=77.4% 7+11+15 trace mica. N =26 REC =18" -220 continued on next page

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. Downhole geophysical logging performed on 6/29/06.

  3. \* = See Appendix I for additional lab testing data.
- 4. Ground water observation well OW-401 installed at a nearby location.

Schnabel

**TEST** BORING

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

Schnab	el Engineering LOG					She	eet: 8 of 13	
DEPTH (FT)	STRATA DESCRIPTION	ON CLASS.	ELEV. (FT)	WL		AMPLING	TESTS	REMARKS
(1.1)			(1 1)		DEPTH	DATA		
-	trace organic matter (±<1%).	MH				9+13+18 N =31 REC =18"		
- - -	contains indurated silt pockets.				 	REC =13"	w=58.6% LL=139	*Osterberg sampler tube push from 228.5 to 229.
- - -					<del>-2</del> 30-		PL=88 PP=>4.5 tsf *	ft
- - -					- - -235	10+15+21 N =36 REC =18"		
-	weak HCl reaction.					8+11+21 N =32 REC =18"	w=122.5%	
	mostly indurated silt layers.				  <del>2</del> 45-	REC =8"	w=96.2% LL=140 PL=65 PP=>4.5 tsf	*Osterberg sampler tube push from 243.5 to 244. ft
- - - - -						7+8+17 N =25 REC =18"	w=122.8% LL=218 PL=100 *	
-						7+10+15 N =25 REC =18"		
			1		ı I	l .	1	I.

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   Downhole geophysical logging performed on 6/29/06.
   \* = See Appendix I for additional lab testing data.
   Ground water observation well OW-401 installed at a nearby location.

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

Schnab	el Engineering LOG	1			1	Shee	t: 9 of 13	I
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL		AMPLING	TESTS	REMARKS
(1 1)		MH	(1.1)		DEPTH	DATA		
- - - -	trace fine to medium sand, very weak HCl reaction.					8+11+19 N =30 REC =18"	w=130.2%	
- - -						9+16+21 N =37 REC =0"		**Resumed drilling at 7:15 AM on 6/23/06
267.0	SILTY SAND, dark green, with fine to medium sand, trace organic matter (±<1%), very weak HCl reaction.	SM	-194.9			7+12+18 N =30 REC =18"	w=63.5% *	
- - - -	greenish gray, weak HCI reaction.					8+12+15 N =27 REC =18"		
- - - - -	trace fine to medium sand, moderate HCI reaction.					50/3" N =50/3" REC =4"		*Switched to O.D. Tri-cone roller bit belov 278.5 ft.
283.0	SANDY ELASTIC SILT, moist, dark greenish gray, trace fine to coarse sand, some fine to coarse shell fragments (±30%), strong HCl reaction.	MH	210.9			11+13+17 N =30 REC =18"	w=30.2% LL=76 PL=42 *	*Very to extremely difficult rotary advancement from 278 to 2 ft (moderate r chatter). *Switched to 9 O.D. Drag bit below 284.5 ft **Resumed
287.0 —	CLAYEY SAND, fine to medium grained, wet, dark brownish gray and blackish gray, few fine to coarse shell fragments (±10%), trace mica, strong continued on next page	SC	-214.9			9+17+23		drilling at 11:0 AM on 6/26/0

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   Downhole geophysical logging performed on 6/29/06.
   \* = See Appendix I for additional lab testing data.
   Ground water observation well OW-401 installed at a nearby location.

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048 Sheet: 10 of 13

Schnak	pel Engineering LOG			ı		Sheet	: 10 of 13	Г	
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	DEPTH	AMPLING DATA	TESTS	REMARKS	
_	HCl reaction, glauconitic	SC				N =40 REC =18"			
- - - - -	dark brownish gray and dark greenish gray, trace fine to coarse shell fragments (±5%). fine to coarse grained, moist, dark brownish gray and blackish gray, trace fine gravel and fine to medium shell fragments (±<5%) below 294.5 ft.					8+12+50/2" N =62/8" REC =14"	w=20.7%	*Switched to 5' O.D. Tri-cone roller bit below 293.5 ft. *Extremely difficult rotary	
- - - -	brownish gray and light blackish gray, trace fine to coarse shell fragments (±5%), weak HCl reaction, contains lean clay layers and pockets.				300	9+14+18 N =32 REC =18"		advancement from 294.5 to 295.5 ft (very strong rig chatter). *Extremely difficult rotary advancement from 297.3 to 298.3 ft (mod t strong rig chatter).	
306.0	SILTY SAND, fine to coarse, contains clayey sand pockets, moist, dark greenish gray and dark blackish brown, very weak HCI reaction	SM	233.9		-305-	10+12+20 N =32 REC =18"	w=27.4% LL=57 PL=42 *	**Resumed drilling at 7:20 AM on 6/27/06 *Switched to 4-3/4" O.D. Drag bit below 298.5 ft.	
- - - 317.0 - - -	SANDY FAT CLAY, fine to medium grained, moist, dark greenish gray and dark blackish gray, very weak HCl reaction, glauconitic.	СН	244.9		-315	18+26+35 N =61 REC =18"	w=28.9% LL=58 PL=28		
-	continued on next page								

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   Downhole geophysical logging performed on 6/29/06.
   \* = See Appendix I for additional lab testing data.
   Ground water observation well OW-401 installed at a nearby location.

Schnabel

**TEST** BORING

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

	el Engineering LOG					<u> </u>	Sheet: 11 of 13		
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL		AMPLING	IESIS	REMARKS	
(1.7)		CH	(,		DEPTH	DAT	'A		
4					L 4				
1					Γ 1				
$\dashv$					325				
4					L 1				
1									
+					<b>-</b> -				
4					$\vdash \dashv \nabla$	11+11+1	7		
					_330_	N =28 REC =0"	,		
					330				
+					<del> </del>				
4					<del> </del>				
]									
+					<u> </u>				
-					-335-				
337.0	SILT with fine to coarse sand, trace fine	ML	-264.9		h 1				
4	gravel and mica, contains sandy lean clay pockets, moist, dark brownish gray and blackish gray, moderate HCl				-				
	and blackish gray, moderate HCl				L 10	8+12+29	w=25.3%		
	reaction, silt exhibits fissility.					N =41 REC =8"			
7					-340- <sup>L</sup>				
+					-				
4					L 4				
7									
+					<del> </del>				
345.0	CILTY CAND fine to seems are in a	CN4	-272.9		345				
	SILTY SAND, fine to coarse grained, moist, dark brownish gray and blackish gay, moderate HCl reaction	SM							
	gay, moderate HCl reaction								
1								*Ostorbora	
4					<del> </del>			*Osterberg sampler tube push from	
_					<u> </u>	REC =7"	w=35.6% LL=52	push from 348.5 to 350.5	
					250		PL=39	ft 540.5 to 550.5	
٦					350		*		
+					<del> </del>				
4					<u> </u>				
7					Γ 1				
4					<del> </del>				
4					355				
	continued on next page		1						

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   Downhole geophysical logging performed on 6/29/06.
   \* = See Appendix I for additional lab testing data.
   Ground water observation well OW-401 installed at a nearby location.

**TEST** Project: Calvert Cliffs Nuclear Power Plant chnabel **Boring Number:** BORING LOG Calvert County, Maryland Contract Number: 06120048

Schna	bel Engineering LOG					Sheet	: 12 of 13	
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	DEPTH	SAMPLING DATA	TESTS	REMARKS
- - - -	contains clayey sand pockets, trace mica, very weak HCl reaction	SM				30+50/5" N =50/5" REC =9"		
367.0 -	POORLY GRADED SAND WITH SILT, fine to medium grained, contains silty sand and lean clay pockets, trace mica, moist, dark brownish gray and blackish gray, very weak HCI reaction.	SP-SM	294.9		-365 370	16+25+44 N =69 REC =18"	w=36.9%	**Resumed drilling at 7:00 AM on 6/28/06.
377.0 -	SILTY SAND, fine to medium grained, moist, dark brownish gray and blackish gray, trace mica, very weak HCl reaction.	SM	304.9		-375-	16+21+36 N =57 REC =18"		
- - - -	fine to coarse grained, contains lean clay pockets, moist, dark brownish gray continued on next page				- 385  			

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   Downhole geophysical logging performed on 6/29/06.
   \* = See Appendix I for additional lab testing data.
   Ground water observation well OW-401 installed at a nearby location.

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Schnabel Engineering

**TEST** BORING

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

Schnab	pel Engineering LOG			•		Sheet	: 13 of 13	0120040
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	DEPTH	SAMPLING DATA	TESTS	REMARKS
-	and blackish gray, trace mica, very weak HCI reaction.	SM			 -390 -	12+20+32 N =52 REC =18"		
-					- 395 			
01.5	fine to medium grained.  BOTTOM OF BORING @ 401.5 FT.		329.4		I II X	11+15+29 N =44 REC =18"	w=33.1%	**Resumed grouting at 7:0 AM on 6/29/06

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   Downhole geophysical logging performed on 6/29/06.
   \* = See Appendix I for additional lab testing data.
   Ground water observation well OW-401 installed at a nearby location.



TEST BORING LOG **Project:** Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Boring Number: B-402
Contract Number: 06120048

Contract Number: 06120048 Sheet: 1 of 7

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings

Drilling Method: Mud Rotary

Drilling Equipment: CME-750 (ATV)

Schnabel Representative: M. Arles

Dates Started: 7/19/06 Finished: 7/21/06

**Location:** Northing: 216405.1 ft Easting: 961463.5 ft

**Ground Surface Elevation:** 82.2 (feet)

	Ground	water Obs	ervations								
	Date Time Depth Casing Cave										
Encountered	7/19		7.5'	0.0'							
Start of day	7/20		15.0'	0.0'							
Start of day	7/21		12.0'	0.0'							

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	SA	AMPLING	TESTS	REMARKS
(FT)	3.13(1)(1213)(11.13)(1	32, 130.	(FT)		DEPTH	DATA		
-	POORLY GRADED SAND, fine to coarse grained, moist, brown, contains root fragments, contains organic matter.	SP			L ⊿IXⅡ	1+3+4 N =7 REC =18"		
2.5	SILTY SAND, fine to coarse grained, moist, brown.	SM	79.7			1+1+2 N =3 REC =12"		
4.5	POORLY GRADED SAND, fine to	SP	77.7		- 5			
-	coarse grained, moist, orangeish brown,				X	1+4+4 N =8 REC =14"		
-	wet, orange, with gravel.			$\bar{\Delta}$		3+4+2 N =6 REC =8"		
10.0	SILTY SAND, fine to medium grained, moist, orange.	SM	72.2			2+3+4 N =7		
13.0	SANDY SILT, fine to medium grained,	ML	69.2			REC =14"		
-	wet, mottled grayish orange.	IVIL				1+3+6 N =9 REC =16"		
17.0	FAT CLAY, moist, gray, with sand.	СН	65.2					
-	The ODA, moist, gray, war saint.	011			_	WOH+2+3		
_					X	N =5 REC =18"		
- - -					 			
-	no sand.					2+3+4 N =7 REC =18"		
$\dashv$	continued on next page				—25— <del> </del>	NEC -10		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-402 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 7 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** CH 3+4+6 N = 10**REC =18"** fine to medium sandy 4+4+5 N = 9REC =18" -35 37.0 45.2 SILTY SAND, fine to medium grained, SM moist, mottled grayish red, contains cemented sand. 6+10+10 N =20 REC =14" 40.2 42.0 POORLY GRADED SAND, fine to SP medium grained, moist, yellowish white. 21+50 N =50 REC =9"

> 29+50/5" N =50/5" REC =11"

50/2"

N =50/2" REC =1" 54' hard drilling

-50

-55

27.2

SM

## Comments:

55.0

gray.

reaction.

reaction.

shell frag.

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

cemented sand with shells, strong HCI

Cemented sand with shells, strong HCI

SILTY SAND, fine to medium grained, wet, grayish green, contains cemented

continued on next page

sand, with fine to coarse shell fragments, strong HCl reaction, 70-80%

TEST Project: Calvert Cliffs Nuclear Power Plant B-402 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 7 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SM REC =6" -60 62.0 20.2 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, wet, green, with fine to coarse shell fragments, strong HCl reaction, 20-30% shell frag. 4+6+9 N =15 REC =18" 67.0 15.2 SILTY SAND, fine to medium grained, SM moist, green, with fine to coarse shell fragments, strong HCI reaction, 30-40% shell frag. 6+8+11 N = 19REC =18" 72.0 10.2 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, wet, green, weak HCl reaction. 6+9+13 N =22 REC =16" 77.0 5.2 SILTY SAND, fine to medium grained, SM wet, green, weak HCl reaction. 3+4+7 N = 11REC =18" contains cemented sand, with fine to 9+13+21 coarse shell fragments, strong HCI N =34 reaction, 70-80% shell frag. **REC =18"** -85 strong HCI reaction, 50-60% shell frag. 13+11+17 N =28 REC =18" -90 continued on next page

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-402 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 4 of 7 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SM 8+12+21 moist, trace fine to coarse shell fragments, moderate HCI reaction, N = 330-10% shell frag. REC =18" -95 moist, with fine to coarse shell 6+9+12 fragments, strong HCI reaction, 30-40% N =21 shell frag. REC =18" trace fine to medium shell fragments, 5+8+11 weak HCl reaction, 0-5% shell frag. N =19 REC =18" 107.0 -24.8 SANDY SILT, fine to medium, moist, ML green, weak HCl reaction. 6+8+9 N =17 REC =18" 112.0 -29.8 SILTY SAND, fine to medium grained, SM moist, green, trace fine to coarse shell fragments, moderate HCI reaction, 0-10% shell frag. 6+9+11 N =20 REC =18" with fine to coarse shell fragments, 7+10+13 strong HCl reaction, 20-30% shell frag. N = 23REC =18" -120 122.0 -39.8 SANDY SILT, fine to medium, moist, ML green, with fine to coarse shell fragments, strong HCl reaction, 10-20% shell frag. 5+6+9

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

B-402 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 5 of 7 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA  $\mathsf{ML}$ N =15 REC =18" -125 127.0 -44.8 ELASTIC SILT, moist, oliveish green. МН 6+8+11 N =19 REC =18" 130 trace fine to medium shell fragments, moderate HCl reaction, 0-5% shell frag. 4+6+8 N =14 ∐ REC =18" **-135** 4+7+8 N =15 REC =18" 4+6+7 N = 13REC =18" 4+8+9 N =17 REC =18" 150 5+9+11 N =20 REC =18" continued on next page

Calvert Cliffs Nuclear Power Plant

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion. 2. \* = See Appendix I for additional lab testing data.

**TEST** 

Project:

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-402 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 6 of 7 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA МН 4+6+8 N =14 REC =18" 6+9+11 N =20 REC =18" with sand. 7+7+10 N =17 REC =18" 4+5+9 no sand. N =14 **-175** TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08 5+8+9 N =17 REC =18" -180 5+9+12 N =21 REC =18" **-185** 187.0 -104.8 SILTY SAND, fine to medium grained, moist, oliveish green, with fine to coarse SM shell fragments, strong HCI reaction, 20-40% shell frag. 10+13+16 N =29 REC =18" -190-

## Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: **B-402** Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 7 of 7 Schnabel Engineering LOG DEPTH **SAMPLING** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SM 8+10+12 40-60% shell frag. N =22 REC =18" -195 5+6+14 no sand, weak HCl reaction. N = 20REC =18" -200 200.0 --117.8 BOTTOM OF BORING @ 200.0 FT.

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.



**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

B-403 **Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 7

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Bender Drilling Method: Mud Rotary Drilling Equipment: CME-550X (ATV) Schnabel Representative: K. Bell

Dates Started: 6/20/06 Finished: 6/22/06

**Location:** Northing: 216305.8 ft Easting: 961562.9 ft

**Ground Surface Elevation:** 63.4 (feet)

	Ground	water Obs	ervations								
	Date Time Depth Casing Cave										
Encountered	6/20		13.5'								
Start of day	6/21		10.5'								
Start of day	6/22		9.5'								

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	s	AMPLING	TESTS	REMARKS
(FT)	0.13.17. D200111 11011	32,300.	(FT)		DEPTH	DATA		
0.5	ROOTMAT AND TOPSOIL.	SP-SM	62.9			1+2+3		
1	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, brown,	OF-OW				N =5 REC =4"		
2.0	trace root fragments, trace wood fragments.	SP-SC	61.4					
1	POORLY GRADED SAND WITH CLAY, fine to coarse grained, moist, yellowish					3+2+2 N =4 REC =11"		
4.5	brown and gray.		58.9		_	REC -II		
-	CLAYEY SAND, fine to coarse grained, moist, yellowish brown and gray.	SC			<u></u> 5 − √	4+3+3		
-					\	N =6 REC =10"		
7.0	SANDY LEAN CLAY, moist, orange and	CL	56.4					
4	gray, trace root fragments, iron staining.					3+2+3 N =5		
_						REC =18"		
10.0			53.4		—10—			
	FAT CLAY, moist, orangeish brown and gray, trace sand, iron staining.	CH	00.1		L JM	2+3+3		
						N =6 REC =18"		
1								
1				$\nabla$		21510		
-						3+5+6 N =11		
					—15— <sup>[]</sup>	REC =18"		
-								
17.0	SANDY LEAN CLAY, wet, gray.	CL	46.4					
4	-							start mud rota
4						3+4+5 N =9		drilling
_					20_	REC =17"		
22.0			41.4					
_	SILTY SAND, fine to medium grained, wet, yellowish brown and orangeish brown.	SM	71.7					
+					- <u> </u>	34+50/5" N =50/5"		
4	continued on next page				25	REC =10"		
	commued on next page							

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-403 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 7 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SM 36+34+50/4" gray N =84/10" REC =12" -30 32.0 31.4 CLAYEY SAND, fine to medium SC grained, wet, gray and black. Resumed drilling on6/21/06 @ 2+50/5" 34.0 29.4 N =50/5" SILTY SAND, fine to medium grained, SM 7:00am wet, light gray, strong cementation, HCl REC =12" -35 reaction strong. 37.0 26.4 CLAYEY SAND, fine to medium SC grained, wet, light gray, contains fine to coarse shell fragments, 20-30%, moderate cementation, HCI reaction 4+8+13 strong. N =21 REC =18" 4+4+7 N =11 REC =18" 7+7+11 N =18 | REC =18" -50 52.0 11.4 SILTY SAND, fine to medium grained, SM wet, greenish gray, trace fine to medium shell fragments, 2-5%, HCl reaction weak. 4+6+7 N =13 REC =18" continued on next page

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

2. \* = See Appendix I for additional lab testing data.

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-403 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 7 ELEV. **SAMPLING DEPTH** STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SM 2+3+4 N =7 REC =18" REC =20" -65 Rig chatter 67.0 -3.6 CLAYEY SAND, fine to medium SC grained, wet, greenish gray and white, with fine to coarse shell fragments, 40-50%, HCI reaction strong. 21+18+12 N =30 REC =18" trace fine to coarse shell fragments, 5-10%, HCl reaction moderate 6+7+12 N =19 REC =18" 77.0 -13.6 SANDY LEAN CLAY, wet, greenish gray, contains fine to coarse shell fragments, 10-20%, HCl reaction CL moderate. 11+7+9 N =16 REC =18" 82.0 -18.6 SANDY SILT, wet, greenish gray, trace fine to medium shell fragments, 2-5%, ML HCI reaction moderate. 5+8+13 N =21 **REC =18"** -85 6+6+10 N =16 REC =17" -90 continued on next page

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**B-403** Project: **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 7 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA  $\mathsf{ML}$ 6+9+13 N =22 REC =18" PP=3.00 tsf REC =12" -100 4+6+9 N =15 REC =18" 5+6+11 N =17 REC =18" 5+7+9 N =16 REC =18" 4+6+8 N =14 REC =18" 120 PP=>4.5 tsf REC =12" continued on next page

Calvert Cliffs Nuclear Power Plant

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion. 2.  $\star$  = See Appendix I for additional lab testing data.

**TEST** 

B-403 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 5 of 7 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA  $\mathsf{ML}$ 125 127.0 -63.6 ELASTIC SILT, moist, greenish gray, trace sand, trace fine to medium shell МН fragments, 2-5%, HCl reaction weak. 4+8+10 N =18 REC =18" 130 6+8+11 N =19 ∐ REC =18" **-135** 137.0 -73.6 SANDY SILT, moist, greenish gray, trace fine to medium shell fragments, ML 2-5%, HCl reaction moderate. 6+7+10 N =17 **REC =18"** 7+8+13 N =21 REC =18" 7+9+12 N =21 REC =18" 150 resumed drilling on 6/22/06 @ 7:30am 5+8+12 N =20 REC =18" -155 continued on next page

Calvert Cliffs Nuclear Power Plant

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

**TEST** 

Project:

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

<sup>2. \* =</sup> See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-403 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 6 of 7 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA ML6+8+11 N =19 REC =18" 5+8+12 N =20 REC =18" oliveish gray, trace fine to medium shell fragments, 5-10%, HCl reaction 3+6+9 N =15 moderate. REC =18" 172.0 -108.6 SC CLAYEY SAND, fine to medium grained, wet, oliveish gray, trace fine to medium shell fragments, 2-5%, HCl reaction weak. 6+10+23 N = 33-175 177.0 -113.6 SANDY SILT, moist, oliveish gray, trace fine to medium shell fragments, 2-5%, HCI reaction weak. 6+10+20 N =30 REC =18" 180 softer drilling 6+8+15 N = 23REC =18" **-185** 5+8+13 N =21 REC =18" -190continued on next page

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

Project: **B-403 Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 7 of 7 Schnabel Engineering LOG DEPTH (FT) **SAMPLING** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) DEPTH DATA  $\mathsf{ML}$ 6+6+12 N =18 REC =18" -195 7+9+14 N =23 REC =18" -200 200.0 -136.6 BOTTOM OF BORING @ 200.0 FT.

Calvert Cliffs Nuclear Power Plant

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

**TEST** 

Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
 \* = See Appendix I for additional lab testing data.



**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

B-404 **Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 7

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings Drilling Method: Mud Rotary Drilling Equipment: CME-750 (ATV) Schnabel Representative: B. Bradfield Dates Started: 6/22/06 Finished: 6/27/06

**Location:** Northing: 216441.34 ft Easting: 961596.49 ft

**Ground Surface Elevation:** 67.9 (feet)

Groundwater Observations											
	Date	Time	Depth	Casing	Caved						
Encountered	6/22		30.0'								
Start of day	6/23		27.5'								

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	S	AMPLING	TESTS	REMARKS
(FT)			(FT)		DEPTH	DATA		
2.0	SILTY SAND, fine to coarse grained, moist, orangeish brown, trace fine rounded gravel, contains root fragments.	SM	65.9			1+2+2 N =4 REC =13"		1.5'- Mud rota with 3 7/8" dra
-	SANDY SILT, fine to coarse, moist, orangeish brown and gray, contains decomposed root fragments.	ML	00.0			5+5+5 N =10 REC =8"		Dit
4.5	LEAN CLAY with sand, moist, orangeish	CL	63.4					
-	brown and gray, colors layered <1/2" thick.	OL.			- 5 -	4+4+5 N =9 REC =12"		
7.0	FAT CLAY with sand, moist, gray and	СН	60.9					
	orangeish brown, colors layered 1/4" to 3/4" thick.					2+2+2 N =4 REC =18"		
10.0	15110111	01	57.9		-10-			
	LEAN CLAY with sand, moist, gray, contains mica.	CL				3+3+5 N =8 REC =18"		
-								
	With darker gray pockets up to 1" thick.					4+5+6 N =11 REC =18"		
-								
-						3+6+7 N =13 REC =18"		
-								
22.0	CLAYEY SAND, fine to medium grained, moist, dark gray, contains mica.	SC	45.9					
						3+4+7 N =11 REC =18"		
	continued on next page	1	1					

- 1. Boring backfilled with cement/bentonite grout via tremie pipe upon completion.
- Downhole geophysical logging performed on 6/27/06.
   \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-404 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 7 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SC 27.5 40.4 POORLY GRADED SAND, fine to SP medium grained, wet, orange and yellowish brown, trace silt. 29-30'- Harder drilling  $\Delta$ -30 40+50/3" N = 50/3" REC =8" None silt, with gray clay lenses <1/4" 21+50/5" N =50/5" REC =10" -35 WOH/18" N = WOH/18" REC =2" 39.9 28.0 CLAYEY SAND, fine to medium SC grained, moist, gray. 43.0 24.9 SILTY SAND, fine to coarse grained, SM wet, light gray and brownish white, 20-30% cemented sand, 30-40% fine to coarse shell fragments. 48+32+29 N =61 REC =18" 47.5 20.4 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, wet, gray and brownish white, 20-30% fine to medium 4+4+5 shell fragments, moderate HCI reaction, N =9 HCI reaction localized to shell -50 fragments. 52'- Shelby w=27.7% 20-30% fine to medium shell fragments, **REC =18"** tube pushed LL=NP strong HCI reaction. PL=NP

10.4

SM

5+10+10

N =20 REC =18"

## Comments:

57.5

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout via tremie pipe upon completion.
- 2. Downhole geophysical logging performed on 6/27/06.3. \* = See Appendix I for additional lab testing data.

10-20% fine to medium shell fragments,

SILTY SAND, fine to medium grained,

continued on next page

HCI reaction localized to shell

fragments.

TEST Project: Calvert Cliffs Nuclear Power Plant B-404 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 7 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** wet, dark gray, 0-10% fine to medium SM shell fragments, weak HCl reaction. -60 4+5+7 N = 12REC =18" 62.5 5.4 CLAYEY SAND, fine to medium SC grained, wet, dark gray, 0-10% fine to medium shell fragments, weak HCl 2+3+4 reaction, HCl reaction localized to shell N =7 REC =18" fragments. 66'- Shelby Gray and brownish white, 20-30% fine **REC =18"** tube pushed to medium shell fragments, strong HCI 68.5'- Start of Wet, dark gray and brownish white, 10+14+13 day 6/23/06 30-40% fine to medium shell fragments, N =27 strong HCI reaction. REC =18" 20-30% fine to medium shell fragments, 4+19+21 10-20% cemented sand, strong HCI N = 40reaction, cemented sand fragments **REC =13"** <3/4" in diameter. 77.5 -9.6 SILTY SAND, fine to medium grained, SM wet, dark gray, 0-10% fine to medium shell fragments, weak HCl reaction. 6+7+10 N =17 REC =15" -80 83.5'- Shelby w=32.2% greenish gray and brownish white, 20-30% fine to medium shell fragments, REC =17" tube pushed LL=53 PL=28 strong HCI reaction. -85 87.5 -19.6SILTY SAND, fine to medium grained, SM wet, greenish gray and dark gray, 0-10% fine to medium shell fragments, weak HCl reaction. 5+8+11 **∥** N =19

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout via tremie pipe upon completion.
- 2. Downhole geophysical logging performed on 6/27/06.3. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-404 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 4 of 7 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SM 92.5 -24.6 SANDY ELASTIC SILT, fine to medium, МН moist, greenish gray, 0-10% fine to medium shell fragments, contains mica, 6+9+10 weak HCl reaction. N =19 REC =18" 97.5 -29.6 SILTY SAND, fine to medium grained, SM wet, greenish gray, 0-10% fine to medium shell fragments, contains mica, 4+9+12 weak HCl reaction. N =21 REC =18" -100 103.0 -35.1 CLAYEY SAND, fine to medium SC grained, moist, greenish gray and brownish white, 30-40% fine to medium shell fragments, contains mica, strong -105 HCl reaction, shell fragments 7+12+15 decomposed and fractured. N =27 REC =18" 107.5 -39.6 FINE TO MEDIUM SANDY ELASTIC МН SILT, moist, greenish gray, 10-20% fine to medium shell fragments, contains 4+6+10 mica, moderate HCI reaction, shell N =16 fragments decomposed. REC =18" 0-10% fine to medium shell fragments. 5+7+10 weak HCl reaction, shell fragments N = 17REC =18" decomposed. 117.5 -49.6 SANDY SILT, fine to medium, moist, ML greenish gray, 0-10% fine to medium shell fragments, contains mica, weak HCl reaction, HCl reaction localized to shell fragments. 120-5+8+10 N =18 REC =18" 5+5+7 continued on next page

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout via tremie pipe upon completion.
- 2. Downhole geophysical logging performed on 6/27/06. 3. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-404 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 5 of 7 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA  $\mathsf{ML}$ N =12 REC =10" -125 127.5 -59.6 МН ELASTIC SILT with sand, moist, greenish gray, contains mica. 128.5'- Start of 5+6+8 day 6/26/06 N =14 REC =18" 130 -135 6+9+10 N =19 REC =18" 137.5 -69.6 СН FAT CLAY with sand, moist, greenish gray, contains mica. 5+6+8 N =14 **REC =18"** 5+6+11 N =17 REC =18" 147.5 -79.6 SANDY ELASTIC SILT, fine to coarse, MH moist, greenish gray, contains mica. 6+8+12 N =20 REC =18" -155

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout via tremie pipe upon completion.
- 2. Downhole geophysical logging performed on 6/27/06. 3. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-404 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 6 of 7 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA МН 6+8+12 N =20 REC =18" -165 7+9+9 N =18 REC =18" 167.5 -99.6 LEAN CLAY, moist, greenish gray, trace CL sand, contains mica. 6+8+11 N =19 REC =18" 172.0 -104.1 SC CLAYEY SAND, fine to medium grained, wet, greenish gray and white, 10-20% fine to medium shell fragments, moderate HCI reaction, shell fragments 3+5+12 decomposed. N =17 -175 -180-6+14+20 0-10% fine to medium shell fragments, weak HCl reaction, shell fragments N =34 decomposed. **REC =18"** 183.5'- Start of no shell fragments. 5+7+18 day 6/27/06 N =25 REC =18" **-185** 187.0 -119.1 SANDY LEAN CLAY with silt, fine to CL medium, moist, greenish gray, trace 4+6+15

> N =21 REC =18"

-190-

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout via tremie pipe upon completion.
- 2. Downhole geophysical logging performed on 6/27/06.3. \* = See Appendix I for additional lab testing data.

**TEST B-404** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 7 of 7 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA CL 193.0 -125.1 SANDY ELASTIC SILT, fine to medium, wet, greenish gray. -195 4+8+13 N =21 REC =3" 197.5 -129.6 SANDY LEAN CLAY, fine to medium, CL moist, greenish gray. 3+5+9 N =14 REC =18" 200.0 --132.1 -200 BOTTOM OF BORING @ 200.0 FT.

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout via tremie pipe upon completion.
- Downhole geophysical logging performed on 6/27/06.
   \* = See Appendix I for additional lab testing data.

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**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant

Calvert County, Maryland

B-405 **Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 5

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Reese Drilling Method: Mud Rotary Drilling Equipment: CME-75 (Truck) Schnabel Representative: M. Arles

Dates Started: 5/15/06 Finished: 5/16/06

**Location:** Northing: 216487.38 ft Easting: 961408.73 ft

Ground Surface Elevation: 122.0 (feet)

Groundwater Observations										
	Date	Time	Depth	Casing	Caved					
Encountered	5/15		43.5'	19.0'						
Start of day	5/16		25.0'	18.0'						

Or our id	Surface Lievation. 122.0 (leet)									
DEPTH (FT)	STRATA DESCRIPTION	CLASS	ELEV. (FT)	WL	DEP <sup>.</sup>		AMPLING DATA	TEST	s	REMARKS
0.3	ROOTMAT AND TOPSOIL.	214	121.7			M	WOH+2+2			4-1/4" I.D.
-	SILTY SAND, fine to coarse grained, moist, orangeish brown, contains root fragments.	SM			 		N =4 REC =18"			Hollow stem augers to 18 ft.
-	brownish orange, trace gravel.				- ·		2+1+2 N =3 REC =18"			
4.5 <u> </u>	POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, brownish orange, trace gravel.	SP-SM	117.5		— 5 <i>-</i>		2+1+1 N =2 REC =18"			
7.0 <del>-</del> -	POORLY GRADED SAND, fine to coarse grained, moist, orange, trace silt, with gravel.	SP	115.0		- ·		2+1+1 N =2 REC =18"			
12.0	DOOD! V CDADED SAND WITH CLAV	SP-SC	110.0		—10 <i>—</i>		1+1+1 N =2 REC =14"			
- - -	POORLY GRADED SAND WITH CLAY, fine to coarse grained, moist, light orange, trace gravel.	35-30			- ·		2+4+6 N =10 REC =18"			
- - -					- ·					Mud rotary below 18 ft.
_	orange (small 1/8" layers of clay sand).				_ 20-		4+5+6 N =11 REC =16"			below to it.
-					- ·					
_	with gravel.				- 25-		8+8+9 N =17 REC =16"			
	continued on next page									

# Comments:

2. \* = See Appendix I for additional lab testing.

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

TEST Project: Calvert Cliffs Nuclear Power Plant B-405 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SP-SC 27.0 95.0 POORLY GRADED SAND WITH SILT, SP-SM fine to coarse grained, moist, orange, trace gravel. 4+7+10 N =17 REC =8" 6+9+13 N =22 REC =12" -35 with gravel. 5+10+10 N =20 REC =14" 80.0 42.0 POORLY GRADED SAND, trace silt, SP with gravel, fine to coarse grained, wet, yellowish white.  $\overline{\nabla}$ 7+15+15 N = 30REC =12" 47.0 75.0 SILTY SAND, fine to medium grained, SM moist, yellowish orange. 4+2+1 N = 352.0 70.0 SANDY SILT, fine to medium, moist, ML orange. 53.8 68.2 2+2+1 SANDY LEAN CLAY, fine to medium, CL N = 354.5 67.5 moist, dark gray REC =18" GP-GC POORLY GRADED GRAVEL WITH

65.0

CL

## Comments:

57.0

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing.

orange.

sand.

CLAY, fine to medium grained, wet,

LEAN CLAY, moist, dark gray, with

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-405 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 3 of 5 Schnabel Engineering LOG ELEV. **SAMPLING DEPTH** STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** CL REC =22" 60 60.0 62.0 FAT CLAY, moist, dark gray, trace CH sand. 2+4+4 N =8 REC =18" 67.0 55.0 LEAN CLAY, moist, dark gray. CL REC =24" 72.0 50.0 CLAYEY SAND, fine to medium SC grained, moist, dark gray. 4+5+7 N =12 REC =18" 77.0 45.0 SILTY SAND, fine to coarse grained, SM moist, red and gray. 9+15+15 N = 30REC =18" Harder drilling 82.0 40.0 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, moist, yellowish  $\boxtimes$ 50/4" N = 50/4" REC =2" -85 gray. 50 REC =4" -90 continued on next page

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing.

B-405 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 4 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SP-SM Start of drilling for the day 15+26+50/2" 94.0 28.0 (5/16/06). SILTY SAND, fine to coarse grained, SM N = 76/8" moist, white and gray, with fine to REC =14" -95 coarse shell fragments (15-25%), contains cemented sand, strong HCI reaction. fine to medium grained, grayish green, 5+5+7 with fine to medium shell fragments N =12 (10-20%), moderate HCl reaction. REC =18" 102.0 20.0 SP-SM POORLY GRADED SAND WITH SILT, fine to medium grained, moist, grayish green, with fine to coarse shell fragments (10-20%), moderate HCl 7+5+4 reaction. N =9 REC =18" grayish green, with fine to coarse shell fragments (15-25%), strong HCl 9+12+16 N =28 REC =18" reaction. 4 inch shell bed below 109 ft. trace fine to medium shell fragments 6+6+7 (0-10%), strong HCl reaction. N =13 REC =18" dark green. 3+3+7 N = 10REC =18" -120 122.0 0.0 SILTY SAND, fine to medium grained, SM moist, green, with fine to coarse shell fragments (15-30%), strong HCI reaction. X 4+9+22 continued on next page

Calvert Cliffs Nuclear Power Plant

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

TEST

Project:

2. \* = See Appendix I for additional lab testing.

**TEST** Project: **BORING** LOG

Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048 Sheet: 5 of 5

ber Engineering E00					'	3 01 3	
STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	l .		TESTS	REMARKS
				11/1	NI =24		
	SIVI			125X	N = 31 REC = 18"		
CLAYEY SAND, fine to medium grained, moist, greenish white, with fine to coarse shell fragments (20-35%), strong HCl reaction.	SC	-5.0		- - - -130-	7+9+11 N =20 REC =18"		
POORLY GRADED SAND WITH SILT, fine to medium grained, moist, green, with fine to coarse shell fragments (10-15%), moderate HCI reaction.	SP-SM	10.0		135	8+12+12 N =24 REC =18"		
CLAYEY SAND, fine to medium grained, moist, green, with fine to coarse shell fragments (10-20%), strong HCl reaction.	SC	15.0			6+7+12 N =19 REC =18"		
SILTY SAND, fine to medium grained, moist, green.	SM	-20.0		  -145	6+8+10 N =18 REC =18"		
CLAYEY SAND, fine to medium grained, moist, grayish green.	SC	25.0		  M	6+7+12 N =19		
BOTTOM OF BORING @ 150.0 FT.		28.0		_150_	REC =18"		
	CLAYEY SAND, fine to medium grained, moist, greenish white, with fine to coarse shell fragments (20-35%), strong HCl reaction.  POORLY GRADED SAND WITH SILT, fine to medium grained, moist, green, with fine to coarse shell fragments (10-15%), moderate HCl reaction.  CLAYEY SAND, fine to medium grained, moist, green, with fine to coarse shell fragments (10-20%), strong HCl reaction.  SILTY SAND, fine to medium grained, moist, green.	STRATA DESCRIPTION  CLASS.  SM  CLAYEY SAND, fine to medium grained, moist, greenish white, with fine to coarse shell fragments (20-35%), strong HCl reaction.  POORLY GRADED SAND WITH SILT, fine to medium grained, moist, green, with fine to coarse shell fragments (10-15%), moderate HCl reaction.  CLAYEY SAND, fine to medium grained, moist, green, with fine to coarse shell fragments (10-20%), strong HCl reaction.  SILTY SAND, fine to medium grained, moist, green.  SM  CLAYEY SAND, fine to medium grained, moist, green.  SM  CLAYEY SAND, fine to medium grained, moist, green.	STRATA DESCRIPTION  CLASS. ELEV (FT)  SM  CLAYEY SAND, fine to medium grained, moist, greenish white, with fine to coarse shell fragments (20-35%), strong HCl reaction.  POORLY GRADED SAND WITH SILT, fine to medium grained, moist, green, with fine to coarse shell fragments (10-15%), moderate HCl reaction.  CLAYEY SAND, fine to medium grained, moist, green, with fine to coarse shell fragments (10-20%), strong HCl reaction.  SILTY SAND, fine to medium grained, moist, green.  SM  -20.0  CLAYEY SAND, fine to medium grained, moist, green.	STRATA DESCRIPTION  CLASS. ELEV (FT) WL  CLAYEY SAND, fine to medium grained, moist, greenish white, with fine to coarse shell fragments (20-35%), strong HCl reaction.  POORLY GRADED SAND WITH SILT, fine to medium grained, moist, green, with fine to coarse shell fragments (10-15%), moderate HCl reaction.  CLAYEY SAND, fine to medium grained, moist, green, with fine to coarse shell fragments (10-20%), strong HCl reaction.  SILTY SAND, fine to medium grained, moist, green.  SC  CLAYEY SAND, fine to medium grained, moist, green.  SC  -25.0  CLAYEY SAND, fine to medium grained, moist, green.	STRATA DESCRIPTION  CLASS. ELEV. (FT) WL DEPTH  SM  CLAYEY SAND, fine to medium grained, moist, greenish white, with fine to coarse shell fragments (20-35%), strong HCl reaction.  POORLY GRADED SAND WITH SILT, fine to medium grained, moist, green, with fine to coarse shell fragments (10-15%), moderate HCl reaction.  CLAYEY SAND, fine to medium grained, moist, green, with fine to coarse shell fragments (10-20%), strong HCl reaction.  CLAYEY SAND, fine to medium grained, moist, green, with fine to coarse shell fragments (10-20%), strong HCl reaction.  CLAYEY SAND, fine to medium grained, moist, green.  SILTY SAND, fine to medium grained, moist, green.	STRATA DESCRIPTION  CLASS. ELEV. (FT) WL SAMPLING DEPTH DATA  SM  CLAYEY SAND, fine to medium grained, moist, greenish white, with fine to coarse shell fragments (20-35%), strong HCl reaction.  POORLY GRADED SAND WITH SILT, fine to medium grained, moist, green, with fine to coarse shell fragments (10-15%), moderate HCl reaction.  SP-SM  -10.0  CLAYEY SAND, fine to medium grained, moist, green, with fine to coarse shell fragments (10-20%), strong HCl reaction.  SC  -15.0  CLAYEY SAND, fine to medium grained, moist, green, with fine to coarse shell fragments (10-20%), strong HCl reaction.  SILTY SAND, fine to medium grained, moist, green, with fine to coarse shell fragments (10-20%), strong HCl reaction.  SC  -25.0  CLAYEY SAND, fine to medium grained, moist, green, with fine to medium grained, moist, green, with fine to coarse shell fragments (10-20%), strong HCl reaction.  SILTY SAND, fine to medium grained, moist, grayish green.  SC  -25.0  -25.0  -38	STRATA DESCRIPTION  CLASS. ELEV. (FT) WL SAMPLING DEPTH DATA  SM  CLAYEY SAND, fine to medium grained, moist, greenish white, with fine to coarse shell fragments (20-35%), strong HCl reaction.  POORLY GRADED SAND WITH SILT, fine to medium grained, moist, green, with fine to coarse shell fragments (10-15%), moderate HCl reaction.  SC  -10.0  POORLY GRADED SAND WITH SILT, fine to medium grained, moist, green, with fine to coarse shell fragments (10-15%), moderate HCl reaction.  SC  -15.0  CLAYEY SAND, fine to medium grained, moist, green, with fine to coarse shell fragments (10-20%), strong HCl reaction.  SILTY SAND, fine to medium grained, moist, green.  SILTY SAND, fine to medium grained, moist, green.  SC  -25.0  G+7+12 N = 19 REC = 18**  CLAYEY SAND, fine to medium grained, moist, grayish green.

Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
 \* = See Appendix I for additional lab testing.

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**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-406 Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 5

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Evans Drilling Method: Mud Rotary **Drilling Equipment:** Failing-1500

Schnabel Representative: B. Bradfield / R. Vinzant Dates Started: 5/17/06 Finished: 5/17/06

**Location:** Northing: 216315.62 ft Easting: 961352.01 ft

Ground Surface Elevation: 118.4 (feet)

	Groundy	water Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	5/17		18.5'		

	Juriace Lievation. 110.4 (leet)		1							
DEPTH (FT)	STRATA DESCRIPTION	CLASS	ELEV. (FT)	WL	DEP		AMPLING DATA	TEST	s	REMARKS
0.3	TOPSOIL.		118.1		J	ĺЙ	2+3+3			Orilling with N3
-	Silty sand FILL, fine and coarse grained, moist, orangeish brown, trace gravel.	FILL					N =6 REC =15"		r	ods
-	fine to medium grained.						2+5+2 N =7 REC =15"			I.0-5.0'-rig chatter
6.0	fine and coarse grained.		112.4		_ 5 _	M	1+2+2 N =4			matter
0.0	CLAYEY SAND, fine to coarse grained, moist, orangeish brown and gray, <1/8" clay lenses throughout sample.	SC	112.4				REC =17"			
9.0	POORLY ORANGE CAMP WITH OUT	OD OM	109.4		- -	M	4+5+5 N =10 REC =18"			
_	POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, orangeish brown and yellowish brown.	SP-SM			—10 <i>—</i>		3+3+3 N =6 REC =18"			
_	1 1/2" piece of limonitic cemented sand.				 - 15-		5+3+4 N =7 REC =1"			
17.0	SILTY SAND, fine to coarse grained, wet, orangeish brown.	SM	101.4	□						
_					- 20-		3+3+4 N =7 REC =12"			
-										
-	orangeish brown and yellowish brown.		00.0		- - -	$\left\{ \right\}$	8+11+7 N =18			
24.8	continued on next page		93.6		25		REC =17"			

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-406 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH **DATA** POORLY GRADED SAND WITH SILT, SP-SM REC =0" fine and coarse grained, wet, white and yellowish brown. 10+12+12 slight layering (<1 1/2") throughout N =24 30'-change REC =14" -30 from 6" to 4" drag bit 32.0 86.4 POORLY GRADED SAND, fine and SP coarse grained, moist, orangeish brown and yellowish brown, trace fine gravel, trace silt. 14+14+15 34.5'- 1" lense N =29 of fine rounded REC =14" -35 gravel medium to coarse grained, gravel is 9+9+15 39.8' - 1" limonitic cemented sand. N =24 limonitic REC =9" cemented sand lense 42.0 76.4 SC CLAYEY SAND, fine to medium grained, moist, mottled orangeish brown and brown, some grayish brown clay pockets <1/8" thick. 3+7+7 N =14 45'-Penetrol REC =8" wetting agent added ~48'-driller noted probable 48.0 70.4 SANDY ELASTIC SILT, fine to medium, MH change from moist, orangeish brown and gray. 2+1+1 sand to silt/clay N =2 REC =18" -50 52.0 66.4 SILTY SAND, fine to medium grained, SM 53.5'-return wet, gray, contains mica. mud changed color from 17+23+22 brown to N =45 grayish brown REC =17"

61.4

CL

### Comments:

57.0

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

LEAN CLAY with sand, moist, gray and

dark gray, contains mica, fine to continued on next page

TEST Project: Calvert Cliffs Nuclear Power Plant B-406 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** CL medium grained. 2+3+4 N = 7REC =15" 62.0 56.4 ORGANIC SILT, with sand, moist, gray, OH contains mica, fine to medium grained, 63.5'- Pushed w=36.1% tube using REC =24" Osterberg LL=63 PL=19 -65 67.0 51.4 LEAN CLAY with sand, moist, light gray, CL fine to medium grained. 4+6+7 1" clay lense 69.2' - 1" clayey N = 13sand lense REC =18" 72.0 46.4 CLAYEY SAND, fine to medium SC grained, moist, gray. 73.5'- Pushed tube using REC =12" Osterberg -75 77.0 41.4 POORLY GRADED SAND, fine to SP 78.5'- Distinct coarse grained, moist, dark orangeish shell patterns brown and gray, trace silt, with fine to imprinted on coarse gravel consisting of limonitic 31+30+31 surfaces of cemented sand. N = 61cemented sand REC =14" gravel -80 fine to medium grained, yellowish 20+15+13 N =28 REC =12" gray. -85 86'-Lost 200 gallons of drilling mud to formation 87.0 31.4 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, wet, gray and white, 40-50% fine to medium shell fragments, strong HCl reaction. 33+29+19 N =48 REC =16" -90

### Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-406 Boring Number:** Contract Number: 06120048 Sheet: 4 of 5

Comida	el Engineering LOG				1		4 of 5	1	
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	l .	MPLING	TESTS	REMARKS	
		SP-SM	,		DEPTH	DATA			
92.0	FINE TO MEDIUM SANDY LEAN CLAY, moist, gray and brownish white, <10% fine to medium shell fragments, weak HCl reaction.	CL	26.4			:7+50/5" √=50/5" REC =10"		94.4'- change to 3 7/8" tri-cone roller bit and encountered slight rig chat	
97.0	POORLY GRADED SAND WITH SILT, fine to medium grained, wet, light gray and brownish white, 10-20% fine to coarse shell fragments, moderate HCI reaction.	SP-SM	21.4			5+25+12 N =37 REC =18"			
102.0	POORLY GRADED SAND, fine to medium grained, wet, gray and brownish white, trace silt, 10-20% fine to coarse shell fragments, moderate HCI reaction.	SP	- 16.4			s+13+15 N=28 REC =18"			
107.0	POORLY GRADED SAND WITH SILT, fine to medium grained, wet, gray and brownish white, <% fine to medium shell fragments, weak HCl reaction.	SP-SM	11.4			:+10+11 I =21 REC =14"			
112.0	SILTY SAND, fine to medium grained, wet, greenish gray, weak HCl reaction, <5% fine to medium shell fragments.	SM	6.4		6 N F	:+8+8 √=16 REC =17"			
117.0	CLAYEY SAND, fine to medium grained, wet, greenish gray, weak HCl reaction, <5% fine to medium shell fragments.	SC	- 1.4			s+4+6 N=10 REC =15"			
122.0	SILTY SAND, fine to medium grained, wet, light gray, strong HCl reaction, 45-55% fine to coarse shell.  continued on next page	SM	3.6			7+50/3"			

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.

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**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

B-406 **Boring Number:** Contract Number: 06120048 Sheet: 5 of 5

eenish gray.  ace mica, weak HCl reaction.	SM	ELEV. (FT)	WL	DEPTH -125	DATA  N =50/3" REC =10"  16+28+20 N =48 REC =18"  3+8+17 N =25 REC =15"	TESTS	133.5'-No return water
ace mica, weak HCl reaction.	SM			-125-	N =50/3" REC =10" 16+28+20 N =48 REC =18"		
ace mica, weak HCl reaction.					N =48 REC =18"		
5% medium to coarse shell fragments,				135	∭N =25		
5% medium to coarse shell fragments,				L J			
eak HCl reaction, HCl reaction limited shell fragments.					4+9+14 N =23 REC =18"		140'-Drilled blind to 140', bag quck gel 141.5'-added bag quick gel
ANDY LEAN CLAY, fine to medium, poist, greenish gray, trace mica, <5% edium to coarse shell fragments, eak HCl reaction.	CL	-23.6			9+12+24 N =36 REC =18"		and 500 gallo of water, still return
OTTOM OF BORING @ 150 0 FT		-31.6		150	6+11+14 N =25		148.5'-3rd ba quick get added, no return
	oist, greenish gray, trace mica, <5% edium to coarse shell fragments,	oist, greenish gray, trace mica, <5% addition to coarse shell fragments, ak HCl reaction.	INDY LEAN CLAY, fine to medium, isist, greenish gray, trace mica, <5% edium to coarse shell fragments, ak HCl reaction.	induction in the formed turn, sist, greenish gray, trace mica, <5% and the formed turn, sist, greenish gray, trace mica, <5% and the formed turn, sist, greenish gray, trace mica, <5% and the formed turn, sist, greenish gray, trace mica, <5% and the formed turn, sist, greenish gray, trace mica, <5% and the formed turn, sist, greenish gray, trace mica, <5% and the formed turn, sist, greenish gray, trace mica, <5% and the formed turn, sist, greenish gray, trace mica, <5% and the formed turn, sist, greenish gray, trace mica, <5% and the formed turn, sist, greenish gray, trace mica, <5% and the formed turn, sist, greenish gray, trace mica, <5% and the formed turn, sist, greenish gray, trace mica, <5% and the formed turn, sist, greenish gray, gra	inDy LEAN CLAY, fine to medium, just, greenish gray, trace mica, <5% addium to coarse shell fragments, ak HCl reaction.	INDY LEAN CLAY, fine to medium, pist, greenish gray, trace mica, <5% edium to coarse shell fragments, ak HCl reaction.  9+12+24 N = 36 REC = 18"  6+11+14 N = 25	INDY LEAN CLAY, fine to medium, pist, greenish gray, trace mica, <5% edium to coarse shell fragments, ak HCl reaction.  9+12+24 N = 36 REC = 18"  6+11+14 N = 25

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.



Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

B-407 **Boring Number:** Contract Number: 06120048 Sheet: 1 of 7

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings Drilling Method: Mud Rotary Drilling Equipment: CME-750 (ATV) Schnabel Representative: M. Arles

Dates Started: 6/14/06 Finished: 6/16/06

**Location:** Northing: 216238.96 ft Easting: 961412.45 ft

**Ground Surface Elevation:** 81.6 (feet)

		011000	. 0		
	Ground	water Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	6/14		10.5'	0.0'	
Start of day	6/15		30.0'	0.0'	
Start of Day	6/16		20.0'	0.0'	

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	S	AMPLING	TESTS	REMARKS
(FT)			(FT)		DEPTH	DATA		
	SANDY SILT, fine to coarse grained, moist, brown, contains root fragments.	ML				2+2+2 N =4 REC =18"		
4.0	goldenish brown, with gravel.		77.6			2+2+5 N =7 REC =14"	w=4.8% LL=NP PL=NP	
	POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, light brown, with gravel.	SP-SM	77.0		5 -	4+4+4 N =8 REC =16"		
] - -	orange.					3+6+5 N =11 REC =12"		
-	with gravelly sand, wet.			Ā	10- 	4+5+7 N =12 REC =12"	w=12.3%	
-	with gravel.					2+3+6 N =9 REC =15"		
17.0	SILTY SAND, fine to medium, moist,	SM	64.6					
- - - -	orange.					6+11+12 N =23 REC =18"	w=24.9%	
23.0	ELASTIC SILT majet dark gray trace	MH	58.6		  - 			
	ELASTIC SILT, moist, dark gray, trace sand.	IVIT				2+2+3 N =5 REC =18"		
	continued on next page							

- 1. Boring backfilled with cement/bentonite grout via tremie pipe upon completion.
- Downhole geophysical logging performed on 6/29/06.
   \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-407 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 7 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA МН w=35.1% 3+4+4 N =8 **REC =18"** w=39.4% 4+6+6 LL=77 N = 12PL=43 REC =18" -35 37.0 44.6 SANDY LEAN CLAY, fine to medium, CL moist, dark gray. 3+5+7 N =12 REC =18" 39.6 42.0 SILTY SAND, fine to coarse grained, SM moist, reddish orange, contains cemented sand, small 1/4" more silty or sand lenses, 1/8" cemented sand w=23.3% 6+13+21 N = 34REC =18" 47.0 34.6 POORLY GRADED SAND WITH CLAY, SP-SC fine to medium grained, moist, dark gray. 4+10+14 N =24 REC =16" -50 52.0 29.6 SILTY SAND, fine to coarse grained, SM moist, green, with fine to coarse shell fragments, strong HCI reaction. **REC =11"** 55' start of day -55 6/15/06 55' grinding, switch to rollerbit

### Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout via tremie pipe upon completion.
- Downhole geophysical logging performed on 6/29/06.
   \* = See Appendix I for additional lab testing data.

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048 Sheet: 3 of 7

DEPTH			ELEV.		84	MPLING		
(FT)	STRATA DESCRIPTION	CLASS.	(FT)	WL	DEPTH	DATA	TESTS	REMARK
- - -	gray, contains cemented sand, moderate HCl reaction, 60-70% cemented sand.	SM				50/5" N =50/5" REC =5"		
63.0	SILTY SAND, fine to coarse grained, moist, green, with fine to coarse shell fragments, strong HCl reaction, 25-35% shell frag.	SM	- 18.6		I IIXII	5+6+8 N =14 REC =16"	w=28.1% *	
- - - -					X	6+8+15 N =23 REC =18"	w=30% *	
- - - - -					X	4+6+13 N =19 REC =18"	w=27.3% *	
-	greenish gray, 0-5% shell frag.					REC =4"		77' softer drilling, try to
- - - - -	green, with clay, with fine to coarse shell fragments, strong HCl reaction, 40-60% shell frag.				X	3+6+9 N =15 REC =18"	w=38.3%	
- - -	70-90% shell frag, 10-20% cemented sand.				I IIXII	21+29+30 N =59 REC =10"	w=12.4% *	90' Rig chat
+	continued on next page				+ +			

- Boring backfilled with cement/bentonite grout via tremie pipe upon completion.
   Downhole geophysical logging performed on 6/29/06.
   \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-407 chnabel **Boring Number: BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 4 of 7 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SM 92.0 -10.4 SP-SM POORLY GRADED SAND, fine to medium grained, moist, green, with silt, with fine to coarse shell fragments, strong HCI reaction, 15-25% shell frag. 6+11+24 N =35 REC =16" -95 w=30.8% moderate HCl reaction, 5-15% shell 5+12+14 frag. N =26 REC =18" -100 -20.4 102.0 SILTY SAND, fine to medium grained, SM moist, green, with fine to coarse shell fragments, strong HCI reaction, 20-30% shell frag. 4+5+8 N =13 REC =18" 107.0 -25.4 SANDY SILT, fine to medium, moist, ML green, weak HCl reaction. w=47.8% 6+9+10 N =19 REC =18" 112.0 -30.4 SILTY SAND, fine to medium grained, SM moist, green, trace fine to coarse shell fragments, moderate HCl reaction, 0-10% shell frag. 8+9+11 N =20 REC =18" w=34.2% with fine to coarse shell fragments, 5+11+16 strong HCl reaction, 30-40% shell frag. N = 27REC =18" 120

-41.4

w=42.2%

|X|| 4+7+7

МН

### Comments:

123.0

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout via tremie pipe upon completion.
- 2. Downhole geophysical logging performed on 6/29/06. 3. \* = See Appendix I for additional lab testing data.

SANDY ELASTIC SILT, fine to medium,

continued on next page

moist, green, with fine to medium shell

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-407 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 5 of 7 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH **DATA** fragments, strong HCI reaction, 10-20% МН N =14 125-128' harder REC =18" -125 drilling then softer 127.0 -45.4 SANDY SILT, fine to medium, moist, ML green, with fine to coarse shell 128.5' Pushed fragments, moderate HCl reaction. PP=4.00 tsf tube 6" REC =6" recovered 6" -130 trace fine to medium shell fragments, 4+8+10 0-5% shell frag. N =18 ∐ REC =18" -135 136.0 -54.4 SILTY SAND, fine to medium grained, SM moist, green, with fine to coarse shell fragments, strong HCI reaction, 20-30% shell frag. w=49.2% 3+4+8 N =12 **REC =18"** -60.4 142.0 SANDY ELASTIC SILT, fine to medium, МН moist, oliveish green.

-65.4

-71.9

СН

MH

w=56.4%

LL=92

PL=63

w=43.1%

LL=81

PL=45

PP=0.17 tsf

4+7+8

N =15

5+5+8

N =13

REC =5"

150

-155

REC =18"

REC =18"

### Comments:

153.5

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

147.0

- 1. Boring backfilled with cement/bentonite grout via tremie pipe upon completion.
- 2. Downhole geophysical logging performed on 6/29/06. 3. \* = See Appendix I for additional lab testing data.

FAT CLAY, moderate HCI reaction.

SANDY ELASTIC SILT, contains sand.

**TEST** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 6 of 7 Schnabel Engineering LOG

ocimab	el Engineering LOG						·	6 of 7	
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	DEPT		AMPLING DATA	TESTS	REMARKS
- - - -	with clay.	МН			 160- 	V	3+5+8 N =13 REC =18"	w=78.4% *	
- - - -					  -165-	ΙXΙ	5+7+11 N =18 REC =18"	w=62.7% LL=120 PL=50 *	
170.0	FAT CLAY, oliveish brown.	СН	88.4		  -170-	ΙXΙ	5+7+8 N =15 REC =18"	w=55.2% LL=104 PL=69 *	
- - - -					  175-	ΙXΙ	4+7+12 N =19 REC =18"	w=53.7% LL=102 PL=37 *	
180.0	ELASTIC SILT, moist, oliveish green.	МН	98.4		  -180-	X	6+8+12 N =20 REC =18"	w=50.9% LL=102 PL=40 *	
- - - -					- - -185-	M	3+5+11 N =16 REC =18"	w=82.2% LL=154 PL=97 *	
187.0	SILTY SAND, fine to medium grained, moist, green, with fine to coarse shell fragments, strong HCl reaction, 10-25% shell frag.  continued on next page	SM	-105.4		  -190-	$\bigvee$	4+7+25 N =32 REC =18"	w=32.6%	

- Boring backfilled with cement/bentonite grout via tremie pipe upon completion.
   Downhole geophysical logging performed on 6/29/06.
   \* = See Appendix I for additional lab testing data.

**TEST B-407** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 7 of 7 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SM w=31.6% trace fine to coarse shell fragments, weak HCl reaction, 0-5% shell frag. 7+9+13 N =22 REC =18" 195 w=32.7% 5+7+12 N =19 REC =18" -200 200.0 --118.4 BOTTOM OF BORING @ 200.0 FT.

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout via tremie pipe upon completion.
- Downhole geophysical logging performed on 6/29/06.
   \* = See Appendix I for additional lab testing data.



Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-408 Boring Number:** Contract Number: 06120048 Sheet: 1 of 5

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings Drilling Method: Mud Rotary **Drilling Equipment:** CME-750 (ATV) Schnabel Representative: R. Vinzant Dates Started: 7/24/06 Finished: 7/25/06

**Location:** Northing: 216261.74 ft Easting: 961482.04 ft

Ground Surface Elevation: 68.4 (feet)

Ground	water Obs	ervations									
Date	Time	Depth	Casing	Caved							
7/24		6.0'									
7/25		20.0'									
	<b>Date</b> 7/24	Date         Time           7/24	Date         Time         Depth           7/24          6.0¹	7/24 6.0'							

(FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	SAMPLING DEPTH DATA	TESTS	REMARKS
0.5	Forest litter, rootmat and topsoil.	SM	67.9		2+2+1		
]	SILTY SAND, fine to medium grained, moist, light brown, contains root fragments, and organic matter.				N =3 REC =18"		
	Yellowish brown.				3+6+5 N =11 REC =18"		
4.5	CLAYEY SAND, fine to medium	SC	63.9		_		
	grained, wet, mottled grayish orange, contains root fragments, trace mica.			Ā	2+4+3 N =7 REC =15"		
	Mottled orangeish gray.				2+3+3		
-					N =6 REC =18"		
10.0	SANDY SILT, fine to medium, moist,	ML	58.4		_10_		
-	gray, contains mica.	IVIL			2+2+4 N =6 REC =18"		
1							
13.0	SANDY SILT, fine to medium, moist, dark greenish gray, contains mica.	ML	55.4		   2+3+4		
	dark greenish gray, contains mica.				N =7 REC =18"		
_					_		
_					_		
_					_		
					3+4+5		
					N =9 REC =18"		
22.0			46.4				
-	SANDY SILT, fine to medium, moist, dark greenish gray, contains mica.	ML	40.4				
-					4+6+6 N =12		
-	continued on next page				REC =18"		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant **B-408 Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA  $\mathsf{ML}$ 27.0 41.4 SILTY SAND, fine to medium grained, SM moist, reddish brown. 11+11+30 N =41 **REC =18"** -30 24+28+49 Gray. N =77 REC =18" -35 Wet. 10+6+3 N =9 REC =11" 42.0 26.4 SANDY SILT, fine to medium, moist, ML greenish gray, strong HCl reaction, strong cementation, 5% med. - coarse shell fragments. 34+50/2" N =50/2" REC =8" Rig chatter Moderate HCI reaction, no cemented 7+6+8 sand, 15% med. - coarse shell N =14 | REC =18" fragments. Dark greenish gray, moderate HCl 9+13+16 reaction, 15% med. - coarse shell N =29 fragments. REC =18"

### Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-408 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA  $\mathsf{ML}$ Weak HCl reaction, 5% med. - coarse 5+8+12 shell fragments. N =20 REC =18" 4+3+5 5% med. - coarse shell fragments. N =8 REC =18" 5% med. - coarse shell fragments. 2+6+6 N =12 REC =18" Light greenish gray, strong HCl reaction, strong cementation, 40% med. 26+48+50/5" N =98/11" - coarse shell fragments. REC =17" Dark greenish gray, weak HCl reaction, 6+11+12 3% med. - coarse shell fragments. N =23 REC =18" Greenish gray, no shell fragments. 6+9+17 N =26 REC =18" -85 5+8+12 N = 20REC =18"

-90

### Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-408 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 4 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA MLWeak HCl reaction, 3% med. - coarse 7+8+11 shell fragments. N =19 ∐ REC =18" -95 Weak HCI reaction, 3% med. - coarse 4+8+11 shell fragments. N =19 REC =18" -100 Weak HCl reaction, 3% med. - coarse 4+6+7 shell fragments. N =13 REC =18" Weak HCl reaction, 3% med. - coarse 5+7+13 shell fragments. N =20 REC =18" Start of drilling Dark greenish gray, weak HCl reaction, 5% med. - coarse shell fragments. 6+7+9 for the day N =16 REC =18" Weak HCl reaction, 3% med. - coarse 5+8+8 N =16 shell fragments. REC =18" -120

5+6+9

### Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

Weak HCl reaction, 5% med. - coarse continued on next page

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Schnabel Engineering
Schnaber Engineering

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

Schnab	pel Engineering LOG						Sheet	5 of 5	
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	DEPT		AMPLING DATA	TESTS	REMARKS
` ,	shell fragments.	ML	, ,			M	N =15		
-	· ·				-125-	М	REC =18"		
					L J				
1					_ 1				
-					h 1				
4	Weak HCl reaction, 3% med coarse shell fragments.					M	4+6+9 N =15		
_					130-	Ш	REC =18"		
					L J				
1					_ 1				
-					h 1				
4	No shell fragments.					M	5+7+7 N =14		
_					135	Ш	REC =18"		
1					[ ]				
1					F 1				
+	Greenish gray.				- 1	M	4+6+8 N =14		
_					-140-	Ш	REC =18"		Rig chatter
					L J				
1					[ ]				
1					F 1				
+	Dark greenish gray, weak HCl reaction, 3% med coarse shell fragments.				- 1		6+9+12 N =21		
_					-145-	Ш	REC =18"		
					L J				
1									
1									
-	Greenish gray, no shell fragments.						5+8+10 N =18		
150.0	BOTTOM OF BORING @ 150.0 FT.		-81.6		150-	Ш	REC =18"		
	BOTTOM OF BOKING @ 130.011.								

Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
 \* = See Appendix I for additional lab testing data.



Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-409 Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 5

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Reese Drilling Method: Mud Rotary Drilling Equipment: CME-75 (Truck) Schnabel Representative: M. Arles

Dates Started: 6/21/06 Finished: 6/27/06

**Location:** Northing: 216253.8 ft Easting: 961614.8 ft

**Ground Surface Elevation:** 61.6 (feet)

	Groundy	vater Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	6/21		7.5'	7.5'	
Start of day	6/22		3.0'	14.0'	
Start of day	6/23		5.0'	14.0'	
Start of day	6/26		19.5'	14.0'	
Start of day	6/27		20.0'	14.0'	

DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV.	WL	SAMPLING		TESTS	REMARKS
(F1)			(FT)		DEPTH	DATA		0.441.0.4741
0.5	Crushed Stone  Poorly graded sand FILL, trace gravel, fine to coarse grained, moist, brown.	FILL	61.1		<del> </del>	3+3+4 N =7 REC =12"		0-14'- 6-1/4" hollow stem auger
-	trace silt. brownish gray.					3+2+2 N =4 REC =18"		
_	contains wood fragments, FILL.				5 -	1+1+2 N =3 REC =18"		
8.5	wet, blackish gray, with gravel, PROBABLE FILL.	CL	53.1	Ā		3+1+1 N =2 REC =18"		9' very soft
	LEAN CLAY, moist, gray, trace sand. with silt.				10-	1+2+2 N =4 REC =16"		augering
-						3+5+5 N =10 REC =18"		14' start of da
14.5	FAT CLAY, moist, gray, trace sand.	СН	47.1		15	1+4+3 N =7 REC =18"		14': 3-7/8 roll bit
17.0	CLAYEY SAND, fine to medium grained, moist, greenish gray.	SC	44.6		 	REC =24"		17.5' Tube pushed
_	green.				20	3+4+4 N =8 REC =18"		
22.0	SANDY FAT CLAY, fine to medium, moist, gray.	СН	39.6			4+2+4		22.5' harder drilling
23.0	CLAYEY SAND, fine to medium grained, moist, reddish orange.	SC	38.6			N =6 REC =18"		g
24.5	POORLY GRADED SAND WITH CLAY, continued on next page	SP-SC	37.1		-25			

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-409 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH **DATA** fine to medium grained, moist, orange, SP-SC 15+26+28 small 1/16" clay layers. N =54 REC =18" 27.0 34.6 POORLY GRADED SAND, fine to SP medium grained, moist, orange. 38+50/5" N = 50/5" **REC =11"** 29.0 32.6 POORLY GRADED SAND with silt, fine SP-SM to medium grained, moist, gray -30 18+50/5" N = 50/5" **REC =11"** 30+40+40 N =80 **REC =18"** pitcher sample -35 w=23.3% pushed LL=NP PL=NP 37.0 24.6 CLAYEY SAND, fine to medium SC grained, moist, gray, contains cemented 3+26+6 sand, with fine to coarse shell N = 32fragments, 10% shell frag, gray colored. REC =12" wet, grayish green. WOH+WOR +WOR N = WOR **REC =18"** contains cemented sand. 3+38+28 43' cemented N =66 layer, grinding REC =18" 44.5 17.1 SILTY SAND, fine to medium grained, SM moist, green, with fine to coarse shell 5+6+6 fragments, contains cemented sand, N =12 strong HCI reaction, 20-30% shell frag. REC =18" 4+5+5 N = 10REC =18" -50 tube pushed REC =24" 4+5+5 N = 10REC =18" 54.5 7.1 POORLY GRADED SAND WITH SILT, SP-SM -55 fine to medium grained, moist, green, 4+5+6 strong HCI reaction, 10-20% shell frag. N = 11REC =18" |||||||||||4+3+5 weak HCl reaction. continued on next page

### Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-409 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 5 **DEPTH SAMPLING** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH **DATA** SP-SM N =8 N =8 REC =18" 59.5 2.1 SILTY SAND, fine to medium grained, SM -60 moist, green, with fine to coarse shell 2+3+2 fragments, strong HCI reaction, 10-20% N =5 shell frag. REC =18" tube pushed contains fine to coarse shell fragments, REC =24" moderate HCI reaction. -65 with fine to coarse shell fragments, 3+6+9 strong HCl reaction, 30-40% shell frag. N =15 REC =18" 67.0 -5.5 CLAYEY SAND, fine to medium SC grained, moist, green and white, 8+14+16 contains cemented sand, with fine to N = 30coarse shell fragments, strong HCI REC =18" reaction, 70-80% shell frag. 69.5 -8.0 SW-SC WELL GRADED SAND WITH CLAY, -70 11+6+12 fine to medium grained, wet, green and N =18 white, with fine to coarse shell REC =18" fragments, strong HCI reaction, 70-90% shell frag. moist, green, with silt, with fine to 7+29+45 coarse shell fragments, strong HCI N =74 reaction, 60-80% shell frag. **REC =18"** 74.5 -13.0 SILTY SAND, fine to medium grained, SM -75 moist, green, trace fine to coarse shell 5+7+13 fragments, moderate HCI reaction, N = 20REC =18" 0-10% shell frag. with fine to coarse shell fragments, 5+7+9 strong HCl reaction, 20-30% shell frag. N = 16 REC =18" 79' start of day 6/23/06 -80 5+7+10 N =17 REC =18" 7+8+11 N =19 **REC =18"** -85 trace fine to medium shell fragments, 4+5+7 moderate HCl reaction, 0-10% shell N =12 REC =18" frag. with fine to coarse shell fragments, 4+5+8 strong HCl reaction, 10-20% shell frag. N = 13**REC =18"** 

-28.0

-90

5+7+9

N =16

ML

### Comments:

89.5

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

SANDY SILT, fine to medium, moist,

green, trace fine to medium shell

fragments, moderate HCl reaction,

chnabel Schnabel Engineering

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048 Sheet: 4 of 5

DEPTH	OTD 4 T 4 DECCE :	01.55	ELEV.		S	AMPLING		DE1
(FT)	STRATA DESCRIPTION	CLASS.	(FT)	WL	DEPTH	DATA	TESTS	REMARKS
-	0-10% shell frag.	ML				REC =18"		
92.0			-30.5			1.20 10		
32.0	SILTY SAND, fine to medium grained,	SM	-50.5					
4	moist, green, trace fine to medium shell				$\vdash \dashv M$	5+6+6		
	fragments, moderate HCl reaction, 0-10% shell frag.				I ∥Λ	N =12 REC =18"		
4	0-10% shell frag.				F	REC = 18		
	contains fine to medium shell				95 <b> </b>	REC =19"	w=33.1%	95' tube pushe
	fragments, greenish gray						LL=61	
							PL=42	
97.0			-35.5		Ļ		_	
07.0	SILTY SAND, fine to medium grained,	SM	00.0					
4	moist, green, with fine to coarse shell				$\vdash \dashv M$	4+6+5		
	fragments, strong HCl reaction, 10-20% shell frag.				I   /\	N =11 REC =18"		
+	Sileli ilag.				├ <i>┤</i> └	KLC - 16		
					400			
					100	2+5+6		
	00.500/ 1.11/					N =11		
7	30-50% shell frag.					REC =18"		
102.0		1	-40.5		F 4			
	CLAYEY SAND, fine to medium	SC				0.40.0		
4	grained, moist, green, with fine to				<b>⊢</b> - M	8+10+8		
	coarse shell fragments, strong HCl reaction, 50-60% shell frag.				<u> </u>	N =18 REC =18"		
	reaction, 50-00 /0 strell frag.				F 4	110-10		
104.5	SANDY SILT, fine to medium, moist,	ML	-43.0		405			105' start of da
	green, with fine to coarse shell	''			105	4+5+8		6/26/06
	fragments, strong HCl reaction, 10-20%					N =13		
	shell frag.					REC =18"		
4					L 4			
						4.0.0		
4	oliveish green, trace fine to coarse shell				$\vdash \dashv V$	4+6+6 N =12		
	fragments, weak HCl reaction, 0-5% shell frag.				\	REC =18"		
4	Shell hag.				F 7	INEO - 10		
					140			
	moderate HCl reaction, 0-10% shell				<del>-110-</del>	5+6+7		
	frag.				L _  X	N =13		
						REC =18"		
4					<b>-</b>			
	with a sead					5.0.0		
-	with sand.				- HV	5+6+8 N =14		
					M	REC =18"		
,,, <u>†</u>					r 1''			
114.5	ELASTIC SILT, moist, oliveish green,	MH	-53.0		115			
	trace fine to medium shell fragments,				1137	6+6+9		
	weak HCl reaction, 0-10% shell frag.				<u> </u>	N =15		
						REC =18"		
117.0	CANDY CILT fine to meeding on the	N 41	-55.5		F 4			
	SANDY SILT, fine to medium, moist, oliveish green, trace fine to coarse shell	ML				4+6+8		
+	fragments, moderate HCl reaction,				F 111	N =14		
	0-10% shell frag.				/\	REC =18"		
7	•				[ ]"			
					120-			
	with fine to coarse shell fragments,				'-5   /	4+5+5		
4	strong HCl reaction, 10-25% shell frag.				F -  X	N =10		
						REC =18"		
122.0	ELASTIC SILT maint aliveint areas	N A1 1	-60.5		F 4			
	ELASTIC SILT, moist, oliveish green, trace fine to medium shell fragments,	MH				4+5+7		
+	with sand, weak HCl reaction, 0-5%				F 11	N =12		
	shell frag.				/\	REC =18"		
7	continued on next page				r 1''	5		
		1			1 1	I .	1	1

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-409 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 5 of 5 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA МН 125 5+5+7 no shells. N =12 **REC =18"** 4+5+6 with clay. N =11 REC =18" 130' start of day -130-5+5+7 6/27/06 N =12 N = 12 REC =18" 6+7+9 N =16 REC =18" -135-5+6+9 N =15 REC =18" 137.5' tube PP=4.00 tsf REC =18" pushed 5+6+8 N =14 REC =18" 5+6+8 N =14 REC =18" 4+6+7 N =13 REC =18" 147.5 -86.0 LEAN CLAY, moist, oliveish green, with CL silt. 7+8+10 N =18

-88.5

REC =18"

-150-

### Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

150.0

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

BOTTOM OF BORING @ 150.0 FT.



Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

B-410 **Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 2

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Reese Drilling Method: Mud Rotary **Drilling Equipment: CME-75** Schnabel Representative: M. Arles

Dates Started: 4/28/06 Finished: 5/2/06

**Location:** Northing: 216374.3 ft Easting: 961323.7 ft

**Ground Surface Elevation:** 119.1 (feet)

Groundwater Observations										
	Date	Time	Depth	Casing	Caved					
Encountered	4/28		44.0'	5.0'						
Start of day	5/1		35.1'	5.0'						
Start of day	5/2		26.0'	5.0'						

DEPTH			ELEV.		SAN	IPLING		
(FT)	STRATA DESCRIPTION	CLASS.	(FT)	WL	DEPTH	DATA	TESTS	REMARKS
0.3	TOPSOIL.	SM	118.8		1+	-2+4		
- -	SILTY SAND, fine to coarse grained, moist, orange.	Sivi				=6 EC =18"		
2.5 - -	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, orange.	SP-SM	116.6		Γ ∏XII Ν	-3+4 =7 EC =18"		
-					L ∐X∥N	-3+2 =5 EC =14"		
- -	fine to coarse grained, yellow orange.				N RI	-3+3 =6 EC =12"		
10.8	fine to medium grained, orange.	SP	108.3			-3+3		
_	POORLY GRADED SAND, fine to medium grained, moist, orange.	31				=6 EC =12"		
13.5	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, orange white, small layers of color changes.	SP-SM	105.6		Γ   X   N	-3+4 =7 EC =15"		
- - - -	fine to coarse grained, orange, grades fine to coarse.				X   N	-5+8 =13 EC =18"		
- -	continued on next page				Γ ∃IXII N	-10+8 =18 EC =17"		

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.
   Boring abandoned due to stuck tube at 55 feet. Offset to 410A

B-410 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering Sheet: 2 of 2 LOG ELEV. **SAMPLING DEPTH** STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SP-SM 28.5 90.6 SILTY SAND, fine to coarse grained, SM 5+8+8 moist, orange. N =16 REC =12" 33.5 85.6 POORLY GRADED SAND WITH SILT, SP-SM 6+9+11 fine to coarse grained, moist, orange. N = 20REC =18" -35 4+13+14 N =27 REC =16" 43.5 75.6  $\overline{\nabla}$ SILTY SAND, fine grained, wet, orange SM 3+1+1 white. N =2 REC =18" WOH+3+3 N =6 REC =18" 53.5 65.6 LEAN CLAY, moist, dark gray, with CL 5+3+3 Pushed tube N =6 sand. and some REC =18" metal; Bechtel 55.0 64.1 BOTTOM OF BORING @ 55.0 FT. abandon hole due to stuck tube problem

Calvert Cliffs Nuclear Power Plant

### Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.
  3. Boring abandoned due to stuck tube at 55 feet. Offset to 410A

**TEST** 

Project:



Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-410A Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Reese Drilling Method: Mud Rotary **Drilling Equipment: CME-75** Schnabel Representative: M. Arles

Dates Started: 4/28/06 Finished: 5/2/06

Location: Northing: 216381.3 ft Easting: 961323.7 ft

**Ground Surface Elevation:** 119.1 (feet)

	Groundy	vater Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	4/28	1:46	44.0'	5.0'	
Start of day	5/1	9:07	35.1'	5.0'	
Start of day	5/2	7:14	26.0'	5.0'	

DEPTH	070474 0704777777	01.00	ELEV.		SAM	MPLING		
(FT)	STRATA DESCRIPTION	CLASS.	(FT)	WL	DEPTH	DATA	TESTS	REMARKS
-+	SEE BORING LOG B-410 FOR	+			JL: !!!	PAIA		Boring was
	SAMPLE DESCRIPTIONS FROM 0 TO							advanced
7	58.0 FEET.				Γ 7 Ι			without
					L			sampling to
								sampling to 58.5' (depth a which original
-								boring was
								terminated)
-					t 1			
					_ 5 _			
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_	continued on next page				<del></del>			

# Comments:

2. \* = See Appendix I for additional lab testing data.

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

chnabel Schnabel Engineering

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048 Sheet: 2 of 4

Schnab	el Engineering LOG					2 of 4		
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	S. DEPTH	AMPLING DATA	TESTS	REMARKS
					DEI III	DAIA		
4	SEE BORING LOG B-410 FOR							
_	SAMPLE DESCRIPTIONS FROM 0 TO							
	58.0 FEET.							
1								
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Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
 \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant **B-410A Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering Sheet: 3 of 4 LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA FAT CLAY, moist, dark gray, with sand. CH 1+2+3 N =5 REC =18" PP=2.25 tsf REC =7" trace sand. -65 with sand. 2+4+5 N =9 REC =18" Bottom of tube contains fine REC =18" sand -75 75.0 44.1 CLAYEY SAND, fine grained, moist, SC greenish gray. 78.5 40.6 POORLY GRADED SAND, fine to SP 9+11+50/5" medium grained, moist, brown. N =61/11" REC =16" 50/2" yellowish brown. N =50/2" REC =1" -85 88.5 30.6 POORLY GRADED SAND WITH SILT, SP-SM 42+50/4" N =50/4" fine to medium grained, moist, greenish gray, with fine to medium shell fragments, moderate HCl reaction. REC =10" -90 continued on next page

### Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST B-410A** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SP-SM Rig chatter 93.5 25.6 POORLY GRADED SAND, fine to SP 50/1" coarse grained, moist, greenish gray, with fine to medium shell fragments, N =50/1" REC =1" -95 moderate HCl reaction. 98.5 20.6 × SP-SM POORLY GRADED SAND WITH SILT, 50/2" 20.5 98.6 fine to medium grained, moist, greenish N = 50/2"gray, with fine to coarse shell \fragments, moderate HCl reaction. REC =1" BOTTOM OF BORING @ 98.6 FT.

### Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

chnabel Schnabel Engineering

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

B-411 **Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 5

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: T. Connelly Drilling Method: Mud Rotary **Drilling Equipment:** CME-550 Schnabel Representative: K. Bell

Dates Started: 7/26/06 Finished: 7/27/06

**Location:** Northing: 216556.31 ft Easting: 961517.19 ft

Ground Surface Elevation: 81.5 (feet)

	Ground	water Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	7/26		7.0'		
Start of Day	7/27		5.0'		

DEPTH	OTDATA DECODIDATO:	01.466	ELEV.		SAMPLING	TEATO	DEMARKS
(FT)	STRATA DESCRIPTION	CLASS.	(FT)	WL	DEPTH DATA	TESTS	REMARKS
0.5	ROOTMAT AND TOPSOIL.  POORLY GRADED SAND WITH SILT, fine to medium grained, moist, yellowish brown, trace gravel.  yellowish brown and orangeish brown, trace root fragments.	SP-SM	81.0		woh+woh+2 N = 2 REC =11" 2+2+2 N = 4	w=6.8% *	
5.6	CLAYEY SAND, fine to medium grained, wet, orangeish brown and reddish brown, trace root fragments, trace gravel, iron staining.  SANDY LEAN CLAY, wet, orangeish brown.	SC	- 75.9 - 74.0	Ā	REC =15"  3+3+3 N =6 REC =18"  1+2+1 N =3 REC =12"	w=27.4%	
-	orangeish brown and gray				10   1+1+1 N =2 REC =16"		start of mud rotary drilling
13.0	FAT CLAY, moist, gray, trace sand.	СН	- 68.5		2+2+3 N =5 REC =18"	w=31.0%	
18.5	ORGANIC CLAY, moist, gray	ОН	- 63.0		1+2+3 N =5 REC =18"		
-	continued on next page				REC =16"	w=37.9% LL=61 PL=19	

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-411 **Boring Number:** hnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** PP=3.50 tsf OH 27.0 54.5 ELASTIC SILT, moist, gray, trace sand. MH 3+4+6 N = 10**REC =18"** -30 32.0 49.5 SANDY SILT, moist, gray. ML w=24.4% 4+5+6 N = 11REC =18" -35 37.0 44.5 CLAYEY SAND, fine to medium SC grained, wet, reddish brown and orangeish brown, contains fine to medium shell fragments, 10-20%, weak 10+12+14 cementation, HCI reaction moderate. N =26 **REC =13"** 39.5 42.0 SM SILTY SAND, fine grained, moist, yellowish brown and orangeish gray. w=24.0% 21+50 N =50 REC =12"  $|\boxtimes|$ 50/5" N = 50/5" REC =4" -50 52.0 29.5 SANDY LEAN CLAY, moist, gray. CL w=25.2% 11+6+23 LL=44 N =29 PL=17 REC =18" Harder drilling 57.0 24.5 SILTY SAND, fine to medium grained, SM wet, light gray, with fine to coarse shell continued on next page

### Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-411 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** fragments, 50-60%, HCI reaction SM 28+6+13 N =19 REC =18" 62.0 19.5 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, wet, gray and white, contains fine to coarse shell w=34.4% fragments, 30-40%, HCl reaction strong. 6+4+5 N =9 REC =18" contains fine to coarse shell fragments, 10-20%, HCl reaction moderate. 6+5+7 N =12 REC =18" w=32.0% trace fine to medium shell fragments, 5+4+6 N = 102-5%, HCl reaction weak REC =18" 3+3+3 N =6 REC =18" w=36.4% gray and white, contains fine to coarse 6+7+7 shell fragments, 40-50%, weak N =14 cementation, HCI reaction strong **REC =18"** -85 87.0 -5.6 SILTY SAND, fine to medium grained, SM wet, gray and white, contains fine to resumed drilling coarse shell fragments, 20-30%, HCI at 7/27/06 @ reaction strong. 7+9+11 7:45am N = 20∐ REC =18" -90

### Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-411 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 5 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SM 92.0 -10.6 SANDY SILT, wet, greenish gray, trace fine to coarse shell fragments, 5-10%, MLHCI reaction weak. w=31.6% 11+10+15 N =25 ∐ REC =18" -95 5+5+6 N =11 REC =18" -100 w=38.2% 5+6+10 LL=43 N =16 PL=30 REC =18" 7+7+9 N =16 REC =18" wet, greenish gray, trace fine to medium shell fragments, 2-5%, HCl reaction weak. w=40.4% 5+8+11 N =19 REC =18" 6+8+16 contains fine to coarse shell fragments, 20-30%, HCI reaction strong N = 24REC =18" -120 122.0 -40.6 ELASTIC SILT, wet, greenish gray, MH trace fine to medium shell fragments, 2-5%, HCl reaction weak w=42.7%

3+6+10

### Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST B-411** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 5 of 5 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA LL=63 МН N =16 REC =18" PL=43 -125 5+7+9 N =16 REC =18" -130-5+7+7 N =14 REC =18" -135 4+6+6 N =12 REC =18" 5+6+8 N =14 REC =18" 6+7+8 N =15 REC =18" -150-150.0 -68.6 BOTTOM OF BORING @ 150.0 FT.

### Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.



**Project:** Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Boring Number: 06120048

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: T. Chew

Drilling Method: Mud Rotary

Drilling Foundation Diedrich D

Drilling Equipment: Diedrich D-50 (ATC)Schnabel Representative: B. BradfieldDates Started: 8/7/06 Finished: 8/8/06

**Location:** Northing: 216589.24 ft Easting: 961495.42 ft

**Ground Surface Elevation:** 92.2 (feet)

	Groundy	water Obs	ervations	i	
	Date	Time	Depth	Casing	Caved
Encountered	8/7		13.5'		
24 hours	8/8		6.5'		

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	SAMPLING	TESTS	REMARKS
(FT)	OTTATA DEGOTOR HOR	OLAGO.	(FT)	772	DEPTH DATA	12313	KEWAKKS
-	Silt with sand, PROBABLE FILL, moist, brown, contains root fragments.	FILL			3+6+6 N =12 REC =18"		Drilled 4 1/4" HSA to 13.5'
2.0	Silty sand PROBABLE FILL, fine to coarse grained, moist, reddish brown, contains root fragments, trace gravel.	FILL	90.2		4+3+3 N =6 REC =18"		
4.5	POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, light brown and brown.	SP-SM	87.7	<u></u>	4+4+8 N =12 REC =18"		
-	fine to medium grained, light yellowish brown and brownish white, some slight iron stained bands <1/4" thick.				5+11+10 N =21 REC =18"		
10.0	SILTY SAND, fine to coarse grained, moist, light yellowish brown and dark reddish brown, trace cemented sand, moderate cementation, some iron stained bands ~1.5" thick.	SM	82.2		-10-   8+10+10 N = 20 REC = 18"		
13.0 -	POORLY GRADED SAND WITH SILT, fine to coarse grained, wet, light grayish brown and dark reddish brown, with cemented sand, trace gravel, strong cementation, limonitic cemented bands up to 2" thick.	SP-SM	79.2	Ā	4+6+8 N =14 REC =18"		15'- Begin mu rotary with 2 15/16" tri-con roller bit
17.0	SILTY SAND, fine grained, wet, light yellowish brown and mottled gray, limonitic cemented bands up to 2" thick.	SM	75.2		1+1+1 N =2 REC =18"		
22.0	SANDY LEAN CLAY, fine, moist, dark gray, contains mica.	CL	70.2		1+2+3 N =5		
_	continued on next page				REC =18"		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-412 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA CL with sand, gray. 2+2+3 N =5 **REC =18"** 32.0 60.2 FAT CLAY with sand, moist, gray, СН contains mica. 33.5'- Start of 2+4+3 day 8/8/06 N =7 REC =18" -35 37.0 55.2 LEAN CLAY with sand, moist, gray, CL contains mica. 3+3+6 N =9 REC =18" 50.2 42.0 SANDY FAT CLAY, fine to medium, CH moist, gray, contains mica. 5+7+9 N =16 REC =18" trace cemented sand, weak cementation. 5+5+16 N =21 49.5 42.7 REC =18" SILTY SAND, fine to coarse grained, SM -50 wet, dark reddish brown and grayish 51'- Driller white, with limonitic cemented sand, noted harder moderate cementation, imprints of shell drilling fragments, highly oxidized zone. 52.0 40.2 SP-SM POORLY GRADED SAND WITH SILT, fine to medium grained, wet, light grayish white. 19+22+50 54.5'- Some N =72 light iron REC =12" staining in -55 sample light gray and mottled orangeish brown.

### Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-412 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SP-SM  $\boxtimes$ 50/5" N = 50/5" REC =5" -60 light brown.  $\boxtimes$ 50/5" N = 50/5" REC =2" -65 67.0 25.2 CLAYEY SAND, fine to medium SC grained, wet, gray and brownish white, 20-30% fine to coarse shell fragments, trace cemented sand, moderate HCI 24+11+11 reaction, moderate cementation. N = 22REC =18" gray and grayish white, 10-20% fine to medium shell fragments, moderate HCl reaction, HCl reaction localized to decomposed shell fragments. 6+6+10 N =16 REC =18" 10-20% fine to coarse shell fragments, strong HCl reaction, HCl reaction localized to decomposed shell fragments. 9+9+10 N =19 REC =14" dark gray, 10-20% fine to medium shell fragments, moderate HCl reaction, HCl reaction localized to decomposed shell fragments. 7+9+15 N =24 **REC =18"** -85 weak HCl reaction, <5% fine shell fragments, HCI reaction localized to decomposed shell fragments. 5+4+6 N = 10REC =18" -90 continued on next page

### Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-412 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SC dark gray and brownish white, 30-40% fine to coarse shell fragments, strong HCl reaction, HCl reaction localized to decomposed shell fragments. 4+9+18 N =27 REC =18" light gray and brownish white, 40-50% fine to coarse shell fragments, with cemented sand, strong HCI reaction, moderate cementation.  $|\boxtimes|$ 50/5" 98.9 -6.7 N = 50/5" BOTTOM OF BORING @ 98.9 FT. REC =4"

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.



Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 5

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Evans Drilling Method: Mud Rotary

Drilling Equipment: Failing-1500 (Truck) Schnabel Representative: R. Vinzant

Dates Started: 5/12/06 Finished: 5/15/06

**Location:** Northing: 216994.88 ft Easting: 961413.25 ft

**Ground Surface Elevation:** 122.9 (feet)

		Once.	1 01 0		
	Ground	vater Obs	ervations		
	Date	Time	Depth	Casing	Caved
Start of day	5/15		20.0'		
Water Reading	5/16		84.6'		

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	s	AMPLING	TESTS	REMARKS
(FT)	OTTALA DEGOTAL HON	OLAGO.	(FT)	VVL	DEPTH	DATA	12313	KEMMINN
0.4	Forest litter, root mat and topsoil.	CD CM	122.5			4+6+8		
-	POORLY GRADED SAND WITH SILT, medium to coarse grained, moist, light orangeish brown.	SP-SM				N =14 REC =18"		
-						5+4+6 N =10 REC =18"		
-	light orangeish gray.				5 -	4+6+7 N =13 REC =14"		
_	light orangeish brown.					4+5+7 N =12 REC =16"	w=9.7%	
-	light reddish brown.				10 	3+4+5 N =9		
-	light group giah brown					REC =14"		
-	light orangeish brown.				- -15-	3+2+3 N =5 REC =12"		
-					 			
-						4+6+6 N =12 REC =15"	w=12.9%	
-					20 <sup> </sup>	NEO = 10		
-								
	3" layer of darker strata.					9+10+14 N =24 REC =16"		
	continued on next page				-			

- 1. Ground Water Observation Well OW-413B installed upon completion
- 2. \* = See Appendix I for additional lab testing data.
  3. Ground Water Observation Well OW-413A installed at a nearby location

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

Schnab	pel Engineering LOG					Sheet	2 of 5	
DEPTH	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL		AMPLING	TESTS	REMARKS
(FT)			(F1)		DEPTH	DATA		
-		SP-SM			 			
_					-30-	9+12+16 N =28 REC =15"		
- - -	orangeish brown.				- - 	10+12+14 N =26	w=8.6%	
-					-35  <u>/</u> \	REC =17"		
- - - -	wet, light orangeish gray.				40	16+18+18 N =36 REC =16"		
45.0	moist, light orangeish brown.  SILTY SAND, fine to medium grained, moist, light orange, mottles of white clay.	SM	77.9		- 45	7+14+16 N =30 REC =16"		
- - - -					-50	3+2+2 N =4 REC =18"	w=26.9% LL=NP PL=NP *	
53.5	SANDY ELASTIC SILT, moist, oliveish gray.	МН	69.4			2+3+3 N =6 REC =18"	w=25.7% LL=56 PL=27 *	
-	continued on next page							

- Ground Water Observation Well OW-413B installed upon completion
   \* = See Appendix I for additional lab testing data.
   Ground Water Observation Well OW-413A installed at a nearby location

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-413 **Boring Number:** hnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 3 of 5 Schnabel Engineering LOG ELEV. **SAMPLING DEPTH** STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA МН w=27.5% with sand, fine to medium grained, 2+4+4 LL=58 N =8 moist, oliveish gray, PL=29 REC =18" -65 PP=1.50 tsf 4+5+7 N =12 REC =18" 70.0 52.9 FAT CLAY, moist, gray СН w=35.5% REC =24" LL=51 PL=15 PP=4.25 tsf 47.9 -75 75.0 SM SILTY SAND, fine to medium grained, moist, greenish gray, contains mica. w=26.1% 4+4+10 N =14 REC =18"

41.9

w=21%

25+50/3" N =50/3" REC =10"

N = 50/3"

REC =4"

-85

-90

⊠ <sub>50/3"</sub>

SP-SM

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

81.0

1. Ground Water Observation Well OW-413B installed upon completion

POORLY GRADED SAND WITH SILT,

fine to medium grained, moist, dark

light greenish gray, mottles of orange

continued on next page

orangeish brown.

color.

- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground Water Observation Well OW-413A installed at a nearby location

TEST Project: Calvert Cliffs Nuclear Power Plant B-413 **Boring Number:** hnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 4 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SP-SM  $\boxtimes$ 50/3" greenish gray, trace fine gravel, orange. N = 50/3" REC =4" 95.0 27.9 -95 SILTY SAND, fine to medium grained, SM moist, greenish gray, trace shell fragments, moderate HCl reaction. w=34.9% 8+11+50/5" N =61/11" REC =17" -100 Resumed on  $\boxtimes$ 25% shell fragments, and cemented 50/5" 5/15/06 8:30am sand, weak HCI reaction. N = 50/5" REC =5" 105.0 17.9 -105 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, greenish gray, moderate HCl reaction, 25% shell fragments, layers of flat shells. w=24.8% 11+12+18 N = 30REC =18" 113.5 w=26.3% SILTY SAND, fine to medium grained, SM 7+9+13 light gray, strong HCl reaction, 50% N =22 shell fragments. REC =18" w=32.5% 5+9+9 N =18 REC =18" -120-

w=35.1%

3+7+9

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

1. Ground Water Observation Well OW-413B installed upon completion

- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground Water Observation Well OW-413A installed at a nearby location

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

Schnab	pel Engineering LOG				Sheet	: 5 of 5	
DEPTH (FT)	STRATA DESCRIPTION   CLASS.   (ET)   WL			SAMPLING TE		REMARKS	
۱۰۰/			(1)	DEPT		*	
		SM			N =16 REC =18"		
-				-125-	INLO - 10		
4				L 4			
1				1			
4							
					15+43+23	w=18.7%	
7				Γ ]	XII N =66	*	
-				130-	REC =18"		
	15% shell fragments.						
+				F 1			
_				L J			
					20127124	w=24.8%	
+					X 28+27+34 N =61	*	
_				-135-	REC =18"		
	5% shell fragments, moderate HCl reaction, one layer of flat shells.						
1	rousion, one rayer or hat eneme.			1			
-							
1						w=27.5%	
-					11+12+16 N =28	W-27.570 *	
				140-	REC =8"		
-				h 1			
4				<u> </u>			
	weak HCl reaction.						
1						22 40/	
-					N =37	w=32.1% *	
				145	REC =18"		
				143			
+							
_				ļ ]			
1				t 1		00.00/	
4				-	8+13+22	w=39.8%	
150.0			27.4	150-	N =35 REC =18"		
150.0	BOTTOM OF BORING @ 150.0 FT.		-27.1	130-			

- Ground Water Observation Well OW-413B installed upon completion
   \* = See Appendix I for additional lab testing data.
   Ground Water Observation Well OW-413A installed at a nearby location

chnabel Schnabel Engineering

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

B-414

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Evans **Drilling Method:** Mud Rotary Drilling Equipment: Failing-1500 (Truck)

Schnabel Representative: R. Vinzant

Dates Started: 5/11/06 Finished: 5/11/06

**Location:** Northing: 216630.18 ft Easting: 961354.48 ft

Ground Surface Elevation: 121.2 (feet)

	Ground	water Obs	ervations	i	
	Date	Time	Depth	Casing	Caved
Encountered	5/11		13.5'		

OEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV.	WL	SAMPLING	TESTS	REMARKS
(, ,,	DOODLY ODADED OAND WITH OUT	00.014	(,		DEPTH DATA		
-	POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, orangeish brown, with root fragments and organic matter.	SP-SM			3+5+6 N =11 REC =15"		
	light orangeish brown.				3+5+7 N =12 REC =14"		
_	fine to medium grained, light reddish orange.				5		
					REC =18"	w=4.29/	
-	fine to coarse grained.				6+8+12 N =20 REC =17"	w=4.2%	
					10 		
-					N =15 REC =16"		
	wet, light orangeish brown.			Ā	5+9+7 N =16 REC =15"		
-					15		
-							
					6+7+10 N = 17 REC =13"	w=9.2%	
-							
_					13+17+19 N =36 REC =17"		
	continued on next page						

# Comments:

2. \* = See Appendix I for additional lab testing data.

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

TEST Project: Calvert Cliffs Nuclear Power Plant B-414 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SP-SM 27.0 94.2 POORLY GRADED SAND, fine to SP coarse grained, wet, grayish brown, trace silt and white clay. 5+6+14 N =20 29.5 91.7 POORLY GRADED SAND WITH SILT, SP-SM REC =15" -30 fine to coarse grained, wet, orangeish w=9.7% 11+12+14 N =26 REC =18" -35 10+13+17 N = 30REC =14" 79.2 42.0 SM SILTY SAND, fine to medium grained, moist, orange. w=20.6% 2+3+2 LL=NP N =5 PL=NP REC =18" w=27.7% light orange, mottles of white clay. 2+1+1 LL=NP N =2 PL=NP REC =18" 53.5 67.7 w=28.0% SANDY LEAN CLAY, moist, greenish CL 2+3+3 LL=42 gray, with fine sand. N =6 PL=23 REC =18" -55

64.2

CH

## Comments:

57.0

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

fine sand

FAT CLAY, moist, greenish gray, with

B-414 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 3 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** w=33.2% CH REC =24" LL=58 PL=19 PP=3.25 tsf -60 w=38.3% 3+5+6 N =11 REC =18" PP=2.50 tsf w=36.7% REC =24" LL=51 PL=15 PP=3.80 tsf 72.0 49.2 SANDY LEAN CLAY, moist, greenish CL gray, fine grained. w=22.9% 4+6+9 LL=39 N =15 PL=20 REC =18" PP=2.75 tsf 77.0 44.2 SANDY SILT, greenish gray, with organic matter, 50% dark brown and ML black organic matter. w=29.8% 4+8+14 N =22 REC =18" 82.0 39.2 SILTY SAND, fine to medium grained, SM wet, light greenish gray. w=19.0% 42+50/4" N = 50/4" REC =10" -85 |oxtimes|50/5" dark gray. N = 50/5" REC =5" -90 continued on next page

Calvert Cliffs Nuclear Power Plant

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

TEST

Project:

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

<sup>2. \* =</sup> See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-414 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SM water loss from 93.5-95 ft, 1 w=20.1% 8+50/2" bag quick gel N = 50/2"REC =8" 26.2 -95 95.0 SILTY GRAVEL, weak HCl reaction.  $\mathsf{GM}$ 600 gal. water, 4 bag w=13.5% 35+50/3" bentonite, still N = 50/3" loosing water REC =10" 100.0 21.2 -100 BOTTOM OF BORING @ 100.0 FT.

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

2. \* = See Appendix I for additional lab testing data.

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

Schnabel Engineering

TEST BORING LOG

**Project:** Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Boring Number: 06120048

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Bender

Drilling Method: Mud Rotary

Drilling Equipment: CME-550X (ATV)

Schnabel Representative: K. Megginson

Dates Started: 4/27/06 Finished: 4/28/06

**Location:** Northing: 216480.9 ft Easting: 961264.2 ft

**Ground Surface Elevation:** 119.3 (feet)

	Groundy	water Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	4/27		18.5'		

STRATA DESCRIPTION	CLASS.	(FT)	WL	DEDTIL	1	TESTS	REMARKS
Doorly graded aand FILL fine to				DEPTH	DATA		
Poorly graded sand FILL, fine to medium grained, contains lean clay layer, moist, brown.	FILL				3+2+5 N =7 REC =18"		
POORLY GRADED SAND WITH SILT, fine to medium grained, trace silt, moist, light brown.	SP-SM	117.3			4+3+4 N =7 REC =16"		
light brown and brown.				5 -	3+4+4 N =8 REC =18"	w=3.6%	
light brown.					3+4+5 N =9 REC =14"		
light brown and yellowish brown.				10 	3+4+4 N =8		
POORLY GRADED SAND, fine to coarse grained, moist, light brown and orangeish brown, trace silt.	SP	107.3			4+4+6 N =10 REC =17"	w=2.5%	
wet, contains lean clay pockets.			Ā		6+7+9 N =16 REC =15"		*Used hollow stem augers depth of 18.5 *Switched to 3-7/8" O.D. Tri-cone rolle bit below 18.6 ft.
POORLY GRADED SAND WITH SILT, fine to coarse grained, wet, yellowish brown.	SP-SM	97.3			6+6+8 N = 14 REC =6"		
	fine to medium grained, trace silt, moist, light brown.  light brown and brown.  light brown and yellowish brown.  POORLY GRADED SAND, fine to coarse grained, moist, light brown and orangeish brown, trace silt.  wet, contains lean clay pockets.  POORLY GRADED SAND WITH SILT, fine to coarse grained, wet, yellowish	fine to medium grained, trace silt, moist, light brown.  light brown and brown.  light brown and yellowish brown.  POORLY GRADED SAND, fine to coarse grained, moist, light brown and orangeish brown, trace silt.  wet, contains lean clay pockets.  POORLY GRADED SAND WITH SILT, fine to coarse grained, wet, yellowish brown.  SP-SM	fine to medium grained, trace silt, moist, light brown.  light brown and brown.  light brown and yellowish brown.  POORLY GRADED SAND, fine to coarse grained, moist, light brown and orangeish brown, trace silt.  POORLY GRADED SAND, fine to coarse grained, moist, light brown and orangeish brown, trace silt.  POORLY GRADED SAND WITH SILT, fine to coarse grained, wet, yellowish brown.	POORLY GRADED SAND WITH SILT, fine to medium grained, trace silt, moist, light brown.    light brown and brown.   SP   107.3     POORLY GRADED SAND, fine to coarse grained, moist, light brown and orangeish brown, trace silt.   SP   107.3     wet, contains lean clay pockets.   SP   SP   SM   SM	POORLY GRADED SAND WITH SILT, fine to medium grained, trace silt, moist, light brown and brown.  POORLY GRADED SAND, fine to coarse grained, moist, light brown and orangeish brown, trace silt.  POORLY GRADED SAND, fine to coarse grained, moist, light brown and orangeish brown, trace silt.  POORLY GRADED SAND WITH SILT, fine to coarse grained, wet, yellowish brown.  POORLY GRADED SAND WITH SILT, fine to coarse grained, wet, yellowish brown.	POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, light brown, trace silt.  POORLY GRADED SAND, fine to coarse grained, moist, light brown and orangeish brown, trace silt.  POORLY GRADED SAND, fine to coarse grained, moist, light brown and orangeish brown, trace silt.  POORLY GRADED SAND WITH SILT, fine to coarse grained, wet, yellowish brown.  POORLY GRADED SAND WITH SILT, fine to coarse grained, wet, yellowish brown.  POORLY GRADED SAND WITH SILT, fine to coarse grained, wet, yellowish brown.  POORLY GRADED SAND WITH SILT, fine to coarse grained, wet, yellowish brown.  POORLY GRADED SAND WITH SILT, fine to coarse grained, wet, yellowish brown.	FOORLY GRADED SAND WITH SILT, fine to coarse grained, moist, light brown, trace silt.  POORLY GRADED SAND, fine to coarse grained, moist, light brown and orangeish brown, trace silt.  POORLY GRADED SAND WITH SILT, fine to coarse grained, wet, yellowish brown.  SP-SM   SP-SM   A+3+4

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-415 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SP-SM w=13.5% orangeish brown and yellowish brown, 5+7+9 trace gravel, contains clayey sand N =16 pockets. REC =9" -30 4+10+13 light brown. N = 23REC =6" -35 light brown and brown, contains clayey 4+9+13 sand pockets. N =22 REC =8" 77.3 42.0 SM SILTY SAND, fine to medium, wet, dark gray, contains mica. w=28.2% 2+2+2 LL=26 N =4 PL=22 REC =15" PP=0.50 tsf 47.0 72.3 CLAYEY SAND, fine to medium SC grained, wet, dark gray, contains mica. 4+7+2 N =9 fine to coarse grained below 49.5 ft. 67.3 52.0 LEAN CLAY, moist, light greenish gray, CL trace sand, contains mica. 2+3+3 N =6 REC =18" 57.0 62.3 FAT CLAY, moist, light greenish gray, CH

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

trace sand, contains mica.

TEST Project: Calvert Cliffs Nuclear Power Plant B-415 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** CH w=36.6% 2+4+5 LL=61 N =9 PL=21 REC =18" PP=1.50 tsf 62.0 57.3 ELASTIC SILT, moist, light greenish МН gray and dark gray, trace sand, contains \*\*Resumed drilling at 7:00 mica. 3+4+5 on 4/28/06. N =9 REC =18" 67.0 52.3 FAT CLAY, moist, light greenish gray, CH trace sand. 5+7+9 N =16 REC =18" 72.0 47.3 SANDY SILT, fine to coarse, moist, SM gray, trace gravel, contains mica. w=26.3% 5+5+8 LL=40 N = 13PL=30 REC =18" PP=2.00 tsf 26+100 N =100 **REC =11"** -80 w=17.0% fine to coarse grained, wet, gray and 17+22+31 greenish gray, contains shell fragments N =53 and lean clay lenses, strong HCl REC =14" -85 reaction.  $\boxtimes$ gray, contains clayey sand pockets. 100 REC =6" -90

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

chnabel

**TEST** BORING

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

EPTH		CLASS. ELEV. (FT) WL		SAMPLING					
FT)	STRATA DESCRIPTION	CLASS.	(FT)	WL	DEP1		DATA	TESTS	REMARKS
		SM			DEF		DATA		
2.0			27.3		L -				
	CLAYEY SAND, fine to coarse grained,	SC							
-	wet, light gray, contains cemented sand, and lean clay layers, moderate HCl					1			
	reaction.					$\boxtimes$	100/3"		
1					_	1	N =100/3"		
_					<del>-</del> 95-		REC =4"		
-					-	1			
7.0			22.3		L -				
	SILTY SAND, fine to coarse grained,	SM							
-	moist, light gray, contains cemented sand, and shell fragments, strong HCl				├ -	1			
8.7	reaction.		20.6			×	100/2"		
	BOTTOM OF BORING @ 98.7 FT.						N =100/2"		
							REC =2"		
			i l	I	I	1		1	

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.

Schnabel
Schnabel Engineering

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: T. Chew Drilling Method: Mud Rotary

**Drilling Equipment:** Diedrich D-50 (ATC) Schnabel Representative: B. Bradfield Dates Started: 8/2/06 Finished: 8/3/06

**Location:** Northing: 216084.5 ft Easting: 961596.34 ft

**Ground Surface Elevation:** 86.2 (feet)

	Groundy	water Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	8/3		58.5'		

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	s	AMPLING	TESTS	REMARKS
(FT)	ondini Deoral Hon	52.300.	(FT)		DEPTH	DATA		
-	SILTY SAND, fine to medium grained, moist, light brown, contains wood fragments.	SM				1+2+2 N =4 REC =13"		Drilled with 4 1/4 HSA to 45
-	Orangeish brown, trace gravel.					5+5+6 N =11 REC =18"		
4.5	POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, light brown and orangeish brown, trace gravel.	SP-SM	81.7		5 -	4+4+6 N =10 REC =16"	w=3.8%	
- - -	Slight banding of colors 1/4-1/2" thick.					4+7+7 N =14 REC =17"		
- - -					10 	5+6+6 N =12 REC =14"		
13.0	SILTY SAND, fine to medium grained, moist, light orangeish brown and gray, some iron staining visable.	SM	73.2		  15-	4+4+4 N =8 REC =18"	w=13.0%	
-	Brown, colors are mottled.					2+1+1 N =2		
22.0 -	SANDY FAT CLAY, moist, dark gray and greenish gray, contains mica, some gray pockets of fine sand present <3/4".	СН	64.2			2+3+4 N =7 REC =18"		
-	continued on next page				<u> </u>	KEC = 18		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-416 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA CH w=33.7% With sand, some clayey sand lenses 4+4+7 LL=58 present <1/8". N =11 PL=17 **REC =18"** 32.0 54.2 LEAN CLAY with sand, moist, dark gray CL and greenish gray, contains mica. 3+4+4 N =8 REC =18" -35 37.0 49.2 FAT CLAY with sand, moist, dark gray СН and greenish gray, contains mica. 3+4+6 N =10 REC =18" 42.0 44.2 CLAYEY SAND, fine to medium SC grained, moist, greenish gray, contains mica, 1" pocket of gray clayey sand in w=25.6% sample. 3+4+7 N =11 45'- Begin mud REC =18" rotary with 2 15/16" tri-cone roller bit Moist, reddish brown and brownish 3+13+21 gray, with cemented sand, weak N = 34cementation, impressions of shell REC =18" fragments, highly oxidized zone. 52.0 34.2 SILTY SAND, fine to medium grained, SM moist, gray. 22+33+50/3" N =83/9" REC =13" 55'- Start of day -55 8/3/06

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-416 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SM  $\nabla$ w=26.2% Wet, contains mica. 41+35 +50/5.5" N =85/11.5" 60 REC =16" 62.0 24.2 SANDY LEAN CLAY with silt, moist, CL gray and brownish white, trace cemented sand, 0-10% fine to medium shell fragments, moderate HCI reaction, 49+50/3" moderate cementation, strong HCI N = 50/3" reaction at decomposed shell REC =8" -65 fragments. 67.0 19.2 CLAYEY SAND, fine to coarse grained, SC wet, light gray and gray, trace cemented sand, 10-20% fine to medium shell fragments, strong HCI reaction, 13+16+42 moderate cementation, darker gray N =58 areas are similar to strata at 65. REC =16" Light gray, with cemented sand, 30-40% fine to coarse shell fragments, strong HCI reaction, strong cementation. 72.0 14.2 POORLY GRADED SAND WITH CLAY, SP-SC fine to medium grained, wet, gray and brownish white, 10-20% fine to coarse w=29.5% shell fragments, strong HCI reaction, 6+8+10 HCI reaction localized to shell N =18 fragments. REC =18" 20-30% fine to coarse shell fragments, 6+8+9 strong HCI reaction, HCI reaction N = 17localized to shell fragments. REC =15" 82.0 4.2 CLAYEY SAND, fine to medium SC grained, wet, gray, 0-10% fine to coarse shell fragments, moderate HCI reaction, HCl reaction localized to shell 4+5+8 fragments. N = 13**REC =16"** -85 w=33.5% 0-10% fine to medium shell fragments, 5+4+7 moderate HCl reaction, HCl reaction N = 11REC =18" localized to shell fragments. -90 continued on next page

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-416 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SC 93'- Harder drilling with rig chatter Light gray and white, 40-50% fine to 24+17+15 coarse shell fragments, with cemented sand, strong HCl reaction, strong N = 32REC =14" cementation. Light gray and brownish white, 20-30% 10+9+11 fine to coarse shell fragments, trace N =20 cemented sand, strong HCI reaction, 100.0 -13.8 -100 weak cementation. BOTTOM OF BORING @ 100.0 FT.

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.



Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

B-417 **Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: T. Connelly Drilling Method: Mud Rotary **Drilling Equipment:** CME-550 Schnabel Representative: K. Bell

Dates Started: 7/24/06 Finished: 7/25/06

**Location:** Northing: 216435.75 ft Easting: 961901.11 ft

**Ground Surface Elevation:** 49.2 (feet)

	Groundy	water Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	7/24		10.8'		
Start of Day	7/25		7.0'		

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	S	AMPLING	TESTS	REMARKS
(FT)	OTTATA DEGOTAL HOR	JLAGG.	(FT)	***	DEPTH	DATA	12313	ILMIAINO
0.5	ROOTMAT AND TOPSOIL.  SANDY LEAN CLAY, moist, brown, trace root fragments.	CL	48.7			2+2+4 N =6 REC =8"		
_	trace wood fragments, iron staining					5+5+5 N =10 REC =18"		
_					- 5 - 	1+2+3 N =5 REC =7"		
7.0	POORLY GRADED SAND with silt, fine to medium grained, moist, yellowish brown and orangeish brown, trace fine to coarse shell fragments, iron staining, HCI reaction moderate.	SP-SM	42.2			6+10+17 N =27 REC =16"		possible fill
10.0	SANDY LEAN CLAY, moist, brown and reddish brown, trace root fragments.  POORLY GRADED SAND with silt, fine	CL SP-SM	39.2 38.4	Ā	10	3+7+16 N =23 REC =18"		start of mud
12.0	to medium grained, wet, yellowish brown and orangeish brown.  POORLY GRADED SAND with clay, fine to medium grained, wet, gray, 1/8th inch clay lenses throughout.	SP-SC	37.2			6+6+6 N =12 REC =11"		rotary drilling
14.5	FAT CLAY, moist, gray, trace sand.	СН	34.7		15	2+2+2 N =4 REC =18"		color change mud tub from orangeish brown to gray
-						1+2+2 N =4 REC =18"		
_	trace fine to coarse shell fragments, 2-5%, HCl reaction weak				20	23+11+6 N =17 REC =18"		cemented sal lenses Harder drilling
22.0	CLAYEY SAND, fine to medium grained, wet, gray and greenish gray, contains fine to coarse shell fragments, 30-40%, strong cementation, HCI	SC	27.2			14+38+38 N =76 REC =18"		The second striking
24.5	reaction strong.  continued on next page	SM	24.7		25			

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-417 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SILTY SAND, fine to medium grained, 6+8+27 SM wet, gray and greenish gray, contains N = 35fine to coarse shell fragments, 30-40%, REC =18" strong cementation, HCI reaction 44+5+6 N =11 **REC =18"** 30.0 19.2 -30 CLAYEY SAND, fine to medium SC 3+4+4 grained, wet, gray and white, contains N =8 fine to coarse shell fragments, 20-30%, REC =18" HCI reaction moderate. gray and white 4+7+7 N =14 REC =18" -35 5+10+9 N =19 REC =16" 37.0 12.2 Rig chatter SILTY SAND, fine to medium grained, SM wet, gray and greenish gray, trace fine 3+4+5 to medium shell fragments, 5-10%, HCI N =9 reaction weak. REC =18" 3+3+3 N =6 REC =18" 2+3+3 N =6 REC =18" 2+2+3 N =5 REC =18" 47.0 2.2 SANDY SILT, wet, gray and greenish ML gray, trace fine to medium shell fragments, 2-5%, HCl reaction weak. 2+3+4 N = 7REC =18" greenish gray and white, contains fine 5+8+50/3" to coarse shell fragments, 40-50%, N = 58/9" REC =16" strong cementation, HCI reaction strong. 52.0 -2.8 SM SILTY SAND, fine to medium grained, 6+10+44 wet, greenish gray and white, contains N = 54fine to coarse shell fragments, 40-50%, REC =18" strong cementation, HCI reaction strong. -55 27+14+20 N = 34REC =18" resumed drilling on7/25/06 @

8+14+20

7:00am

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

contains fine to coarse shell fragments, continued on next page

TEST Project: Calvert Cliffs Nuclear Power Plant B-417 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH **DATA** 10-20%, weak cementation, HCI SM N = 34N =34 REC =16" reaction moderate -60 11+14+27 N =41 REC =18" 62.0 -12.8 SANDY SILT, wet, greenish gray, ML contains fine to coarse shell fragments, 4+6+10 10-20%, HCl reaction moderate. N =16 REC =18" -65 4+7+14 N =21 REC =18" 67.0 -17.8 SILTY SAND, fine to medium grained, SM wet, greenish gray, contains fine to 5+6+10 coarse shell fragments, 10-20%, HCI N =16 REC =18" reaction moderate. 70.0 -20.8 SANDY SILT, wet, greenish gray, ML4+6+9 contains fine to coarse shell fragments, N =15 10-20%, HCI reaction moderate. REC =18" 72.0 -22.8 ELASTIC SILT, moist, blueish gray, MH trace sand, trace fine to medium shell 6+7+10 fragments, 2-5%, HCl reaction weak. N = 17**REC =18"** -75 5+7+10 N =17 **REC =18"** 6+6+8 N =14 REC =18" 79.5 -30.3 SANDY SILT, moist, blueish gray, trace fine to medium shell fragments, 2-5%, ML -80 5+7+10 HCI reaction weak. N =17 REC =18" 5+6+8 N =14 **REC =18"** 84.5 -35.3 SILTY SAND, fine to medium grained, SM -85 moist, blueish gray, trace fine to 4+6+7 medium shell fragments, 2-5%, HCI N =13 reaction weak. REC =18" 87.0 -37.8 SANDY SILT, moist, blueish gray and ML organic oder white, contains fine to medium shell 7+7+14 fragments, 10-20%, HCI reaction N =21 moderate. REC =18" trace fine to medium shell fragments, 5+6+9 N =15 5-10%, HCl reaction weak

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

B-417 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH **DATA**  $\mathsf{ML}$ 92.0 -42.8 ELASTIC SILT, moist, greenish gray, МН trace sand, trace fine to medium shell fragments, 2-5%, HCl reaction weak. 5+7+9 N =16 REC =18" 94.5 -45.3 SANDY SILT, moist, greenish gray, ML -95 trace fine to medium shell fragments, 5+6+9 N =15 2-5%, HCl reaction weak. REC =18" 6+6+8 N =14 REC =18" -100-5+6+10 N =16 REC =18" 101.5 -52.3 BOTTOM OF BORING @ 101.5 FT.

Calvert Cliffs Nuclear Power Plant

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

**TEST** 

Project:

2. \* = See Appendix I for additional lab testing data.



Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

B-418 **Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 7

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings **Drilling Method:** Mud Rotary **Drilling Equipment:** CME-750 (ATV) Schnabel Representative: B. Bradfield Dates Started: 6/28/06 Finished: 6/29/06

**Location:** Northing: 216340.25 ft Easting: 961976.71 ft

**Ground Surface Elevation:** 43.7 (feet)

		0												
	Ground	water Obs	ervations											
	Date Time Depth Casing Caved													
Encountered	6/28		6.5'											
Water Reading	7/6		10.5'											

DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	SAMPLING	TESTS	REMARKS
0.3	TOPSOIL.		43.4		<b>DEPTH DATA</b> 8+8+5		
2.0 -	POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, brownish gray and orange, contains root	SP-SM	41.7		N =13 REC =8"		1.5'- Mud rotary with 3 7/8" drag bit
-	fragments, weak limonitic cementation.  CLAYEY SAND, fine to coarse grained,	SC	71.7		_	w=27.9%	Dit
_	moist, gray and orangeish brown.				REC =13"		
4.5 	SILTY SAND, fine to medium grained, wet, orangeish brown and reddish brown.	SM	39.2	<u>∑</u>	6+7+8 N =15 REC =14"		
7.0 -	SILTY SAND, fine to medium, moist,	SM	36.7	-			
-	gray.	Sivi			5+4+3 N =7 REC =14"	w=30.9% LL=NP PL=NP	
	With sand.				40		
-					10 3+2+3 N =5 REC =18"		
13.0 -	CANDY I FAN OLAY See to see disse	01	30.7		_		
-	SANDY LEAN CLAY, fine to medium, moist, gray, contains mica.	CL			4+4+5 N =9 REC =18"	w=32.7% LL=49 PL=22 *	
-							
17.0 -	POORLY GRADED SAND WITH SILT, fine to medium grained, wet, gray and brownish white, 20-30% fine to coarse	SP-SM	26.7		 		
_	shell fragments, strong HCl reaction.				15+8+8 N =16 REC =18"		
-							
_					_	W=25 20/	
_	30-40% fine to coarse shell fragments, strong HCl reaction.				4+5+8 N =13 REC =18"	w=25.2% *	
	continued on next page						

- 1. Observation Well OW-418B installed upon completion.

- 2. Downhole geophysical logging performed on 6/29/06.

  3. \* = See Appendix I for additional lab testing data.

  4. Ground Water Observation Well OW-418A installed at a nearby location

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**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

DEDTU	1		EL EV			SAMPLING	eet: 2 of 7	
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL			TESTS	REMARKS
		SP-SM	, ,		DEPTH	DATA		
		OI -OIVI			L l			
-					h 1			
4					L 4			
	20-30% fine to coarse shell fragments,					6+8+10		
1	strong HCI reaction.					N =18		
-					<u></u> -30 -   <u> </u>	REC =14"		
1					h 1			
4					L 4			
	10-20% fine to coarse shell fragments,					4+5+7	w=28.4%	
1	strong HCI reaction.					N =12	*	
$\dashv$					-35-\ <u>\</u>	REC =15"		
					L ]			
†					t 1			
4					+ +			
	Brownish, 0-10% fine to coarse shell					1+1+2		
7	fragments, weak HCl reaction.					N =3		
-					-40-V	REC =18"		
_					L ]			
40.0								
42.0	CLAYEY SAND, fine to medium	SC	1.7					
4	grained, wet, gray and brownish white, 30-40% fine to coarse shell fragments,				+ +			
	strong HCl reaction.				L 117	3+8+13	w=27.4%	
					X	N =21 REC =18"	Î	
					-45-L	I INEO - 10		
4					+ +			
								47'- Grinding
7								rig chatter
+					<del> </del>			
_	White, 30-40% fine to coarse shell				F 41	11+13+18		
	fragments, 40-50% cemented sand, strong HCl reaction, strong				[ ]	N =31 REC =18"		
٦	cementation.				-50-L			
4					+ +			
52.0			-8.3		L ]			
-	POORLY GRADED SAND WITH CLAY, fine to medium grained, wet, gray and	SP-SC						
1	brownish white, 10-20% fine to medium				[		w-22 20/	
4	shell fragments, moderate HCl reaction, HCl reaction localized to shell				F - 1	7+19+19 N =38	w=23.3%	
	fragments.				_55_	REC =16"		
+					† †			
57.0	CANDY CILT with alay fine to madi-	ML	-13.3		+ +			
	SANDY SILT with clay, fine to medium, moist, gray, 10-20% fine to medium	IVIL						
	continued on next page	1	1		. 7	1	1	1

- Observation Well OW-418B installed upon completion.
   Downhole geophysical logging performed on 6/29/06.
   \* = See Appendix I for additional lab testing data.
   Ground Water Observation Well OW-418A installed at a nearby location

TEST Project: Calvert Cliffs Nuclear Power Plant B-418 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 7 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** shell fragments, moderate HCI reaction, ML HCI reaction limited to shell fragments. 5+10+5 N =15 REC =18" 62.0 -18.3 SILTY SAND, fine to medium grained, SM moist, gray, 0-10% fine to medium shell fragments, weak HCl reaction, HCl w=32.1% reaction localized to shell fragments. 6+9+14 N = 23REC =18" 67.0 -23.3 SANDY LEAN CLAY with silt, fine to CL medium, moist, greenish gray, 10-20% fine to medium shell fragments, weak HCl reaction, HCl reaction localized to 5+9+9 shell fragments. N = 18REC =18" 72.0 -28.3 CLAYEY SAND, fine to medium SC grained, wet, greenish gray, 0-10% fine to medium shell fragments, weak HCI w=41.7% reaction. 6+8+15 N = 23REC =18" 10-20% fine to medium shell fragments, 5+6+8 moderate HCI reaction N =14 REC =18" -38.3 82.0 SILTY SAND, fine to medium grained, SM moist, greenish gray, 10-20% fine to medium shell fragments, moderate HCI reaction. 10+13+10 N =23 **REC =18"** -85 87.0 -43.3 SANDY ELASTIC SILT with clay, fine to МН medium, moist, greenish gray, 10-20% fine to medium shell fragments, w=49.8% moderate HCI reaction. 4+8+9 LL=76 N = 17PL=49 REC =18" -90

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

1. Observation Well OW-418B installed upon completion.

- 2. Downhole geophysical logging performed on 6/29/06.3. \* = See Appendix I for additional lab testing data.
- 4. Ground Water Observation Well OW-418A installed at a nearby location

B-418 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 4 of 7 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA МН With sand, trace decayed organic 4+6+9 matter. N =15 ∐ REC =18" -95 97.0 -53.3 LEAN CLAY, fine to medium, moist, CL greenish gray, 10-20% fine to medium shell fragments, moderate HCl reaction. w=36.7% 4+6+9 LL=46 N =15 PL=25 REC =18" -100 7+7+9 N =16 REC =18" 107.0 -63.3 SANDY ELASTIC SILT, fine to medium, MH moist, greenish gray. w=39.8% 5+7+9 LL=55 N =16 PL=38 REC =18" 112.0 -68.3 FAT CLAY with sand, moist, greenish CH gray. 7+8+10 N =18 REC =18" 5+8+11 N =19 REC =18" -120 w=56.4% 5+7+10 continued on next page

Calvert Cliffs Nuclear Power Plant

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Observation Well OW-418B installed upon completion.

- 2. Downhole geophysical logging performed on 6/29/06.

  3. \* = See Appendix I for additional lab testing data.

  4. Ground Water Observation Well OW-418A installed at a nearby location

**TEST** 

Project:

TEST Project: Calvert Cliffs Nuclear Power Plant B-418 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 5 of 7 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** LL=106 CH N =17 REC =18" PL=41 125 0-10% fine to medium shell fragments, 8+11+12 weak HCl reaction. N = 23REC =18" -130-8+8+11 N =19 ∐ REC =6" -135 135.0 -91.3 ELASTIC SILT with sand, moist, MH greenish gray, 0-10% fine to medium shell fragments, weak HCl reaction. w=64.4% 10+12+14 LL=103 N =26 PL=63 140'- Start **REC =18"** drilling on 6/29/06 4+7+9 N =16 REC =18" 145.0 -101.3 FAT CLAY, moist, no shell fragments. CH

w=52.6%

LL=69

PL=27

5+8+8

N =16

150

**-155** 

-108.3

SC

REC =18"

7+13+21 N = 34∐ REC =14"

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

152.0

1. Observation Well OW-418B installed upon completion.

CLAYEY SAND, fine to medium

HCI reaction.

grained, moist, greenish gray, 10-20% fine to medium shell fragments, weak

- 2. Downhole geophysical logging performed on 6/29/06.

  3. \* = See Appendix I for additional lab testing data.

  4. Ground Water Observation Well OW-418A installed at a nearby location

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-418 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering Sheet: 6 of 7 LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SC 4+8+16 N =24 REC =18" 162.0 -118.3 SANDY ELASTIC SILT, fine to medium, MH moist, greenish gray. 4+8+15 N =23 REC =18" w=57.3% With sand. 3+6+9 LL=76 N =15 PL=49 REC =18" fine to medium, moist, greenish gray. 7+9+15 N =24 REC =18" -175 With sand, 0-10% fine to medium shell 8+10+13 fragments, weak HCI reaction. N =23 REC =18" 180 w=56.7% 6+9+11 LL=100 N = 20PL=60 REC =18" **-185** 7+9+13 No shell fragments. N = 22REC =18" -190continued on next page

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Observation Well OW-418B installed upon completion.

- 2. Downhole geophysical logging performed on 6/29/06.

  3. \* = See Appendix I for additional lab testing data.

  4. Ground Water Observation Well OW-418A installed at a nearby location

**TEST** Project: **B-418** Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 7 of 7 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA MH 5+6+10 N =16 REC =18" 195 w=66.5% 6+7+9 LL=109 N =16 PL=71 REC =18" -200 200.0 --156.3 BOTTOM OF BORING @ 200.0 FT.

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Observation Well OW-418B installed upon completion.

- 2. Downhole geophysical logging performed on 6/29/06.

  3. \* = See Appendix I for additional lab testing data.

  4. Ground Water Observation Well OW-418A installed at a nearby location



**Project:** Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Boring Number: B-419
Contract Number: 06120048

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings

Drilling Method: Mud Rotary

Drilling Equipment: CME-750 (ATV)

Schnabel Representative: M. Arles

Dates Started: 6/5/06 Finished: 6/6/06

**Location:** Northing: 216267.83 ft Easting: 961895.6 ft

**Ground Surface Elevation:** 55.3 (feet)

	Groundy	vater Obs	ervations										
	Date Time Depth Casing												
Encountered	6/5		15.0'	20.0'									
Start of Day	6/6		30.0'	20.0'									

DEPTH (ET)	STRATA DESCRIPTION	CLASS.	ELEV.	WL	SAMPLING	TESTS	REMARKS
(FT)			(FT)		DEPTH DATA		
0.5	Crushed Stone	FILL	54.8		_     5+8+5 _   N =13		0-20' Hollow stem augers
2.0	Clayey sand FILL, fine to coarse grained, moist, yellow, with gravel.	1166	53.3		REC =6"		
2.0	Lean clay FILL, moist, orange, with sand.	FILL	33.3		2+1+WOH N =1 REC =4"		
_					WOH/18" N = WOH/18" REC =0"		
	fine to coarse sandy, wet.		47.0		1+WOH+2		
8.3	Clayey Sand PROBABLE FILL, fine to coarse grained, moist, gray, contains wood fragments.	FILL	47.0		N =2 REC =12"		
-					2+2+3 N =5		
11.6	Sandy lean clay PROBABLE FILL, moist, gray, contains wood fragments.	FILL	43.7		REC =18"		
13.5	SANDY LEAN CLAY, fine to coarse, moist, gray.	CL	41.8	Δ	3+3+5 N =8 REC =18"		
-							
17.0	POORLY GRADED SAND, fine to medium grained, moist, orange and gray, 1/8-1/4" color changes.	SP	38.3		10+20+12 N =32 REC =18"		2-15/16" Drag bit
- - -	wet, yellowish gray.				7+1+1 N =2		
4	continued on next page				25   REC =6"		

## Comments:

2. \* = See Appendix I for additional lab testing data.

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048 Sheet: 2 of 4

Schnab	pel Engineering LOG					•	eet: 2 of 4	1
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL		SAMPLING	TESTS	REMARKS
(- ')		SP	(. ')		DEPTH	I DATA		
4								
1					[ ]			
4					F +			28.5' Harder
4						50/0"		drilling
					_30_	N =50/0" REC =0"		28.5'-100' 4 1/4" roller bit
					30			
1					† †			
32.0	SILTY SAND, fine to coarse grained,	SM	23.3		+ +			
4	moist, grayish green, with fine to coarse shell fragments, contains cemented	Oivi						
	shell fragments, contains cemented sand, strong HCl reaction, 35-45% shell					17+20+13		
1	frag.					X    N =33		
-					-35-V	REC =18"		
_								
1								
-	green				F -	4+7+9 N =16		
_					L-40-	REC =18"		
1								
-					<b>†</b> †			
4					+ +			
_	fine to medium grained, wet, contains				L _ r	32+12+7		
	cemented sand.				_45_	N =19 REC =14"		
					45	_		
-					<b>†</b> †			
4					+ +			
					L ]			
	trace fine to medium shell fragments					4+4+6		
7	trace fine to medium shell fragments, moderate HCl reaction, 0-10% shell				[	N =10 REC =18"		
$\dashv$	frag.				-50-V	7 KEC = 18"		
4					-			
1								53.5' Pushed
+					+ +			tube
_					-55-			
]								
†								
4	continued on next page				+ +			
	continued on next page							

Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
 \* = See Appendix I for additional lab testing data.

**TEST** | **Project:** Calvert Cliffs Nuclear Power Plant

B-419 Boring Number:

SC	hnabel	BORING Project:	Calvert Cliff			CI FIAIIL	Boring Number:	B-418
	el Engineering	LOG	Carvert Cott	y, IVIA	yıaııu		Contract Number: Sheet: 3 of 4	U612U048
DEPTH	STDAT	A DESCRIPTION	CLASS.	ELEV.	WL	SAMPL	ING TESTS	REMARKS
(FT)	JIRAI	A DESCRIPTION		(FT)	VVL	DEPTH D	DATA TESTS	REMARKS
- - -	coarse shell frag	white, with fine to gments, contains , strong HCl reaction, ag.	SM			11+10 N =53 REC	3	
						   -     8+13-   N = 34   REC	1	63' Rig chatte
	25-30% shell fra	ag.				6+7+ N = 19 REC	9	
-						4+5+5 N = 14 N = 14 REC	1	
77.0 -	green, trace fine	ne to medium, moist, e to medium shell ng HCl reaction, 0-5%	ML	21.7		6+9+   6+9+ N = 22 REC	)	
	with clay, weak frag.	HCl reaction, 0-5% shell				5+8+8   5+8+8 N = 16 REC	6	
-	moderate HCl refrag.	eaction, 0-10% shell				5+8+ N =20	)	

# Comments:

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.

**TEST B-419** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA  $\mathsf{ML}$ 92.0 -36.7 SILTY SAND, fine to medium grained, SM moist, green, with fine to coarse shell fragments, strong HCl reaction, 35-45% shell frag. 6+11+13 N =24 REC =18" 4+6+9 N =15 REC =18" 100.0 -100--44.7 BOTTOM OF BORING @ 100.0 FT.

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

chnabel Schnabel Engineering

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

B-420 **Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 5

**Boring Contractor: UNI-TECH DRILLING** 

MALAGA, NEW JERSEY

Boring Foreman: J. Evans Drilling Method: Mud Rotary

Drilling Equipment: Failing-1500 (Truck)

Schnabel Representative: K. Megginson / B. Bradfield

Dates Started: 6/6/06 Finished: 6/7/06

**Location:** Northing: 216213.53 ft Easting: 961670.44 ft

**Ground Surface Elevation:** 62.6 (feet)

	Ground	water Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	6/6		24.0'		
Start of day	6/7		15.0'		

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	;	SAMPLING	TESTS	REMARKS
(FT)	OTTATA DECOME HON	JEA00.	(FT)		DEPTH	DATA	1.23.0	KEMAKKO
0.5	Crushed stone FILL, moist, brown and	FILL	62.1		II.	7+4+7	w=17.2%	
0.5	$\setminus$ dark gray, contains fine to coarse sandy $\ /$	FILL	02.1		Ļ	N =11	LL=52 PL=21	
	\silt pockets.				<u> </u>  L	REC =6"	FL=ZI *	
2.0	Fat clay PROBABLE FILL, moist,	СН	60.6					
	vellowish brown and light gray, with fine	СП				2+3+3	w=28.6%	
1	to medium sand, trace mica, contains root fragments.				├   \	N =6	LL=68	
					L JL	REC =16"	PL=23	
	SANDY FAT CLAY, moist, stratified							
-	orangeish brown and light gray, trace fine to medium sand, contains iron				<u> </u>	7	w=29.7%	
	oxide stained pockets (1/8 inch) and				\	2+3+4 N =7	LL=64	
4	root fragments.				├  /	REC =18"	PL=22	
					L		*	
7					「		00 00/	
4	light gray and dark yellowish brown.				├ - \	2+2+3	w=38.3% LL=71	
					<i>)</i>	N =5	PL=19	
4					├ ┤└	REC =18"	* * *	
$\neg$					—10— <sub>_</sub>			
4	light gray, dark yellowish brown and				├ <i>-</i>  \	3+4+7		
	dark orangeish brown				/	N =11 REC =18"		
4	gray, trace mica and organic matter				├ <i>┤</i> └	J REC = 16		
	(±1%) below 11 ft.							
7					「	_		
_	contains fine to medium sandy fat clay				L 4	4+5+8	w=42.1% LL=74	
	pockets.				/	N =13	PL=31	
-					—15— <sup> </sup>	REC =18"	*	
7								
_					L			
4								
	gray and dark gray, contains fat clay					7+8+9	w=28.6%	
7	with sand pockets.				┌	N =17	*	
	·				L_20-1	REC =18"		
4								
20.0			400					
22.0	SANDY SILT, fine to medium grained,	ML	40.6					
	moist, yellowish brown and dark				L ]			
	orangeish brown, contains moderately				-	7 5.47.00	w=24.4%	
24.0	cemented sand pockets.	SP-SM	38.6	$\nabla$	├ - \	/  5+17+37    N =54	LL=NP	
	POORLY GRADED SAND WITH SILT,	3F-3IVI			/	\  \	PL=NP	
$\neg$	continued on next page				—25— <sup>L</sup>			
			I I			1		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-420 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** fine to medium grained, wet, brown and SP-SM yellowish brown, contains black particles.  $\boxtimes$ contains iron oxidized zone from 28.5 to 50 REC =5" 28.6 ft -30 32.0 30.6 SILTY SAND, fine to medium grained, SM wet, dark gray. w=24.2% 26+31+22 N =53 REC =16" -35 \*Very to extremely difficult rotary 37.0 25.6 advancement LEAN CLAY with sand, fine to medium CL from 37 to 38.5 grained, moist, gray, trace fine to ft (slow rotary medium shell fragments (±5%), weak advancement). w=20% HCI reaction. 13+15+50/3" Difficult rotary LL=30 N = 65/9" advancement wet, gray and light gray, trace fine to PL=19 REC =16" may be in part coarse shell fragments (±5%), contains be due to using sandy lean clay pockets, moderate HCI drag bit. reaction below 39.3 ft \*Difficult to very difficult rotary advancement from 38.5 to 39.5 ft. 43.5 19.1 w=26.5% \*Difficult to very SILTY SAND, fine to medium grained, SM 5+8+11 wet, gray, trace fine to coarse shell N =19 difficult rotary advancement fragments (±5%), weak HCl reaction. REC =18" from 42.5 to 43.5 ft (slight to moderate rig chatter). w=28.4% dark gray, little fine to coarse shell 10+12+12 fragments (±15%). N =24

REC =18"

5+5+8 N =13 REC =18"

-55

w=28.0%

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

gray, trace fine to coarse shell fragments (±5%), very weak HCl

continued on next page

reaction.

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048 Sheet: 3 of 5

					CAMPI	ING	
DEPTH   (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	SAMPL	TESTS	REMARKS
-	trace fine to medium shell fragments (±<5%).	SM			DEPTH 1 3+4+ N = 9 REC	*	
62.0	CLAYEY SAND, few fine to coarse shell	SC	- 0.6		  REC	=24" W=28.3%	*Osterberg sampler tube push
67.0	fragments (±10%), strong HCl reaction, moist, olive gray.  SILTY SAND, light greenish gray,	SM	4.4		65 	LL=49 PL=11 *	*Slight to moderate rot resistance fro 66 to 68.5 ft.
-	mostly fine to coarse shell fragments (±50%), contains strongly cemented sand pockets (1 inch), clayey sand pockets and shark teeth.	Sivi			20+2 N =5 REC	w=16.8% 2 =18"	
- - - -	gray, trace fine to coarse shell fragments (±5%). fine to medium grained, wet, gray, trace fine to medium shell fragments (±1%) and mica, moderate HCI reaction.				5+11 N =2 REC		
- - - -	moist, gray and light greenish gray, trace fine to coarse shell fragments (±5%), weak HCl reaction.				「	4+16 w=26.2% 0 LL=48 PL=32	**Resumed drilling at 7:0 AM on 6/7/06
83.5	SANDY ELASTIC SILT, trace fine to medium shell fragments (±<5%), dark green.	MH	20.9		5+9+ N =2: REC	2 LL=60	
87.0	FAT CLAY, moist, light greenish gray, trace fine to medium sand and mica, and fine to medium shell fragments (±1%), weak HCl reaction.	СН	-24.4		7+10 N = 2 REC	2   LL=90	
1	continued on next page						

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-420 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 4 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** CH w=39.4% 7+12+19 fine to medium sandy, gray, very weak HCl reaction (high percentage of sand). N =31 ∐ REC =12" -95 98.5 -35.9 w=34.8% SANDY SILT, wet, trace fine to medium ML 5+7+12 LL=49 shell fragments (±5%), weak HCI N =19 PL=30 REC =18" reaction. 103.5 -40.9 SILTY SAND, moist, gray, trace fine to coarse shell fragments (±5%), moderate w=38.5% SM 6+10+19 LL=57 N =29 PL=42 REC =18" HCI reaction. 108.5 -45.9 w=46.4% SANDY ELASTIC SILT, with shells, МН 7+10+14 LL=80 N =24 gray PL=51 REC =18" 113.5 -50.9 w=64.9% FAT CLAY, greenish gray and gray, CH 7+8+12 LL=118 trace fine to medium sand, contains N =20 PL=38 REC =18" indurated lean clay pockets.

-55.9

-60.9

MH

CH

w=41.6%

LL=65

PL=40

w=47.5%

7+9+15

REC =18"

N = 24

5+7+10

-120

## Comments:

123.5

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT

118.5

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

SANDY ELASTIC SILT, dark gray, with

SANDY FAT CLAY, dark greenish gray,

continued on next page

fine to medium sand, moderate HCI

reaction.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-420 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 5 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** LL=83 very weak HCl reaction. CH N =17 REC =18" PL=29 125 127.0 -64.4 SANDY ORGANIC SILT, weak HCI ОН \*Osterberg reaction. sampler tube push from w=39.0% REC =22" 128.5 to 130.3 LL=59 ft PL=34 -130 PP=4.00 tsf -70.9 133.5 w=73.4% ELASTIC SILT, moist, dark greenish МН 7+9+11 LL=147 gray, trace fine to medium sand, and N = 20PL=75 ∐ REC =18" mica. <del>-</del>135 w=78.8% 7+9+11 LL=145 N =20 PL=76 **REC =18"** fine to medium shell fragments, moderate HCI reaction. w=58.9% 7+8+11 LL=107 N =19 PL=56 REC =18"

-87.4

w=74.2%

LL=127

PL=100

7+12+12

REC =18"

N =24

-150-

### Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

150.0

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

weak HCl reaction, blocky.

BOTTOM OF BORING @ 150.0 FT.



Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 5

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Reese Drilling Method: Mud Rotary Drilling Equipment: CME-75 (Truck) Schnabel Representative: M. Arles

Dates Started: 5/10/06 Finished: 5/11/06

**Location:** Northing: 216497.56 ft Easting: 961019.77 ft

Ground Surface Elevation: 115.6 (feet)

<b>Groundwater Observations</b>												
Date Time Depth Casing Caved												
Encountered	5/10		33.8'	3.5'								
Start of day	5/11		11.5'	3.5'								

DEDTI!			EL E\			AMPLING		•
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL		1	TESTS	REMARKS
` ′	DOCTMAT AND TODOCH				DEPTH	DATA	w=11.6%	
0.3	ROOTMAT AND TOPSOIL.  POORLY GRADED SAND WITH SILT, fine to medium grained, moist, brown, contains root fragments.	SP-SM	115.3		_	1+3+2 N =5 REC =10"	*	
-	-					1+3+3 N =6 REC =14"	w=14.8%	
4.5	CLAYEY SAND, fine to medium grained, moist, brown.	SC	111.1		5 	1+2+2 N =4 REC =12"	w=11.9%	
7.0 - -	SILTY SAND, fine to medium grained, moist, yellowish brown.	SM	108.6		 	2+2+2 N =4	w=7.6%	
- - 10.5			105.1		<u>                                  </u>	REC =12"	44 00/	
-	POORLY GRADED SAND, trace silt, tan yellow	SP	100.1			7+7+7 N =14 REC =16"	w=11.8% LL=NP PL=NP *	
-	fine to coarse grained.					16+10+18 N =28 REC =12"	w=9.2%	
-					 			
18.5	WELL GRADED SAND WITH SILT, trace gravel, light brown, contains 1/8" thick clay lenses.	SW-SM	97.1			5+8+8 N =16 REC =12"	w=9.4%	
-			00.4		 			
23.5	SILTY SAND, light brown	SM	92.1			8+13+14 N =27 REC =14"	w=11.0% LL=NP PL=NP	
	continued on next page			l				

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

Project: B-421 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 5 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SM 27.0 88.6 POORLY GRADED SAND WITH SILT, SP-SM fine to coarse grained, wet, orange. w=15.6% 10+14+15 N =29 REC =10" -30  $\overline{\nabla}$ 2+1+1 wet. N =2 REC =18" -35 w=17.3% 4+6+5 N =11 REC =14" 73.6 42.0 SANDY ELASTIC SILT, moist, mottled MH white and orange. w=31.5% WOH+WOH +1 N = 1REC =18" 47.0 68.6 SANDY FAT CLAY, moist, dark gray. CH w=28.8% REC =24" LL=50 PL=18 -50 w=29.6% 3+3+4 PP=1.00 tsf N =7 REC =18" -55 continued on next page

Calvert Cliffs Nuclear Power Plant

### Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

**TEST** 

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

<sup>2. \* =</sup> See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-421 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 3 of 5 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** CH w=34.2% REC =24" LL=78 PL=32 -60 PP=1.50 tsf w=28.6% 3+4+5 PP=2.50 tsf N =9 REC =18" 67.0 48.6 SILTY SAND, fine to medium grained, SM moist, greenish gray. w=22.2% 4+5+5 N = 10REC =18" w=24.9%  $\boxtimes$ 50/4" N =50/4" REC =6" -75 w=19.7% 11+11+45 N =56 REC =14" w=20.5%  $\boxtimes$ 50/4" with fine to medium shell fragments N = 50/4" (10%). REC =4" -85 w=26% wet, greenish white, with fine to coarse 22+26+29 shell fragments (25-30%), HCl reaction. N =55 REC =18" -90 continued on next page

### Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-421 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 4 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SM 92.0 23.6 POORLY GRADED SAND WITH CLAY, SP-SC fine to medium grained, moist, greenish gray, with fine to medium shell fragments (20-30%), HCl reaction. w=20.7% 6+8+50 LL=NP N =58 PL=NP contains cemented sand, with fine to REC =18" -95 medium shell fragments (10-20%), HCI reaction. 97.0 18.6 SP-SM POORLY GRADED SAND WITH SILT, fine to medium grained, moist, green, with fine to coarse shell fragments (10-20%). w=28.4% 6+6+8 N =14 REC =18" -100 102.0 13.6 SILTY SAND, fine to medium grained, SM moist, green, with fine to coarse shell fragments (25-40%), HCI reaction. w=26% 10+8+8 N =16 REC =18" w=26.1% 6+6+7 LL=NP N =13 PL=NP REC =18" w=31.7% 3+3+5 N =8

-2.9

ML

REC =18"

10+8+9

REC =18"

N = 17

|¤| <sub>50/4"</sub>

-120

w=27.8%

LL=NP

PL=NP

### Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

118.5

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

SANDY SILT, green, with fine to coarse

shell fragments (20-30%), HCl reaction.

continued on next page

chnabel Schnabel Engineering

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048 Sheet: 5 of 5

DEPTH	OTD 4 - 4 - 5 - 5 - 5 - 5 - 5 - 5 - 5 - 5 -		ELEV.	,		S	AMPLING		
(FT)	STRATA DESCRIPTION	CLASS.	(FT)	WL	DEPTI		DATA	TESTS	REMARKS
1		ML			DE: 11	••	N =50/4"		
_					-125-		REC =0"		
1					F 1				
4					<b>├</b>				
1					Γ 7.	_		00.00/	
4					├ -{	M	10+11+13 N =24	w=22.0%	
					130-	Ν	REC =18"		
					130				
4									
					L				
,, <sub>-</sub>			47.0		- 1				
33.5	SILTY SAND, dark green, trace fine to coarse shell fragments (0-5%).	SM	-17.9		L ⊿ĭ	M	7+13+14	w=29.0%	
	coarse shell fragments (0-5%).					M	N =27 REC =18"		
-					-135- <sup>1</sup>	ш	KLC - 16		
4									
1					1				
4									
38.5	SANDY FAT CLAY, dark gray	CH	-22.9			М	4+6+8	w=38.5%	
7						I X II	N =14	LL=53 PL=25	
$\dashv$					-140-\	Ш	REC =18"	* *	
7									
42.0 +	SILTY SAND, fine to medium grained,	SM	-26.4						
	moist dark green trace fine to medium				L				
	shell fragments (0-5%), HCl reaction.						0.7.0	w=46.8%	
+					- 1	XI	6+7+8 N =15	*	
4					145	M	REC =18"		
1					r 1				
4					L 4				
1					Γ 1.	_		47 40/	
4					-	M	6+6+8 N =14	w=47.4% *	
50.0			-34.4		150-	$\mathbb{N}$	REC =18"		
00.0	BOTTOM OF BORING @ 150.0 FT.		-54.4		130				

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.

Schnabel	,
Schnabel Engineering	

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Bender Drilling Method: Mud Rotary **Drilling Equipment:** CME-550 Schnabel Representative: K. Bell

Dates Started: 5/4/06 Finished: 5/4/06

**Location:** Northing: 216478.23 ft Easting: 960915.01 ft

Ground Surface Elevation: 104.0 (feet)

Groundwater Observations												
	Date	Time	Depth	Casing	Caved							
Encountered	5/4		Dry									

0.3 - 2.5	TOPSOIL.  SILTY SAND, fine to coarse grained, moist, brown and orangeish brown, trace root fragments.	SM	ELEV. (FT)	WL	DEPTH	AMPLING DATA	TEST	S	REMARKS
0.3	SILTY SAND, fine to coarse grained, moist, brown and orangeish brown,	SM	` '		DEPTH	DATA			
-	SILTY SAND, fine to coarse grained, moist, brown and orangeish brown,	SM	100.7			d .			
2.5 - -	trace root tragitients.		104.5			1+2+1 N =3 REC =14"			
	LEAN CLAY with sand, moist, brown, trace root fragments, trace wood fragments.	CL	101.5			2+1+2 N =3 REC =14"			
-	yellowish brown, trace root fragments.				5 -	2+3+4 N =7 REC =18"			
7.5 -	SILTY SAND, fine to coarse grained, moist, yellowish brown, trace root fragments.	SM	96.5			6+6+8 N =14 REC =18"			
- - -					10 	5+7+9 N =16 REC =13"			
- 13.5 - -	POORLY GRADED SAND WITH CLAY, fine to coarse grained, moist, orange and brownish white, trace gravel.	SP-SC	90.5		15	6+8+9 N =17 REC =14"			
- - - -	brownish orange, no gravel.					5+4+5 N =9 REC =13"			
- - -	continued on next page					3+2+2 N =4 REC =16"			

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-422 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA 25.5 78.5 CLAYEY SAND, fine to medium SC grained, moist, orange and grayish medium to coarse grained, orange and 1+1+3 yellowish brown, trace gravel. N =4 **REC =18"** 33.5 70.5 LEAN CLAY with sand, moist, brownish CL 1+1+2 orange and reddish gray. N = 3REC =18" -35 60.5 43.5 FAT CLAY with sand, moist, gray. CH 2+3+5 N =8 PP=>4.5 tsf 5+7+8 N =15 REC =18"

### Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

continued on next page

TEST Project: Calvert Cliffs Nuclear Power Plant B-422 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** CH 59.5 44.5 CLAYEY SAND, fine to coarse grained, SC 7+11+26 -60 moist, dark gray, trace organic matter, N = 371/4 inch orgnic REC =18" lense organic oder. changed to a 2 7/8" roller bit 63.5 40.5 SILTY SAND, fine to coarse grained, 30+7+100/4" SM N =107/10" moist, light gray. REC =13" light gray and white. 69+100 N =100 REC =14" wet, light gray and white, with fine to 17+15+18 coarse shell fragments, strong HCI N = 33reaction. REC =15" 78.5 25.5  $\boxtimes$ POORLY GRADED SAND WITH SILT, SP-SM 100/5" fine to coarse grained, wet, light gray N = 100/5" 79.4 24.6 SM and white, with fine to coarse shell REC =12" fragments, strong HCI reaction. SILTY SAND, fine to medium grained, wet, light gray and white, trace fine to coarse shell fragments, moderate HCI reaction.  $\boxtimes$ 100/4" fine to coarse grained, light greenish gray and white, with fine to coarse shell N = 100/4" fragments, strong HCl reaction. **REC =5"** -85 trace fine to medium shell fragments, 5+5+8 moderate HCI reaction. N = 13REC =18" -90 continued on next page

### Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

Project: **B-422 Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SM 6+7+10 N =17 ∐ REC =18" 1/4 inch shell 98.5 5.5 POORLY GRADED SAND WITH SILT, SP-SM 5+6+8 lense fine to medium grained, wet, gray and brownish gray, trace fine to medium shell fragments, weak HCl reaction. N =14 REC =18" 100.0 -100-4.0 BOTTOM OF BORING @ 100.0 FT.

Calvert Cliffs Nuclear Power Plant

### Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

**TEST** 

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

<sup>2. \* =</sup> See Appendix I for additional lab testing data.



Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048 Sheet: 1 of 7

**Boring Contractor: UNI-TECH DRILLING** 

MALAGA, NEW JERSEY

Boring Foreman: J. Evans Drilling Method: Mud Rotary Drilling Equipment: Failing-1500 (Truck)

Schnabel Representative: K. Megginson Dates Started: 6/8/06 Finished: 6/14/06

**Location:** Northing: 216331.76 ft Easting: 960850.21 ft

**Ground Surface Elevation:** 110.1 (feet)

Groundwater Observations												
	Date Time Depth Casing Caved											
Encountered	6/8		10.5'									
Start of day	6/12		30.0'									
Start of day	6/13		4.0'									
Start of day	6/14		0.0'									

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	5	SAMPLING	TESTS	REMARKS
(FT)			(FT)		DEPTH	DATA		_
-	SILTY SAND, fine to medium grained, moist, brown, trace organic matter (±1%).	SM				2+3+3 N =6 REC =10"		*5.4" O.D. Drag bit from 0 to 20 feet.
-	brown and light brown.					2+2+3 N =5 REC =11"	w=4.9% *	
_	contains clayey sand pockets.				5 -	5+10+8 N =18 REC =14"		
- - -	brown.					4+5+6 N =11 REC =8"		
-	fine to coarse grained, wet, brown and light brown, contains poorly graded sand with silt lenses.			Ā	10 	4+4+6 N =10 REC =7"		
-	yellowish brown.					5+6+8 N =14 REC =6"	w=12.3% LL=NP PL=NP *	
-					 			
-					20	2+5+12 N =17 REC =8"	w=10.4%	*4-3/4" O.D. Drag bit used below 20 ft.
23.5	DOODLY CDADED CAND WITH CIT	en en	86.6			12:42:40	w=16.6%	
-	POORLY GRADED SAND WITH SILT, fine to medium grained.  continued on next page	SP-SM			-25	13+13+16 N =29 REC =10"	*	

- 1. Boring backfilled with cement/bentonite grout via tremie pipe upon completion.

- Downhole geophysical logging performed on 6/14/06.
   \* = See Appendix I for additional lab testing data.
   Ground Water Observation Well OW-423 installed at a nearby location

TEST Project: Calvert Cliffs Nuclear Power Plant B-423 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 7 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** stratified light brown and yellowish SP-SM brown below 24.5 ft. 28.5 81.6 w=17.4% SILTY SAND, yellowish brown and light SM 4+5+8 N =13 REC =7" -30 w=13.6% yellowish brown. 8+11+11 LL=NP N =22 PL=NP REC =10" -35 37.0 73.1 CLAYEY SAND, wet, yellowish brown SC and light grayish brown, contains clayey sand lenses. w=43.9% 4+3+8 LL=43 N =11 70.6 39.5 PL=15 SILTY SAND, fine to coarse grained, SM REC =12" wet, yellowish brown. 68.1 42.0 FAT CLAY, moist, gray, with fine to CH medium sand, trace mica. w=30.9% 2+3+4 LL=55 N =7 PL=20 REC =18" w=36.6% gray and light greenish gray, trace fine 3+3+4 LL=61 to medium sand, contains organic N =7 PL=16 REC =18" matter pocket. w=38.1% trace mica and organic matter (±1%). 4+4+6 LL=80 N =10 PL=34 REC =18" -55

### Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout via tremie pipe upon completion.

- Downhole geophysical logging performed on 6/14/06.
   \* = See Appendix I for additional lab testing data.
   Ground Water Observation Well OW-423 installed at a nearby location

continued on next page

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048 Sheet: 3 of 7

	el Engineering LOG						3 of 7	
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	SAMI   DEPTH	PLING DATA	TESTS	REMARK
58.5	ELASTIC SILT, gray	MH	51.6		6+	7+10 =17 CC =18"	w=33.8% LL=78 PL=45	
63.5	SANDY SILT, gray	ML	- 46.6		Γ   X   <b>n</b> =	7+7 =14 C =18"	w=21.9% LL=37 PL=27 *	
68.5	SILTY SAND, trace fine to medium sand and organic matter (±1%), mostly indurated lean clay layers (±100%).	SM	41.6		「	+50/2" =50/2" C =8"	w=25.4% LL=NP PL=NP *	*Switched to O.D. Tri-con roller bit belo 69 ft. *Moderately difficult rotar
- - - - -					 ⊠ 50 RE	C =5"	w=22.8% *	advancement (slow rotal advancement advanc
78.5	SANDY SILT, wet, mostly fine to coarse shell fragments (±70%), strong HCI reaction.	ML	31.6		X   N =	+18+21 =39 :C =12"	w=21.9% *	
83.5	SILTY SAND, gray and light greenish gray, contains strongly cemented sand pockets.	SM	- 26.6		X   N =	8+17 =25 C =14"	w=25.6% *	*Switched to 4-3/4" O.D. Drag bit belo 83.5 ft. *Extreme difficultly in rotary advanceme!
- - - -	little fine to coarse shell fragments (±15%), contains black particles (1/16 inch).				X   N =	+11+12 =23 :C =18"	w=23.1% *	from 85.5 to 88.5 ft (moderate ri chatter, slow advancement *Switched to O.D. Tri-con roller bit beleas.5 ft.
-	continued on next page							20.010.

- Boring backfilled with cement/bentonite grout via tremie pipe upon completion.
   Downhole geophysical logging performed on 6/14/06.
   \* = See Appendix I for additional lab testing data.
   Ground Water Observation Well OW-423 installed at a nearby location

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048 Sheet: 4 of 7

					CAM	'	4 of 7	
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	DEPTH	PLING DATA	TESTS	REMARKS
- - - -	gray and dark gray, trace fine to medium shell fragments (±5%), weak HCl reaction.	SM			5+	6+10 =16 EC =18"	w=29.8% *	*Very difficult rotary advancement from 88.5 to 9 ft (strong rig chatter).
100.0	light greenish gray and gray, few fine to coarse shell fragments (±10%).  POORLY GRADED SAND WITH CLAY, gray, trace fine to medium shell fragments (±5%), moderate HCI reaction.	SP-SC	- 10.1		X   N :	+13+18 =31 EC =18"	w=27.4% *	
- - -					RE - 105- ■	EC =21"	w=23.1% LL=24 PL=18 *	*Osterberg sampler tube push from 103.5 to 105. ft
-	greenish gray and blueish gray, trace fine to medium shell fragments (±1%), very weak HCl reaction.				[	8+9 =17 EC =18"	w=30.8%	
-					RE	EC =0"		*Osterberg sampler tube push ftom 113.5 to 113. ft *Slight to moderately difficult rotary
117.0 -	SILTY SAND, fine to medium grained, wet, gray and light greenish gray, mostly fine to coarse shell fragments (±70%), strong HCl reaction.	SM	6.9		X   N :	16+50/4" =66/10" EC =18"	w=26.2% LL=NP PL=NP *	advancement from 113.5 to 118.5 ft (slight to moderate in chatter).  **Resumed drilling at 10:: AM on 6/12/0  *Slight to moderate difficulty in rotary advancement from 118.5 to
-	gray and greenish gray, weak HCI continued on next page				 	11+19	w=33.9%	120 ft (slight chatter).

- Boring backfilled with cement/bentonite grout via tremie pipe upon completion.
   Downhole geophysical logging performed on 6/14/06.
   \* = See Appendix I for additional lab testing data.
   Ground Water Observation Well OW-423 installed at a nearby location

TEST Project: Calvert Cliffs Nuclear Power Plant B-423 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 5 of 7 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SM reaction. N = 30N =30 REC =18" 125 w=31.9% 11+17+20 N = 37REC =18" -130-132.0 -21.9 SANDY SILT, fine to medium, moist, greenish gray, trace fine to coarse shell ML fragments (±5%), contains indurated silt w=37.1% pockets, very weak HCl reaction. 6+12+18 N = 30∐ REC =18" trace fine to medium shell fragments <del>-</del>135 (±1%) below 134.5 ft. 137.0 -26.9 SILTY SAND, moist, greenish gray, SM trace fine to medium shell fragments (±5%), very weak HCl reaction. w=45.1% 8+10+14 N =24 **REC =18"** w=38.9% dark greenish gray, few fine to coarse 7+9+17 shell fragments (±10%), trace organic N =26 matter (±1%), contains clayey sand REC =18" layers (high percentage of sand). strong HCI reaction w=32.8% 7+18+15 N = 33

REC =18"

5+9+13 N =22 REC =18" w=44.9%

-150-

**-155** 

-41.9

CL

### Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

152.0

- 1. Boring backfilled with cement/bentonite grout via tremie pipe upon completion.

SANDY LEAN CLAY, fine to medium,

moist, dark greenish gray, trace fine to coarse shell fragments (±<5%), strong

continued on next page

HCI reaction.

Downhole geophysical logging performed on 6/14/06.
 \* = See Appendix I for additional lab testing data.
 Ground Water Observation Well OW-423 installed at a nearby location

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-423 Boring Number:** Contract Number: 06120048 Sheet: 6 of 7

Schnab	el Engineering LOG		1 1			Sheet	: 6 of 7	
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	S. DEPTH	AMPLING DATA	TESTS	REMARKS
158.5	ORGANIC CLAY, trace fine to coarse shell fragments (±5%) and mica, contains indurated lean clay pockets, weak HCl reaction.	CL	-48.4		 160-	REC =19"	w=44.9% LL=74 PL=18 PP=>4.5 tsf	*Osterberg sampler tube push from 158.5 to 160. ft
162.0	ELASTIC SILT, moist, dark greenish gray, trace fine to medium sand and mica, weak HCl reaction.	МН	51.9			8+10+14 N =24 REC =18"	w=59.7%	
167.0 -	SILT, moist, dark greenish gray, with fine to medium sand, trace fine to coarse shell fragments (±5%), moderate HCl reaction.	ML	56.9			4+7+11 N =18 REC =18"	w=41.0%	
172.0	SILTY SAND, moist, gray	SM	61.9		175	8+8+12 N =20 REC =18"	w=49.7%	
- - - - -	contains indurated elastic silt pockets.				  -180- 	REC =16"	w=41.5% LL=64 PL=34 PP=>4.5 tsf	*Osterberg sampler tube push from 178.5 to 179 ft *Swiched to O.D. Tri-con roller bit belo 178.5 ft.
185.0	greenish gray, very weak HCl reaction.  ELASTIC SILT, moist, dark greenish	MH	74.9		- - -185	6+8+11 N =19 REC =18"	w=73.3%	**Resumed drilling at 7:0 AM on 6/13/0
- - - -	gray, trace fine to medium sand and mica, weak HCl reaction.  trace fine sand, mostly indurated elastic silt layers.  continued on next page				   -190-	REC =8"	w=72.4% LL=111 PL=70	*Osterberg sampler tube push from 188.5 to 190.

- Boring backfilled with cement/bentonite grout via tremie pipe upon completion.
   Downhole geophysical logging performed on 6/14/06.
   \* = See Appendix I for additional lab testing data.
   Ground Water Observation Well OW-423 installed at a nearby location

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-423 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 7 of 7 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA ft МН w=71% contains indurated elastic silt pockets, 5+10+14 weak HCl reaction. N =24 REC =18" 195 199.0 -88.9 LEAN CLAY, moist, greenish gray and dark greenish gray, with fine to medium sand, trace mica, weak HCl reaction. CL \*\*Resumed grouting at 7:00 AM on 6/14/06. -200 w=45.3% 6+9+15 N =24 REC =18" 201.5 -91.4 BOTTOM OF BORING @ 201.5 FT.

### Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout via tremie pipe upon completion.

- Downhole geophysical logging performed on 6/14/06.
   \* = See Appendix I for additional lab testing data.
   Ground Water Observation Well OW-423 installed at a nearby location

Schnabel Schnabel Engineering TEST BORING LOG **Project:** Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Boring Number: B-42

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings

Drilling Method: Mud Rotary

Drilling Equipment: CME-750

Schnabel Representative: B. Bradfield

Dates Started: 4/27/06 Finished: 4/28/06

**Location:** Northing: 216263.3 ft Easting: 960818.6 ft

Ground Surface Elevation: 118.9 (feet)

	<b>Groundwater Observations</b>												
Date Time Depth Casing Caved													
Encountered	4/27		23.5'										

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	s	AMPLING	TESTS	REMARKS
(FT)	OTTATA BEGORIE TION	OLAGO.	(FT)	***	DEPTH	DATA	12010	KEMARKO
0.3	ROOTMAT AND TOPSOIL.	SM	118.6			1+2+3		
2.5	SILTY SAND, fine to medium grained, moist, light brown, contains root fragments.	J	116.4		- <u>-                                   </u>	N =5 REC =15"		
2.5	SANDY LEAN CLAY, fine to medium, moist, orangeish brown.	CL	110.4			1+2+3 N =5 REC =13"		
-					5 -	2+2+4 N =6 REC =2"		
7.0	POORLY GRADED SAND WITH SILT, medium to coarse grained, moist, brownish orange, w/ iron staining.	SP-SM	111.9			2+1+3 N =4 REC =12"		
-	orangeish brown, no iron staining.				—10— 	2+5+4 N =9		
- -	yellowish brown, trace gravel, w/ slt. iron staining.				_	REC =12"		
-					 15-	5+7+8 N =15 REC =12"		
-								
17.0	SILTY SAND, medium to coarse grained, moist, orangeish brown, trace fine to medium gravel.	SM	101.9			10.10.0		
-					20_	10+10+9 N =19 REC =13"		
22.0	DOODLY CDADED CAND WITH OF T	SP-SM	96.9					
-	POORLY GRADED SAND WITH SILT, fine and coarse grained, wet, orangeish brown and gray, trace fine to medium gravel.	3Y-3IVI		$\bar{\Delta}$		6+13+12		
	moist, orangeish brown and gray.				_   \	N =25 REC =14"		
	continued on next page				25  <u> </u>			

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-424 **Boring Number:** hnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SP-SM brownish orange and gray. 6+9+15 fine to medium grained. N =24 REC =14" orangeish brown and brown, <1/2 " clay lenses. 9+14+17 N = 31REC =14" -35 brownish orange and gray. 3+4+5 N =9 1/4" clay lense REC =15" brownish orange and mottled gray, <1/8" clay lenses . 6+5+4 N =9 44.8 74.1 CLAYEY SAND, fine to medium SC grained, moist, brownish orange and gray. 48.5 70.4 POORLY GRADED SAND WITH SILT, SP-SM 9+11+16 medium to coarse grained, wet, orange N =27 REC =16" brown, trace gravel. -50 66.9 52.0 LEAN CLAY with sand, moist, dark CL gray. 1+5+6 N = 11REC =18" 57.0 61.9 FAT CLAY with sand, moist, dark gray. CH

### Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

continued on next page

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-424 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering Sheet: 3 of 4 LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** CH PP=1.25 tsf WOH+5+7 N =12 REC =18" PP=2.50 tsf WOH+4+5 N = 964.5 54.4 REC =18" CLAYEY SAND, fine to medium SC grained, moist, dark gray. 67.0 51.9 FAT CLAY with sand, moist, gray. CH PP=3.00 tsf 3+6+9 N =15 REC =18" 72.0 46.9 CLAYEY SAND, fine to medium SC grained, moist, gray. 4+6+7 N = 13REC =18" 77.0 41.9 POORLY GRADED SAND, fine to medium grained, wet, dark greenish gray, trace clay, glauconite 33+50/3" N =50/3" cementation. REC =6" -80 50/2" N =50/2" REC =2" -85 with fine to medium shell fragments, strong HCI reaction.  $\boxtimes$ 50/4" N = 50/4" -90 continued on next page

### Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

chnabel

**TEST** BORING LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

_ gra	AYEY SAND, fine and coa		SP	ELEV. (FT)	WL	DEPT		AMPLING DATA	TESTS	REMARKS
92.0 - CL gra to	AYEY SAND, fine and coa	****	SP			DEPT	Н	DATA		
_ gra	AYEY SAND, fine and coa	roo								
rea	ained, moist, gray and white coarse shell fragments, struction.	ise e, with fine ong HCl	SC	26.9		  95-		9+9+17 N =26 REC =18"		
-	ay and brownish white, trac	e gravel.				 		4+19+27 N =46 REC =18"		Hard drilling
100.0 BC	OTTOM OF BORING @ 10	0.0 FT.		18.9		_100_				

Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
 \* = See Appendix I for additional lab testing data.

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**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Evans **Drilling Method:** Mud Rotary **Drilling Equipment:** FAILING-1500 Schnabel Representative: R. Vinzant Dates Started: 4/28/06 Finished: 5/1/06

Location: Northing: 216247.5 ft Easting: 961274.7 ft

**Ground Surface Elevation:** 118.4 (feet)

	Groundwater Observations												
	Date	Time	Depth	Casing	Caved								
Encountered	4/28		Dry										

EPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	S	AMPLING	TESTS	REMARKS
(FT)	OTTALA DECOMI HOR	OLAGO.	(FT)		DEPTH	DATA		i Linai Mi
	POORLY GRADED SAND WITH SILT,	SP-SM				2+6+8	w=13.7%	
	fine to medium grained, moist, reddish					N =14	*	
	brown, trace organic matter.					REC =18"		
4								
4								
						3+3+4	w=7.3%	
7						N =7	*	
					<u> </u>	REC =13"	0 50/	
						3+4+3	w=2.5%	
4					⊢ -  ∧	N =7 REC =18"		
						KEC = 10		
+					t 1			
					L			
7							40.00/	
4	brown.				Ļ	2+2+3	w=10.8%	
					X	N =5		
$\dashv$					<u></u> 10− <del> </del>	REC =14" 3+3+4	w=14.2%	
					<u> </u>	N =7	*	
1						REC =14"		
4								
						0.5.0	w=16.4%	
+					├   \ <u> </u>	6+5+6 N =11	*	
					<u>                                   </u>	REC =14"		
	fine to medium grained, moist, brown,				<del>-</del> 15			
4	trace fine gravel.							
4					<b>├</b>			
7								
					L			
4					<u> </u>	0.0.0	w=11.1%	
					Y	8+9+9 N =18	*	
+					├   N	REC =15"		
					LJ	5		
7					]			
4					<b>├</b>			
4					<b>├</b>			
$\dashv$	continued on next page				-25			
		1	1 1			1	1 1	

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

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**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048 Sheet: 2 of 4

DEPTH			ELEV.		9	SAMPLING	_	
(FT)	STRATA DESCRIPTION	CLASS.	(FT)	WL	DEPTH		TESTS	REMARKS
-		SP-SM				15+19+14 N =33 REC =18"	w=11.6%	
	orangeish brown.							
_								
-					30-	13+14+15 N =29 REC =13"	w=15.2%	
-								
-					35 	13+13+14 N =27 REC =13"	w=12% *	
_			70.0		_40-	14+17+19 N =36 REC =12"	w=14.9% *	
11.5 - - -	WELL GRADED SAND WITH SILT, medium grained, wet, orangeish brown.	SW-SM	76.9					
					45 	17+17+19 N =36	w=13.7%	
-	dark brown, with fine gravel.					REC =16"		
-					-50-	11+14+14	w=12.1%	
51.5	SANDY LEAN CLAY, fine to medium grained, wet, orange.	CL	66.9		<u>                                  </u>	N =28 REC =14"	LL=28 PL=17 *	
-								
_					- 55	3+3+4 N =7 REC =18"	w=28.2% LL=46 PL=19	
57.0 +	FAT CLAY, with sand, wet, gray.	СН	61.4		├ <b>┤▮</b>	REC =24"	w=31.2% LL=55	
4	continued on next page				⊢ ⊣■	•		

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-425 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 3 of 4 Schnabel Engineering LOG ELEV. **SAMPLING DEPTH** STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA PL=25 CH -60 w=35.1% 3+3+4 LL=63 N =7 PL=21 REC =18" -65 w=39.5% REC =24" LL=69 PL=28 70.0 48.4 w=38.4% ELASTIC SILT, gray MH 6+6+9 LL=77 N =15 PL=42 **REC =18"** 75.0 43.4 -75 w=21.8% SC REC =24" CLAYEY SAND, dark gray LL=41 PL=20 -80 w=31.7% 22+35+50/4" N =85/10" 81.0 37.4 SILTY SAND, fine grained, moist, dark REC =18" SM 81.5 36.9 reddish brown, with fine to coarse shell SP fragments. POORLY GRADED SAND, fine to medium grained, wet, dark gray, with shell fragments. -85 w=19% 7+10+24 N =34 REC =16" w=20.5% 29+19+17 N =36 continued on next page

### Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-425 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SP w=17.9% 50/4" N = 50/4" REC =4" 96.5 21.9 SILTY SAND, fine to medium grained, wet, light gray, with fine gravel SM -100-50/0.5" N =50/0.5" REC =0" 101.5 16.9 BOTTOM OF BORING @ 101.5 FT.

### Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.



Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

B-426 **Boring Number:** Contract Number: 06120048 Sheet: 1 of 4

**Boring Contractor:** CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: W. Wolf Drilling Method: Mud Rotary Drilling Equipment: CME-550X (ATV)

Schnabel Representative: K. Bell / K. Megginson

Dates Started: 7/28/06 Finished: 8/3/06

**Location:** Northing: 216193.04 ft Easting: 961386.57 ft

Ground Surface Elevation: 83.7 (feet)

Groundwater Observations												
Date Time Depth Casing Cave												
Encountered	7/28		9.0'									
Start of day	7/31		11.5'									
Start of day	8/1		43.5'									
Start of day	8/2		43.5'									

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	s	AMPLING	TESTS	REMARKS
(FT)	OTTATA DEGOTAL TION	OLAGO.	(FT)	***	DEPTH	DATA	12010	KEMAKKO
-	POORLY GRADED WITH SILT, fine and coarse grained, moist, brown, trace root fragments.	SP-SM				3+3+3 N =6 REC =14"		AWJ rods use
- -	yellowish brown, trace gravel.					2+3+4 N =7 REC =16"		
-					5 -	4+4+4 N =8 REC =16"		
	wet, yellowish brown and orangeish brown.			∑		2+2+3 N =5 REC =12"		
12.0	moist, orangeish brown and reddish brown.  CLAYEY SAND, fine to coarse grained,	SC	71.7			3+4+5 N =9 REC =12"		_
-	wet, yellowish brown and orangeish brown.				- 15	3+2+3 N =5 REC =17"		*4-1/4" I.D. Hollow Stem Augers used from 0 to 13.5 ft. *Switched to 3-7/8" O.D. Tri-cone rolle
17.0	SILTY SAND, fine to coarse grained, wet, yellowish brown, trace fine grave.	SM	66.7		  -  -			bit below 13.8 ft.
-						3+2+1 N =3 REC =0"		
22.0	FAT CLAY, wet, grayish brown and orangeish brown, trace fine to medium sand.	СН	61.7					*Slight to moderate rig chatter at 22. ft.
-	gray and dark gray, trace mica, contains clayey sand and silty sand pockets continued on next page				25	1+2+3 N =5 REC =18"		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

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Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	3	AMPLING	TESTS	REMARKS
(FT)			(FT)		DEPTH	DATA		11
-	below 24 ft.	СН						
27.0	ELASTIC SILT, moist, gray and dark gray, trace fine to medium sand, mica, and organic matter (±1%), contains clayey sand lenses	МН	56.7		- 30	3+3+3 N =6 REC =18"		
- - -	gray.				- - -35-	3+3+5 N =8 REC =18"		
37.0	SANDY LEAN CLAY, fine to medium, moist, gray, trace mica, contains light gray clayey sand pockets, contains indurated sandy lean clay pockets.	CL	46.7			3+4+5 N =9 REC =18"		
42.0	CLAYEY SAND, fine to medium grained, moist, gray, mostly indurated clayey sand layers (±100%).	SC	41.7			8+13+43		*Slight to moderate rig chatter at 43
44.0 -	SILTY SAND, fine to medium grained, moist, dark orangeish brown, dark yellowish brown and light brown, contains poorly graded sand trace silt layers and pockets, and dark reddish brown lense (oxidized) from 44 to 44.1 ft.	SM	39.7		-45-	N =56 REC =18"		
-	wet, gray.					7+5+3 N =8 REC =15"		*Lost ~80 ga mud from 48 to 53.5 ft. Thickened m *Lost anothe 160 gal of m (2 batches).
- - - - -	few fine to coarse shell fragments (±10%), contains shell bed layer from 54 to 54.3 ft, strong HCl reaction.				  55-	19+36+50 N =86 REC =18"		*Rotary bit became frictionally seized at 47 (presumaedl by running sands). Ran 4-1/4" I.D. H to 53.5 ft to f rod. *Switched to 3-7/8" O.D. Tri-cone rolle
4		1			L J			

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.

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**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048 Sheet: 3 of 4

DEPTH			ELEV.		SA	MPLING		
(FT)	STRATA DESCRIPTION	CLASS.	(FT)	WL	DEPTH	DATA	TESTS	REMARKS
-	moist, mostly strongly cemented sand layers (±90%), few fine to coarse shell fragments (±10%).	SM				50/5" N =50/5" REC =2"		bit below 53.5 ft. *Slight to moderate difficulty in rotary advancement from 53.5 to
62.0	CLAYEY SAND, fine to medium grained, moist, gray and oliveish gray, contains strongly cemented sand pockets, trace fine to coarse shell fragments (±5%).	SC	21.7		<u>   </u>	6+50 N =50 REC =14"		57.5 ft (slight chatter).  *Very to extremely difficult rotary/auger advancement from 57.5 to 58.5 ft.  *Lost addition
67.0	SILTY SAND, fine to medium grained, wet, gray, little fine to coarse shell fragments (±15%), moderate HCl reaction.	SM	- 16.7		ا	6+7+11 N =18 REC =18"		80 gal of mud between 53.5 58.5 ft. With r off, can hear mud quickly draining into formation. *Ran 4-1/4" I. HSA to 58.5 f *Sampler
72.0	CLAYEY SAND, fine to medium grained, wet, gray and greenish gray, trace fine to coarse shell fragments (±5%), contains sandy silt pockets, weak HCl reaction.	SC	11.7		ا	5+5+9 N =14 REC =18"		refusal at 58. ft.  **Resumed drilling at 7:2t AM on 8/1/06 *Due to significant muloss, attempte to run augers 63.5 ft in orde
77.0	SILTY SAND, fine to medium grained, wet, gray and light greenish gray, trace fine to medium shell fragments (±<5%), very weak HCI reaction.	SM	6.7		1    X	4+5+8 N =13 REC =18"		to socket augers in a lo permeable strata. However, augers becar sand-locked overnight due to running sands. Augers
82.0 -	CLAYEY SAND, fine to medium grained, wet, gray and light greenish gray, trace fine to medium shell fragments (±5%), contains black particles (1/16 inch), very weak HCl reaction.	SC	- 1.7			4+4+7 N =11 REC =18"		successfully un-sand-locke with considerable effort. **Resumed drilling at 12:4 PM on 8/2/06 *Moderate to very difficult rotary advancement from 59 to 60
- - - -	light greenish gray and greenish gray, mostly fine to coarse shell fragments (±70%), contains moderately cemented sand pockets, strong HCl reaction.  light greenish gray, some fine to coarse continued on next page				ا الكال	18+7+9 N =16 REC =18"		ft (moderate t strong rig chatter). *Moderate to difficult rotary advancement from 60.5 to 6

Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
 \* = See Appendix I for additional lab testing data.

chnabel

**TEST** BORING LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

STRATA DESCRIPTION  If fragments (±30%) below  TY SAND, fine to medium a gray and greenish gray, for see shell fragments (±10%) reaction.  AYEY SAND, fine to medium ned, wet, greenish gray, tradium shell fragments (±1%) derate HCl reaction.	grained, ew fine to ), weak	SC SM	ELEV. (FT)8.3	WL	DEPTH	6+8+10 N =18 REC =18"	TESTS	ft. *Ran 4-1/4" I.D HSA to 63.5 ft. *More mud loss. *Modrate to difficult rotary advancement from 88 to 88.5 ft (moderate to strong rig chatter).
TY SAND, fine to medium of gray and greenish gray, for the se shell fragments (±10%) reaction.  AYEY SAND, fine to medium ned, wet, greenish gray, tradium shell fragments (±1%) derate HCI reaction.	grained, ew fine to ), weak	SM			- - 	6+8+10 N =18		*Ran 4-1/4" I.D HSA to 63.5 ft. *More mud loss. *Modrate to difficult rotary advancement from 88 to 88.5 ft (moderate to strong rig
gray and greenish gray, firse shell fragments (±10%) reaction.  AYEY SAND, fine to mediuned, wet, greenish gray, tradium shell fragments (±1%) derate HCI reaction.	ew fine to ), weak m ace fine to ),				- 95	N =18		HSA to 63.5 ft. *More mud loss. *Modrate to difficult rotary advancement from 88 to 88.5 ft (moderate to strong rig
ned, wet, greenish gray, tradium shell fragments (±1%) derate HCl reaction.	ace fine to ),	SC	-13.3					chatter).
ned, wet, greenish gray, tradium shell fragments (±1%) derate HCl reaction.	ace fine to ),	SC	-13.3		h 1			
TTOM OF BORING @ 100	).0 FT.				- \_	7+11+18 N =29		
			-16.3		100-	REC =18"		

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.

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TEST BORING LOG **Project:** Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Boring Number: **B-**Contract Number: 06120048

Contract Number: 06 Sheet: 1 of 5

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Reese
Drilling Method: Mud Rotary
Drilling Equipment: CME-75
Schnabel Representative: M. Arles
Dates Started: 5/2/06 Finished: 5/2/06

**Location:** Northing: 216164.05 ft Easting: 961272.73 ft

Ground Surface Elevation: 116.3 (feet)

Groundwater Observations													
Date Time Depth Casing Caved													
Encountered	5/2		44.0'	3.5'									
Start of day	5/3		17.0'	5.0'									

DEPTH	STRATA DESCRIPTION CL		ELEV		SAMPLING			
(FT)		CLASS.	ELEV. (FT)	WL	DEPTH	DATA	TESTS	REMARKS
0.3	ROOTMAT AND TOPSOIL.		116.0			5+4	PP=4.50 t	
-	SILTY SAND, fine to medium grained, moist, orangeish brown.	SM			X   N =			auger
-					X   N =	3+3 =6 :C =14"	w=9.4%	Mud rotary
-					X   N =	2+2 =4 :C =14"		
7.0 -	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, orange	SP-SM	109.3		X   N =	5+7 =12 :C =18"	w=7.9%	
- - -					X   N =	3+3 =6 :C =18"		
-					□   X   <b>n</b> =	4+4 =8 :C =15"		
17.0	SILTY SAND, fine to medium grained, moist, orange	SM	99.3					
- - -					□   X   n =	4+5 =9 :C =18"	w=8.2%	
22.0	POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, orange.	SP-SM	94.3					
_	continued on next page				X   N =	13+14 =27 :C =15"		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-427 **Boring Number:** hnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 5 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SP-SM w=12.2% 7+9+7 N =16 REC =10" -30 33.5 82.8 POORLY GRADED SAND, fine to SP 11+12+12 coarse grained, moist, orangeish white, N =24 with fine gravel. REC =14" -35 w=13.6% 10+15+13 orange. N =28 REC =18" 43.5 72.8 SP-SM  $\overline{\triangle}$ POORLY GRADED SAND WITH SILT, 10+12+13 fine to medium grained, wet, orange. N =25 REC =15" w=18.6% 10+12+13 N =25 REC =15" 53.5 62.8 SILTY SAND, fine grained, moist, SM 5+9+15 mottled orange and white. N =24 REC =15" -55

### Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

continued on next page

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-427 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 3 of 5 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA 58.5 57.8 LEAN CLAY, moist, dark gray, with CL 4+5+7 N =12 REC =18" 63.5 52.8 w=32.8% SANDY, ORGANIC CLAY, moist, dark ОН REC =24" LL=56 gray. PL=18 -65 PP=2.50 tsf trace sand. 5+7+5 N =12 REC =18" 73.5 42.8 CLAYEY SAND, fine grained, moist, SC REC =16" dark gray. -75 78.5 37.8 44+50/3" N =50/3" w=23.1% SILTY SAND, fine to medium grained, SM moist, dark brownish orange. **REC =10"** -80  $\boxtimes$ 50/4" N = 50/4" REC =4" -85 trace fine to medium shell fragments, 50/2" N = 50/2"weak HCl reaction. REC =2" -90 continued on next page

### Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048 Sheet: 4 of 5

	pel Engineering LOG				2.1		4 of 5	
DEPTH   (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	DEPTH	MPLING DATA	TESTS	REMARK
- - - -		SM			  -       5	50/4" N =50/4" REC =3"	w=12.0%	Rig chatter
- - - -	fine to medium grained, moist, grayish green, trace fine to medium shell fragments, weak HCl reaction.					5+7+8 N =15 REC =18"		
103.5	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, grayish green, with fine to coarse shell fragments, weak HCl reaction.	SP-SM	- 12.8		X   N	8+12+13 N =25 REC =16"	w=24.8%	
108.5	SILTY SAND, fine to medium grained, moist, grayish green, trace fine to coarse shell fragments, moderate HCI reaction.	SM	7.8			7+9+11 N =20 REC =18"		
113.5	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, grayish green, trace fine to coarse shell fragments, weak HCl reaction.	SP-SM	- 2.8		X    N	9+9+8 N =17 REC =13"		
118.5	SILTY SAND, fine to medium grained, moist, grayish green, trace fine to coarse shell fragments, moderate HCl reaction.	SM	2.2		X   N	8+3+4 N =7 REC =18"	w=29.2% *	
-	greenish white, with medium to coarse continued on next page					6+11+14		

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048 Sheet: 5 of 5

RIPTION					C A	MIDLINIC		
Tall Hold	CLASS.	(FT)	WL	S <i>A</i>   DEPTH		MPLING DATA	TESTS	REMARKS
s cemented ction.	SM				Mli	N =25		
				_				
					1    X	N =25	w=31.4%	
				130  <sup>l</sup>		REC =18"		
				 	$\Box$	7+8+8		
				-135-		N =16 REC =12"		
				_				
					1    X	N =13	w=38.5% *	
				- 140-1				
medium shell				_	$\mathbb{N}$	7+5+8 N =13	PP=3.00 tsf	
Si readion.				-145-	∐i	REC =18"		
				-   -				
moist groop						51610	w=44 3%	
-		-33.7		 150		N =15 REC =18"	*	
@ 150.0 F1.								
	medium shell CI reaction.  , moist, green.  @ 150.0 FT.	medium shell Cl reaction.	medium shell CI reaction. , moist, green.	medium shell Cl reaction.  , moist, green.	medium shell C1 reaction.  —125— —130— —135— —135— —140— ——140— —————————————————————————	medium shell Cl reaction.  -125	medium shell CI reaction.  -125-   REC =18"   REC =18"   P+11+14   N = 25   REC =18"   REC =18"   REC =18"   REC =18"   REC =18"   REC =18"   P+15+8   REC =18"   REC =18"   REC =18"   P+15+8   REC =18"   P+	medium shell Cl reaction.    125

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.

Schnabel
Schnabel Engineering

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 5

**Boring Contractor: UNI-TECH DRILLING** 

MALAGA, NEW JERSEY

Boring Foreman: J. Evans Drilling Method: Mud Rotary Drilling Equipment: FAILING-1500 (Truck)

Schnabel Representative: R. Vinzant Dates Started: 5/2/06 Finished: 5/3/06

**Location:** Northing: 216109.19 ft Easting: 961210.06 ft

**Ground Surface Elevation:** 114.1 (feet)

	Groundwater Observations										
	Date	Time	Depth	Casing	Caved						
Encountered	5/2		Dry								

DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	SAMPLING	TESTS	REMARKS
(F1)					DEPTH DATA		
0.4	ROOTMAT AND TOPSOIL	CL	113.7		3+4+4 N =8		
-	LEAN CLAY, fine to medium grained,	02			REC =14"		
_	moist, reddish brown.				L -  T		
					3+3+3		
4.0	CLAYEY SAND, fine to medium	SC	110.1		REC =16"		
	grained, moist, reddish brown.	30			5 - 5		
					\/   2+3+3		
<u> </u>			407.0		N =6 REC =18"		
6.5	SILTY SAND, fine to medium grained,	SM	107.6				
	moist, reddish brown.				1+2+2		
_					X   N =4		
_	light raddish brown				REC =16"		
	light reddish brown.				_10_		
-							
12.0			102.1		REC =16"		
	POORLY GRADED SAND, fine to medium grained, moist, light brown,	SP					
٦	trace fine gravel.						
-							
15.0 —			99.1		REC =15"		
10.0	CLAYEY SAND, fine to medium	SC	33.1				
-	grained, moist, reddish brown.						
-							
٦							
-							
20.0 —			94.1		REC =18"		
	SILTY SAND, fine to medium grained, moist, light orangeish brown.	SM	•		-		
-	moot, iight orangolon brown.				† †		
-							
]							
-							
_					REC =14"		
	continued on next page				'		

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.
   Ground Water Observation Well OW-428A installed at a nearby location

**TEST** Project: Calvert Cliffs Nuclear Power Plant **B-428 Boring Number:** hnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 5 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SM medium to coarse grained. 11+13+16 N =29 **REC =13"** 24+16+10 fine to medium grained, dark reddish N =26 brown, with fine gravel REC =4" -35 fine to medium grained, wet, light brown. 37.0 77.1 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, wet, light 11+13+11 N =24 REC =15" 40.0 74.1 CLAYEY SAND, fine to medium SC grained, moist, orangeish brown and black, trace fine rock fragments. 16+9+10 N =19 REC =13" orange, no rock fragments. 6+9+6 N =15 50.0 64.1 FAT CLAY, moist, gray. СН 4+3+5 N =8 REC =18" PP=1.00 tsf REC =21"

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground Water Observation Well OW-428A installed at a nearby location

continued on next page

**TEST** Project: Calvert Cliffs Nuclear Power Plant **B-428 Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 3 of 5 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA CH 59.0 55.1 СН FAT CLAY, moist, gray, with sand. -60 w=37.1% REC =24" LL=61 PL=17 PP=2.00 tsf REC =24" PP=2.00 tsf REC =20" -65 PP=2.50 tsf REC =24" REC =7" -70 71.0 43.1 CLAYEY SAND, fine to medium SC grained, moist, dark gray. 9+10+12 N =22 REC =18" with fine rock fragments. PP=1.50 tsf  $\boxtimes$ 50/4" N = 50/4" REC =4"  $\boxtimes$ 50/3" N = 50/3"REC =0" 85.0 29.1 -85 SILTY SAND, fine grained, moist, gray, SM with fine to coarse shell fragments, moderate HCl reaction. 50/4" N = 50/4" REC =4" -90 continued on next page

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground Water Observation Well OW-428A installed at a nearby location

**TEST** Project: Calvert Cliffs Nuclear Power Plant **B-428 Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 5 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SM 7+13+50/2" N = 63/8"REC =19" -95 7+8+8 N =16 REC =18" 14+15+19 N = 34REC =18" 105.0 9.1 POORLY GRADED SAND, fine to SP medium grained, moist, gray. 19+24+30 N =54 REC =18" trace fine to medium shell fragments. 4+5+10 N =15 REC =18" 115.0 -0.9 CLAYEY SAND, fine to coarse grained, moist, greenish gray, with fine to coarse SC shell fragments, strong HCI reaction. 10+18+25 N = 43REC =18" 120 30+47+36 continued on next page

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.
  3. Ground Water Observation Well OW-428A installed at a nearby location

**TEST** Project: Calvert Cliffs Nuclear Power Plant **B-428 Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 5 of 5 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DATA **DEPTH** SC N =83 N =83 REC =17" -125 trace fine to coarse shell fragments, moderate HCl reaction. 8+I0+17 N =17 REC =18" 130 11+17+22 N =39 ∐ REC =18" -135 10+13+18 N =31 REC =18" 7+12+17 N =29 REC =18" with fine to coarse shell fragments, TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

6+8+13 N =21 REC =18"

-150-

-35.9

## Comments:

150.0

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

moderate HCI reaction.

BOTTOM OF BORING @ 150.0 FT.

2. \* = See Appendix I for additional lab testing data.
3. Ground Water Observation Well OW-428A installed at a nearby location

SC	hnabel
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**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings Drilling Method: Mud Rotary **Drilling Equipment:** CME-750 Schnabel Representative: B. Bradfield Dates Started: 5/1/06 Finished: 5/2/06

**Location:** Northing: 216087.85 ft Easting: 961119.27 ft

Ground Surface Elevation: 103.7 (feet)

Groundwater Observations										
	Date Time Depth Casing Caved									
Encountered	5/1		17.0'							

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	SAMPLING	TESTS	REMARKS
(FT)			(FI)		DEPTH DATA		
0.3	ROOTMAT AND TOPSOIL.  SILTY SAND, fine to medium grained, moist, reddish brown, contains organic	SM	103.4				
- -	matter. orangeish brown, trace gravel, trace organic matter.				WOH+WOH +1 N =1 REC =6"		
	fine to coarse grained, trace root fragments.				2+3+4 N = 7 REC =16"		
- -	fine to medium grained, yellowish brown.				3+3+3 N =6 REC =14"		
9.5	POORLY GRADED SAND, fine to coarse grained, moist, yellowish brown	SP	94.2		10		
_	and orangeish brown, trace silt.				7+8+11 N =19		
12.0 -	POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, yellowish brown and orangeish brown, trace gravel.	SP-SM	91.7		REC =12" 9+9+13		
_	grave.				N =22 REC =12"		
- 17.0 -			86.7	¥			
-	POORLY GRADED SAND, fine to coarse grained, wet, white and orangeish brown, trace gravel, trace silt.	SP	00.7	_			
_					20    N = 24 REC = 12"		
22.0 -	POORLY GRADED SAND WITH SILT,	SP-SM	81.7				
-	fine to medium grained, wet, orangeish brown, trace gravel.	31 -3IVI					
_	continued on next page				N =19 REC =9"		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-429 **Boring Number:** hnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SP-SM fine to coarse grained, yellowish brown, no gravel. 7+11+12 N =23 REC =12" 32.0 71.7 POORLY GRADED SAND, medium to SP coarse grained, wet, light orangeish brown and yellowish brown, trace gravel, trace silt. 10+10+10 N = 20REC =12" -35 37.0 66.7 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, moist, brownish orange and gray. 5+4+6 N =10 REC =18" 61.7 42.0 FAT CLAY with sand, moist, gray, CH contains mica. 3+4+5 N =9 REC =18" REC =24" PP=2.00 tsf 2+2+3 N =5 49.5 54.2 REC =18" SANDY ELASTIC SILT, wet, gray. МН -50 52.0 51.7 FAT CLAY, moist, gray, trace sand. CH REC =0" -55 PP=3.50 tsf 3+6+8 N =14 REC =18" 57.0 46.7 CLAYEY SAND, fine to medium SC grained, moist, dark greenish gray. continued on next page

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-429 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SC **REC =18"** -60 11+16+28 N = 44REC =18" Hard drilling 67.0 36.7 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, wet, gray.  $\bowtie$ 50/3" N =50/3" REC =4" 72.0 31.7 POORLY GRADED SAND, fine to SP medium grained, wet, gray. 21+20+19 N = 39REC =18" 77.0 26.7 POORLY GRADED SAND WITH SILT, SP-SM fine to coarse grained, wet, gray and white, with fine to coarse shell fragments, strong HCI reaction. 20+19+14 N = 33Resumed REC =16" drilling on 5/2/06 Augers grinding/scraping Changed to 82.0 21.7 CLAYEY SAND, fine to medium SC roller bit grained, moist, gray, trace fine to medium shell fragments, weak HCl reaction. 17+11+15 N =26 **REC =18"** -85 87.0 16.7 POORLY GRADED SAND, fine to SP medium grained, wet, gray and white, trace silt, with fine to coarse shell fragments, moderate HCl reaction. 5+8+8 N =16 REC =18" -90 continued on next page

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

Project: B-429 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SP 8+12+12 N =24 REC =17" -95 97.0 6.7 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, moist, gray, trace fine to coarse shell fragments, weak HCl reaction. 5+7+9 N =16 REC =18" 100.0 -100-3.7 BOTTOM OF BORING @ 100.0 FT.

Calvert Cliffs Nuclear Power Plant

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

**TEST** 



TEST BORING LOG **Project:** Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Boring Number: B-430

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Bender

Drilling Method: Mud Rotary

Drilling Equipment: CME-550X (ATV)

Schnabel Representative: K. Megginson

Dates Started: 5/1/06 Finished: 5/1/06

**Location:** Northing: 216006.88 ft Easting: 961193.12 ft

Ground Surface Elevation: 102.5 (feet)

<b>Groundwater Observations</b>										
	Date Time Depth Casing Cave									
Encountered	5/1		10.5'							
Start of Day	5/2		17.0'							

Ground	Surface Elevation: 102.5 (feet)						
DEPTH (FT)	STRATA DESCRIPTION	CLASS	S. ELEV. (FT)	WL	SAMPLING	TESTS	REMARKS
	Forest litter, restmat and toposil				DEPTH DATA	PP=1.00 tsf	
0.5	Forest litter, rootmat and topsoil.  SANDY SILT, fine to medium, moist, brown, contains root fragments.	ML	102.0		2+3+3 N =6 REC =11"	1.1 1.00 to.	
2.0 -	CLAYEY SAND, fine to coarse grained, moist, brown.	SC	100.5		3+2+2 N =4 REC =14"		
4.5 — —	POORLY GRADED SAND WITH SILT, trace gravel, fine to coarse grained, moist, brown and light brown.	SP-SM			3+5+4 N =9 REC =11"		
7.0	CLAYEY SAND, fine to coarse grained, moist, brown.	SC	95.5		3+6+8 N =14 REC =12"		
12.0	wet.		90.5	Σ	6+6+7 N = 13 REC =11"		
	POORLY GRADED SAND WITH SILT, fine to coarse grained, wet, light brown and light yellowish brown.	SP-SM	1		7+6+8 N = 14 REC =10"		*Switched to 3-7/8" O.D. Tri-cone roller bit below 13.5 ft.
- - - -	light brown.				11+12+19 N =31 REC =8"		
- - - - - -	continued on next page				6+8+8 N = 16 REC =9"		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-430 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SP-SM 27.0 75.5 SANDY SILT, fine to medium, wet, light ML yellowish brown. 1+1+2 N = 3**REC =16"** -30 PP=1.50 tsf **REC =10"** gray. 32.0 70.5 LEAN CLAY, wet, gray, trace sand, CL contains mica. 1+2+3 N =5 34.5 68.0 CLAYEY SAND, fine to coarse grained, REC =18" SC -35 wet, gray, contains mica, and lean clay pockets. PP=NM tsf REC =5" 39.7 62.8 LEAN CLAY, wet, dark gray, trace sand, CL 6+6+7 N =13 contains clayey sand lenses and mica. REC =18" 60.5 42.0 ELASTIC SILT, moist, gray, trace sand, МН contains mica. 3+3+4 N =7 REC =18" PP=2.50 tsf REC =18" -50 50.2 52.3 LEAN CLAY, moist, gray and light CL 3+3+4 greenish gray, trace sand, contains N =7 **REC =18"** 52.0 50.5 FAT CLAY, moist, light greenish gray, CH trace sand, contains mica. 4+4+7 N = 11REC =18" 57.0 45.5

## Comments:

gray.

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

ML

2. \* = See Appendix I for additional lab testing data.

SANDY SILT, fine to medium, moist,

continued on next page

TEST Project: Calvert Cliffs Nuclear Power Plant B-430 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** MLPP=4.50 tsf REC =17" -60 62.0 40.5 SILTY SAND, fine to coarse grained, SM moist, dark gray, trace gravel, trace fine to medium shell fragments, moderate HCI reaction. 24+15+15 N = 30\*Switched to REC =12" 2-15/16" Tri-cone roller bit below 65 ft. 67.0 35.5 POORLY GRADED SAND, fine grained, SP-SM wet, gray, with silt, with fine to medium shell fragments, moderate HCl reaction. 45+43+12/1" N =55/7" REC =10" 72.0 30.5 SILTY SAND, fine to coarse grained, SM wet, gray, with fine to coarse shell fragments, strong HCl reaction. 11+12+14 N =26 REC =11" 77.0 25.5 CLAYEY SAND, fine to coarse grained, SC wet, light gray, trace fine to medium shell fragments, moderate HCl reaction. 12+7+6 N = 13REC =14" oliveish gray and grayish brown, trace fine to medium shell fragments, moderate HCI reaction. 26+9+23 N =32 **REC =16"** -85 fine to medium grained, trace fine to coarse shell fragments, strong HCI \*\*Resumed reaction. drilling at 7:00 6+5+9 AM on 5/2/06. N =14 REC =0" -90 continued on next page

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-430 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SC few fine to medium shell fragments, strong HCI reaction. 15+7+8 N =15 trace fine to medium shell fragments, strong HCI reaction. 7+8+12 N =20 REC =18" 100.0 -100-2.5 BOTTOM OF BORING @ 100.0 FT.

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion. 2.  $\star$  = See Appendix I for additional lab testing data.

Schnabel Schnabel Engineering TEST BORING LOG **Project:** Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Boring Number: 06120048

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Evans

Drilling Method: Mud Rotary

Drilling Equipment: FAILING-1500

Schnabel Representative: R. Vinzant

Dates Started: 4/27/06 Finished: 4/28/06

Location: Northing: 216271.1 ft Easting: 961177.3 ft

Ground Surface Elevation: 118.4 (feet)

Groundwater Observations								
Date Time Depth Casing Caved								
Encountered	4/27		13.5'					

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL			REMARKS
(FT)			(FT)		DEPTH DA	TESTS	
1.5	CLAYEY SAND, fine to coarse grained, moist, orangeish brown  SANDY LEAN CLAY, fine to medium	SC CL	116.9		1+4+5 N =9 REC =		
	grained, moist, orangeish brown.	OL			2+3+3 N =6		:
6.0	CLAYEY SAND, fine to medium	SC	112.4		REC =		
-	grained, moist, orangeish brown.				N =4 REC =	12"	
_	orangeish brown and brown.				3+4+4 N =8 REC =		
_	fine to coarse grained, orangeish brown and yellowish brown.				5+7+8 N =15 REC =		
13.5	POORLY GRADED SAND WITH SILT and gravel, fine to coarse grained, wet, orangeish brown and white.	SP-SM	104.9	Ā	5+7+1 <sup>-</sup> N =18 REC =		
_							
20.5	SILTY SAND, fine to coarse grained,	SM	97.9		10+14- N = 32		
-	moist, orangeish brown.					12	
-	continued on next page				 25		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-431 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SM 10+14+19 N = 33REC =11" -30 11+14+20 N =34 REC =9" 31.5 86.9 POORLY GRADED SAND WITH SILT, SP-SM fine gravel, fine to medium grained, wet, orangeish brown and brown. -35 18+13+30 N =43 REC =13" yellowish brown. 40.0 78.4 POORLY GRADED GRAVEL, fine to GΡ 10+10+10 40.5 77.9 medium grained, with sand, trace silt, N =20 SC wet, yellowish brown and white. REC =12" CLAYEY SAND, fine to coarse grained, trace fine gravel, moist, orangeish brown and yellowish brown. 12+14+15 no gravel, wet. N =29 REC =12" 50.0 68.4 -50 SANDY ELASTIC SILT, fine to medium 2+4+6 МН grained, moist, orangeish brown and N =10 REC =18" 55.0 63.4 -55 FAT CLAY with sand, moist, c. mica, СН 3+3+5 N =8 gray. REC =18" continued on next page

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-431 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering Sheet: 3 of 4 LOG ELEV. **SAMPLING DEPTH** STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** CH -60 4+3+6 N =9 REC =18" -65 4+4+6 sandy N = 10REC =18" 70.0 48.4 LEAN CLAY with sand, c. mica, moist, CL 5+7+10 greenish gray. N =17 REC =18" -75 sandy 4+5+7 N =12 REC =18" 0.08 38.4 -80 CLAYEY SAND, fine to medium SC 13+50/5" N =50/5" grained, wet, orangeish brown and gray. REC =11" 85.0 33.4 -85  $\boxtimes$ SANDY ELASTIC SILT, medium to МН 50/4" N =50/4" coarse grained, wet, gray. REC =4" 86.5 31.9 SILTY SAND, fine to medium grained, SM moist, light gray, with shell fragments, trace rock fragments. 13+11+31

N =42

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

continued on next page

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-431 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SM with fine to coarse shell fragments, 17+50/2" strong HCI reaction. N = 50/2"REC =8" 96.5 21.9 CLAYEY SAND, fine to medium SC grained, moist, light gray, with shell fragments, trace rock fragments. -100trace fine to medium shell fragments, 10+32+16 N =48 REC =18" moderate HCl reaction. 101.5 16.9 BOTTOM OF BORING @ 101.5 FT.

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

<sup>2. \* =</sup> See Appendix I for additional lab testing data.

chnabel Schnabel Engineering

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Contract Number: 06120048 Sheet: 1 of 4

**Boring Number:** 

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Reese Drilling Method: Mud Rotary **Drilling Equipment: CME-75** Schnabel Representative: M. Arles

Dates Started: 4/27/06 Finished: 4/28/06

**Location:** Northing: 216399 ft Easting: 961139.1 ft

Ground Surface Elevation: 118.6 (feet)

Groundwater Observations										
Date Time Depth Casing Caved										
Encountered	4/27		29.0'							
Start of day	4/28	-	12.7'	-						

Ground	Surface Elevation: 118.6 (feet)								
DEPTH (FT)	STRATA DESCRIPTION	CLASS	ELEV. (FT)	WL	S DEPTH	AMPLING DATA	TEST	s I	REMARKS
0.3	TOPSOIL.	FILL	118.3		IM	WOH+2+2			
-	Poorly graded sand FILL, moist, brown, with clay.	FILL				N =4 REC =14"			
2.5	SILTY SAND, fine and coarse grained, moist, brownish orange.	SM	116.1			5+3+4 N =7 REC =18"			
5.0	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, grayish orange.	SP-SM	113.6		5 -	2+3+4 N =7 REC =18"			
_	white.					3+4+5 N =9 REC =14"			
- - -	orange.				10 	4+5+7 N =12 REC =18"			
- - -	orangeish white layering 1/4" thick.				  15	4+5+7 N =12 REC =16"		rota	itch to mud ary at 15' ng 2 15/16"
- - - -						9+9+10 N =19 REC =10"			
- - -	fine to coarse grained, orange, layering.  continued on next page					12+13+13 N =26 REC =12"			

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-432 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SP-SM  $\nabla$ 10+12+12 wet. N =24 REC =10" -30 19+18+21 yellow, trace gravel. N = 39REC =13" -35 38.5 80.1 SM SILTY SAND, fine to medium grained, 7+8+8 wet, light brownish orange. N =16 REC =13" orange. 5+7+7 N =14 REC =13" 48.5 70.1 SILT, moist, dark orange, with sand. ML 2+2+1 49.3 69.3 N = 3LEAN CLAY, moist, dark gray, with CL REC =18" 3+3+4 N =7 REC =18"

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

continued on next page

B-432 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering Sheet: 3 of 4 LOG ELEV. **SAMPLING DEPTH** STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA CL greenish gray. 3+3+4 N =7 REC =18" 63.5 55.1 FAT CLAY, wet, dark gray. СН 3+3+3 N =6 -65 4+6+4 N =10 REC =5" 73.5 45.1 CLAYEY SAND, fine grained, moist, SC 4+5+5 dark greenish gray. N = 10REC =18" 78.5 40.1 34+50/4" N =50/4" SILTY SAND, fine grained, moist, SM reddish brown. **REC =10"** -80 83.5 35.1 POORLY GRADED SAND WITH SILT, SP-SM 6+8+30 fine to medium grained, wet, grayish N = 38green, contains shell fragments, strong HCl reaction. REC =17" -85 48+27+29 moist, greenish white. N =56 REC =18" -90 continued on next page

Calvert Cliffs Nuclear Power Plant

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

**TEST** 

Project:

Project: B-432 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SP-SM 93.5 25.1 SP-SC POORLY GRADED SAND WITH CLAY, 7+12+50/5" fine to coarse grained, wet, green. N =62/11" 94.5 24.1 SC REC =18" -95 CLAYEY SAND, fine to medium grained, moist, green, contains shell fragments.  $\boxtimes$ 50/3" wet. N = 50/3" REC =2" 100.0 18.6 -100 BOTTOM OF BORING @ 100.0 FT.

Calvert Cliffs Nuclear Power Plant

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

**TEST** 

chnabel Schnabel Engineering

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Reese Drilling Method: Mud Rotary Drilling Equipment: CME-75 (Truck) Schnabel Representative: M. Arles

Dates Started: 5/16/06 Finished: 5/17/06

**Location:** Northing: 215963.8 ft Easting: 961107.5 ft

**Ground Surface Elevation:** 97.5 (feet)

Groundwater Observations									
	Date Time Depth Casing Cave								
Encountered	5/17		33.5'	4.0'					

			1					
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	S DEPTH	AMPLING DATA	TESTS	REMARKS
0.5	ROOTMAT AND TOPSOIL.		97.0			WOH+1+1		0-4' Hollow
2.0 -	CLAYEY SAND, fine to medium grained, moist, brown, contains root fragments.	SC	95.5			N =2 REC =15"		stem auger
-	SANDY SILT, moist, orangeish brown, contains root fragments.	ML	30.0			2+2+3 N =5 REC =18"		4-48.5'- 3 7/8" roller bit
			01.2		5 -	4+3+2 N =5 REC =18"	w=27%	Start of drilling for the day
6.3 7.0 -	POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, brown.	SP-SM ML	91.2			KLC - 16		
-	SANDY SILT, fine to medium, moist, brown.					2+2+2 N =4 REC =16"		
9.5	WELL GRADED SAND WITH SILT, fine to coarse grained, moist, brown.	SW-SM	88.0		10 	5+5+5	w=5.8%	
-						N =10 REC =15"		
- -	brownish orange, with gravel.				15	8+12+10 N =22 REC =16"		
_					 			
-	orange.					6+8+8 N =16 REC =12"		
-   					  -  -		44.40/	
_	brownish orange.					5+8+5 N =13 REC =18"	w=14.4%	
	continued on next page				25			

# Comments:

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

TEST Project: Calvert Cliffs Nuclear Power Plant B-433 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SW-SM 27.0 70.5 SILTY SAND, fine to medium grained, SM moist, orange. 1+2+2 N =4 **REC =18"** -30 32.0 65.5 SANDY ELASTIC SILT, fine to medium, МН wet, orange.  $\overline{\nabla}$ w=23.3% 4+4+5 N = 934.5 63.0 REC =18" SILTY SAND, fine to medium grained, SM -35 moist, grayish orange 36.5 61.0 SANDY FAT CLAY, moist, dark gray, CH with sand. w=33.5% REC =24" LL=61 PL=14 PP=2.50 tsf w=33.5% 3+4+5 LL=59 N =9 PL=22 REC =18" 48.5-100' - 2 w=33.6% REC =24" 15/16" roller bit LL=64 PL=23 -50 PP=4.00 tsf 52.0 45.5 SANDY LEAN CLAY, fine to medium CL grained, moist, dark gray. w=21% 5+7+8 LL=45 N =15 PL=18 REC =18" -55 57.0 40.5 SILTY SAND, fine to medium grained, SM moist, dark greenish gray.

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

continued on next page

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Schliaber Engineering

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048 Sheet: 3 of 4

	el Engineering LOG						3 of 4	
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	SAMPLING		TESTS	REMARKS
(		SM	( ,		DEPTH	DATA		
-		SIVI			1    X	7+13+19 N =32 REC =18"	w=29.3% LL=44 PL=35	
62.0	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, gray.	SP-SM	35.5		  	50/5"		
_						N =50/5" REC =4"		
67.0	WELL GRADED SAND WITH SILT, fine to medium grained, moist, greenish gray, with fine to coarse 20-30% shell fragments, strong HCl reaction.	SW-SM	30.5		l   X	23+19+32 N =51 REC =16"		
- - - -	50-70% shell fragments.				l   X	6+8+14 N =22 REC =18"	w=23.7% *	
- - - -	25-30% shell fragments.				1    X	11+8+8 N =16 REC =18"		
-	20-25% shell fragments.				1    X	6+9+11 N =20 REC =18"		
87.0	SANDY SILT, fine to medium grained, moist, dark green, with fine to coarse 15-20% shell fragments, strong HCl reaction.	ML	10.5		l   X	9+9+9 N =18 REC =18"		
+	continued on next page				<b> </b>			

Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
 \* = See Appendix I for additional lab testing data.

**B-433** Project: **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG DEPTH **SAMPLING** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA  $\mathsf{ML}$ w=31.5% weak HCl reaction, 0-5% shell 5+6+8 fragments. N =14 REC =18" 5+4+5 N =9 REC =18" 100.0 -100--2.5 BOTTOM OF BORING @ 100.0 FT.

Calvert Cliffs Nuclear Power Plant

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion. 2.  $\star$  = See Appendix I for additional lab testing data.

**TEST** 

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**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Bender Drilling Method: Mud Rotary Drilling Equipment: CME-550X (ATV) Schnabel Representative: K. Bell

Dates Started: 5/9/06 Finished: 5/10/06

Location: Northing: 215827.1 ft Easting: 961244.3 ft

Ground Surface Elevation: 105.2 (feet)

	Groundy	water Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	5/9		28.5'		

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	SAMPLING	TESTS	REMARKS
(FT)	SHAIR DEGGIGI HON	JEAGO.	(FT)	•••	DEPTH DATA	120.0	TEMPINO
0.5	CLAYEY SAND, fine to medium grained, moist, orangeish brown and reddish brown, trace root fragments, trace wood fragments.  SILTY SAND, fine to medium grained, moist, orangeish brown, trace root fragments.	SC	104.7		3+4+4 N =8 REC =18" 3+4+5 N =9 REC =18"		
-	orangeish brown and grayish brown.				2+4+6 N =10 REC =18"		
7.0 -	POORLY SAND SAND WITH SILT, trace gravel, fine to coarse grained, moist, orangeish brown and yellowish brown.	SP-SM	98.2		3+6+7 N =13 REC =15"	w=11.8%	
9.5 _ _ _	SILTY SAND, fine to coarse grained, moist, orangeish brown.	SM	95.7		10 		
- 14.8	POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, yellowish brown and orange.	SP-SM	90.4		9+9+9 N = 18 REC =9"	w=7.0% *	
- - -					5+8+11 N =19 REC =10"	w=10.6%	
22.0 -	SILTY SAND, medium to coarse grained, moist, orangeish brown and yellowish brown.	SM	83.2		2+4+3 N = 7 REC =12"		
	continued on next page				-25-LI REC -12		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-434 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SM  $\overline{\triangle}$ w=21.9% 3+2+2 wet, orangeish brown and gray. N =4 REC =18" -30 w=26.6% 2+2+2 fine to medium grained, light gray. N =4 REC =18" -35 w=27.4% 2+1+1 LL=NP N =2 PL=NP REC =18" PP=1.50 tsf REC =7"

58.2

w=38.2%

LL=73

PL=24

w=87.8%

LL=56 PL=23

PP=2.50 tsf

2+3+5

**REC =18"** 

-55

N =8 REC =18"

CH

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

47.0

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

continued on next page

FAT CLAY, trace sand, moist, gray and

greenish gray.

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**TEST** BORING LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

	el Engineering LOG				_	· · · · · ·	t: 3 of 4		
DEPTH (FT)	STRATA DESCRIPTION	ON CLASS.			Ι.	AMPLING	TESTS	REMARKS	
-		СН	(,			5+5+8 N =13 REC =18"	w=36.6% LL=86 PL=22 PP=2.75 tsf	Resumed drilling on 5/10/06 @ 7:3 am	
62.0	SILTY SAND, fine to medium grained, moist, greenish gray and white, trace fine to medium shell fragments, HCl reaction moderate, weakly cemented.	SM	- 43.2			REC =19"	w=23.7% LL=NP PL=NP PP=2.00 tsf		
- - - -					   70	20+100/5" N =100/5" REC =10"	w=25% *		
- - - -	HCI reaction weak.				   75 -	48+50 N =50 REC =13"	w=22.6%		
- - - -						36+29+49 N =78 REC =17"	w=15.6%		
82.0	SANDY LEAN CLAY, moist, light gray, trace fine to coarse shell fragments, HCl reaction moderate.	CL	- 23.2			50 REC =6"	w=19.8% LL=30 PL=22 PP=1.00 tsf		
87.0	SILTY SAND, fine to medium grained, moist, gray and greenish gray, with fine to coarse shell fragments, HCl reaction strong.	SM	- 18.2			8+28+21 N =49 REC =18"	w=15.6%		
+	continued on next page				+ +				

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.

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**TEST** BORING LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

Schnab	el Engineering LOG					Sheet: 4 of 4				
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL		SAMPLING	TESTS	REMARKS		
( /		SM	( /		DEPTH	DATA				
92.0	POORLY GRADED SAND, trace silt, wet, gray and white, trace fine to coarshell fragments, HCl reaction moderat	SP	13.2		- - - -95-	6+6+8 N =14 REC =18"	w=31.2% LL=NP PL=NP *			
97.0	SILTY SAND, fine to medium grained, wet, greenish gray and white, trace fin to coarse shell fragments, HCl reactio strong.	SM e n	- 8.2 - 5.2			11+7+11 N =18 REC =18"	w=25.6%			
	BOTTOM OF BORING @ 100.0 FT.									

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.



**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Bender Drilling Method: Mud Rotary Drilling Equipment: CME-550X (ATV) Schnabel Representative: K. Megginson Dates Started: 5/2/06 Finished: 5/3/06

**Location:** Northing: 216020.06 ft Easting: 961404.74 ft

Ground Surface Elevation: 107.7 (feet)

	Groundwater Observations											
	Date	Time	Depth	Casing	Caved							
Encountered	5/2		7.5'									
Start of Day	5/3		9.7'									

DEPTH					SAMPLING		
(FT)	STRATA DESCRIPTION	CLASS.	ELEV.	WL		TESTS	REMARKS
0.4	Forest litter, rootmat and topsoil.		107.3		<b>DEPTH</b>   <b>DATA</b>		
2.0	CLAYEY SAND, fine to medium grained, moist, brown, contains root fragments.	SC	107.3		N =3 REC =10"		
-	SILTY SAND, fine to medium grained, moist, brown, contains root fragments.	SM	100.7		2+2+2 N =4 REC =13"		
-	fine to coarse grained.				3+4+4 N =8 REC =12"		
7.0	CLAYEY SAND, fine to coarse grained, wet, brown.	SC	100.7	Ā	3+5+6 N =11 REC =12"		*Used hollow stem augers
9.5	SILTY SAND, fine to medium grained, wet, brown.	SM	98.2		-10- - 6+5+6 N =11 REC =11"		depth of 9 ft. *3-7/8" Tri-co roller bit belov 9 ft.
- - -	light yellowish brown.				6+6+8 N = 14 REC =10"		
-							
- - -	light brown.				5+7+8 N =15 REC =8"		
-	fine to coarse grained, brown and light				 5+9+10		
_	brown.  continued on next page				N =19 REC =10"		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-435 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SM 2+10+12 brown. N =22 REC =7" -30 32.0 75.7 CLAYEY SAND, fine to medium SC \*Switched to grained, wet, brown. 2-15/16" Tri-cone roller 3+2+2 bit below 33.5 N =4 ft. REC =13" -35 37.0 70.7 SANDY SILT, fine, wet, yellowish brown ML and light gray, contains mica. WOH/18" N = WOH/18" REC =18" 65.7 42.0 SILTY SAND, fine to medium grained, SM wet, gray, contains mica. 2+4+5 N =9 REC =18" 47.0 60.7 FAT CLAY, moist, gray and dark gray, CH trace sand, contains mica. PP=1.00 tsf 2+2+4 N =6 \*\*Resumed REC =18" drilling at 6:50 AM on 5/3/06. gray and light greenish gray, trace sand, contains mica and organic matter. PP=1.75 tsf 2+5+5 N =10 REC =14" \*Switched to gray, trace sand, contains mica. 3-7/8" Tri-cone

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

continued on next page

TEST Project: Calvert Cliffs Nuclear Power Plant B-435 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** roller bit below CH 58.5 ft because 3+4+6 smaller roller bit N =10 was clogged REC =18" with sediment. 62.0 45.7 LEAN CLAY, moist, gray, with sand, CL \*Switched to contains mica. 2-15/16" Tri-cone roller 3+6+6 bit below 33.5 N = 12REC =18" 67.0 40.7 SANDY SILT, fine to medium, moist, ML orangeish brown and grayish brown, contains fine to coarse silty sand pockets 7+13+33 N =46 gray below 69 ft. REC =18" 72.0 35.7 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, wet, gray. 7+6+7 N = 13REC =12" 77.0 30.7 SILTY SAND, fine to medium grained, SM wet, gray, with fine to coarse shell fragments, strong HCl reaction. 23+25+40 N =65 REC =14" 82.0 25.7 CLAYEY SAND, fine to medium SC grained, wet, light gray, mostly fine to coarse shell fragments (±60%), strong HCI reaction 17+23+29 N =52 **REC =18"** -85 6+46+19 gray and oliveish gray, little fine to coarse shell fragments. N =65 REC =18" -90 continued on next page

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST B-435** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SC gray. 5+4+5 N =9 ∏ REČ =18" 97.0 10.7 SILTY SAND, fine to medium grained, SM wet, gray, little fine to coarse shell fragments, strong HCl reaction. 7+10+10 N =20 REC =18" 100.0 -100-7.7 BOTTOM OF BORING @ 100.0 FT.

# Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion. 2.  $\star$  = See Appendix I for additional lab testing data.



**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

B-436 **Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Bender Drilling Method: Mud Rotary Drilling Equipment: CME-550X (ATV) Schnabel Representative: K. Bell Dates Started: 5/5/06 Finished: 5/9/06

**Location:** Northing: 515923.92 ft Easting: 961441.55 ft

Ground Surface Elevation: 108.3 (feet)

	Groundwater Observations											
	Date	Time	Depth	Casing	Caved							
Encountered	5/9		37.0'									

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	s	AMPLING	TESTS	REMARKS	
(FT)		02.100.	(FT)		DEPTH	DATA	12010		
0.3	ROOTMAT AND TOPSOIL.	SM	108.0		l IM	1+2+4			
-	SILTY SAND, fine to medium grained, moist, orangeish brown and reddish brown.	OW				N =6 REC =13"			
-						3+2+2 N =4 REC =20"			
-	orangeish brown and yellowish brown.				5 -	3+2+3 N =5 REC =15"			
7.0		SP-SM	101.3						
	POORLY GRADED SAND WITH SILT, medium to coarse grained, moist, orangeish brown and brown.	SF-SIVI				2+3+4 N =7 REC =14"	w=3.3%		
9.5	CILTY CAND modium to coores	CM	98.8						
	SILTY SAND, medium to coarse grained, moist, orangeish brown and yellowish brown.	SM			<u></u> 10−	4+5+6			
					l IX	N =11 REC =12"			
12.0	POORLY GRADED SAND WITH SILT, medium to coarse grained, moist, yellowish brown and orange.	SP-SM	96.3			1120 12			
-	,					5+6+8 N =14 REC =14"			
					<del>-</del> 15				
1									
17.0	SILTY SAND, fine to coarse grained, moist, yellowish brown and orange.	SM	91.3						
					L Jm	5+7+9			
7						N =16 REC =11"			
					-20-L				
22.0			86.3						
-	POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, orangeish brown, trace gravel.	SP-SM					w=11.1%		
+					 	7+7+10 N =17	vv = 11.170 *		
-	continued on next page				-25-L	REC =12"			

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.
   Ground Water Observation Well OW-436A installed at a nearby location.

B-436 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SP-SM 27.0 81.3 CLAYEY SAND, fine to coarse grained, SC moist, orangeish brown and black, trace 3+4+8 N =12 REC =15" 4 inch orange and white fat clay layer below 29.6 ft. 32.0 76.3 SILTY SAND, fine to medium grained, SM moist, orangeish brown and reddish white. w=25.2% 2+2+2 N =4 REC =17" -35  $\overline{\Delta}$ 37.0 71.3 CLAYEY SAND, fine to medium SC grained, wet, orangeish brown and gray. 2+2+2 N =4 39.4 68.9 SANDY LEAN CLAY, wet, gray. CL REC =20" moist 1+2+3 N =5 drilling resumed 5/9/06 @7:00 REC =19" am REC =24" -50 56.3 52.0 FAT CLAY with sand, moist, gray. СН 4+4+6 N =10 REC =20" continued on next page

Calvert Cliffs Nuclear Power Plant

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground Water Observation Well OW-436A installed at a nearby location.

**TEST** 

Project:

B-436 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA CH 3+5+5 N =10 REC =20" 5+7+11 light gray and greenish gray. N =18 REC =19" 67.0 41.3 SANDY LEAN CLAY, moist, gray and CL greenish gray. 5+7+11 N =18 REC =20" 72.0 36.3 SILTY SAND, fine to medium grained, SM moist, light gray. 35+67+100/4" N =167/10" REC =14" -75 88+100/4" N =100/4" wet, light gray and white, with shell fragments, HCI reaction strong. **REC =11"** fine to coarse grained, gray and white. 100 REC =6" -85 87.0 21.3 CLAYEY SAND, fine to coarse grained, SC wet, oliveish gray and reddish white, trace fine to coarse shell fragments, HCI reaction strong. 50+10+11 N =21 REC =20" -90 continued on next page

Calvert Cliffs Nuclear Power Plant

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground Water Observation Well OW-436A installed at a nearby location.

**TEST** 

Project:

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-436 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SC oliveish gray and white. 7+6+6 N =12 REC =18" light gray and white. 8+10+17 N =27 REC =18" 100.0 -100-8.3 BOTTOM OF BORING @ 100.0 FT.

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.
  3. Ground Water Observation Well OW-436A installed at a nearby location.



**Project:** Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Boring Number: B-437
Contract Number: 06120048

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Evans

Drilling Method: Mud Rotary

Drilling Equipment: Failing-1500 (Truck)Schnabel Representative: K. MegginsonDates Started: 7/10/06 Finished: 7/11/06

**Location:** Northing: 216521.76 ft Easting: 960968.8 ft

Ground Surface Elevation: 110.6 (feet)

<b>Groundwater Observations</b>												
Date Time Depth Casing Caved												
Encountered	7/10		18.5'									
Start of day	7/11		20.0'									

DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	S <i>i</i> DEPTH	AMPLING DATA	TESTS	REMARKS
0.2	Rootmat and topsoil  Silty Sand PROBABLE FILL fine to coarse grained, moist, brown, trace	FILL	110.4			3+3+6 N =9 REC =10"		
2.0 -	coarse gravel, contains root fragments and fine to coarse sandy fat clay layer from 0.2 to 0.4 ft.	SC	108.6			2+2+1 N =3		
4.5	CLAYEY SAND, fine to coarse grained, moist, brown.	CL	106.1			REC =18"		
-	LEAN CLAY, moist, brown, trace fine to medium sand.	OL.			- 5 -	WOH+1+1 N =2 REC =14"		
-	trace organic matter (±1%).					3+5+7 N =12 REC =18"		
9.5 — –	CLAYEY SAND, fine to medium grained, moist, brown and light brown, trace organic matter (±1%), contains sandy lean clay pockets.	SC	101.1		10 \	4+7+8 N =15		
12.0 -	brown and grayish brown below 11 ft.  POORLY GRADED SAND, with silt, fine to coarse grained, moist, brown, trace fine gravel, contains clayey sand	SP-SM	98.6			REC =18"	w=7.2%	*Osterberg sampler tube
_	pockets.					REC =23"	LL=NP PL=NP PP=NP tsf	push from 13 to 15.5 ft
-				$\nabla$	 			*5.4" O.D. Drobit from 0 to 18.5 ft.
- -	fine to medium grained, wet, brown. fine to coarse grained, moist, yellowish brown and dark reddish brown, contains strongly cemented sand pockets and lenses below 19 ft .			_	20	7+17+12 N =29 REC =12"		4-3/4" O.D. Drag bit below 18.5 ft.
-								
_	wet, contains clayey sand lenses.					5+5+8 N =13 REC =13"		
_	continued on next page				-25-L	NEO - 13		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-437 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SP-SM fine to medium grained, mottled light 2+1+1 gray and yellowish brown. N =2 **REC =18"** 7+12+12 brown, yellowish brown, and light gray. N =24 REC =10" -35 37.0 73.6 LEAN CLAY, wet, yellowish brown and CL light gray, trace fine to medium sand. 1+3+6 N =9 39.5 71.1 REC =18" SILTY SAND, fine to medium grained, SM wet, stratified brown and orangeish brown. 42.0 68.6 LEAN CLAY, wet, light grayish brown CL and yellowish brown, trace fine to medium sand, contains cemented sand fragments, contains silty sand layer 4+4+5 44.0 66.6 from 43.8 to 44 ft. N =9 СН REC =18" FAT CLAY, moist, gray, trace fine to medium sand and mica. gray and dark gray, contains silty sand 2+3+4 N =7 pockets. REC =18" gray, contains silty sand layers from 54.1 to 54.2 ft and from 54.8 to 55 ft. 2+3+4 N =7 REC =18" 57.0 53.6 ELASTIC SILT, moist, gray, trace fine МН sand and mica.

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

continued on next page

TEST Project: Calvert Cliffs Nuclear Power Plant B-437 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** МН 4+5+9 N =14 REC =18" 62.0 48.6 CLAYEY SAND, fine to medium SC grained, moist, gray, contains light gray to white clayey sand pockets, trace organic matter (±1%). 4+5+7 N =12 REC =18" 67.0 43.6 SANDY SILT, fine to medium, moist, ML dark gray, contains clayey sand pockets and indurated silt pockets. 27+50/5" N =50/5" REC =11" 72.0 38.6 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, moist, gray. 22+50/4" N = 50/4" REC =10" -75  $\bowtie$ 50/4" weak HCl reaction. N = 50/4" REC =3" -80 82.0 28.6 SILTY SAND, fine to medium grained, SM wet, gray, mostly fine to coarse shell fragments (±80%), strong HCl reaction. 12+16+18 N = 34REC =14" -85 \*Extremely difficult rotary advancement from 86.5 to 88.5 ft (strong to very strong rig chatter). \*Switched to 5" oliveish gray, trace fine to medium sand 9+11+25 O.D. Tri-cone N = 36roller bit below REC =18" 87 ft. -90 few fine to coarse shell fragments \*Moderate to (±10%), contains weakly cemented

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

continued on next page

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-437 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA difficult rotary sand pockets, moderate HCI reaction SM advancement below 89.8 ft. from 88.8 to 93.5 ft (slight to moderate rig chatter). gray, strong HCI reaction. 6+9+13 N =22 ∐ REC =18" \*Osterberg sampler tube push from 98.5 to 100.5 ft \*\*Resumed PP=NP tsf some fine to coarse shell fragments REC =22" grouting at 7:00 AM on 7/11/06. (±30%), moderate HCl reaction. -100 100.5 10.1 BOTTOM OF BORING @ 100.5 FT.

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.



Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-438 Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 1

**Boring Contractor: UNI-TECH DRILLING** 

MALAGA, NEW JERSEY

Boring Foreman: J. Evans Drilling Method: Mud Rotary

Drilling Equipment: Failing-1500 (Truck) Schnabel Representative: K. Megginson Dates Started: 7/6/06 Finished: 7/6/06

**Location:** Northing: 216414.91 ft Easting: 960848.9 ft

Ground Surface Elevation: 106.6 (feet)

Groundwater Observations												
Date Time Depth Casing Caved												
Encountered	6/7	5:00	Dry									

DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL			AMPLING	TEST	s	REMARKS
0.2	Pootmat and tonsoil		106.4		DEP.	TH   \  /	<b>DATA</b> 2+2+2			
2.0 -	Rootmat and topsoil.  Clayey Sand FILL, fine to medium grained, moist, mottled light orangeish brown and grayish brown, contains root fragments.	FILL	104.6		 		N =4 REC =16"			
_	Lean Clay FILL, moist, mottled light orangeish brown and grayish brown, contains root fragments and organic matter (±1%).				- · - ·		N =3 REC =14"			Advancing
- 6.5	fine to coarse, mottled yellowish brown, grayish brown, and orangeish brown. contains cement fragments at 6 ft.		100.1			-M	1+1+12 N =13 REC =14"		0	otary bit was leflected by a considerable
	BOTTOM OF BORING @ 6.5 FT.								C	ingle at a lepth from 6 to 5.5 ft.

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.
  3. Obstruction ecountered at 6.5 feet. Boring offset B-438A

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Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-438A Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Evans **Drilling Method:** Mud Rotary Drilling Equipment: Failing-1500 (Truck) Schnabel Representative: K. Megginson

**Location:** Northing: 216411.98 ft Easting: 960867.31 ft

Dates Started: 7/7/06 Finished: 7/7/06

Ground Surface Elevation: 106.0 (feet)

<b>Groundwater Observations</b>											
Date Time Depth Casing Caved											
Encountered	7/7		18.5'								

DEPTH	CTDATA DECODIDATION	CI ACC	ELEV.	\A/I	s	AMPLING	TECTO	DEMARKS
(FT)	STRATA DESCRIPTION	CLASS.	(FT)	WL	DEPTH	DATA	TESTS	REMARKS
_	Rotary probe to 7.5 ft; see B-438 alt for strata description.							
-								
_					- 5 - 			
7.5	SILTY SAND, fine to coarse grained, moist, brown.	SM	98.5			5+8+8 N =16 REC =11"		
	fine to medium grained, stratified yellowish brown and light brown, contains poorly graded sand with silt lenses.					4+7+8 N =15 REC =12"		
-	fine to coarse grained, stratifed yellowish brown, orangeish brown, and light brown.				- 15	3+6+7 N =13 REC =10"		
- - - -	wet, light orangeish brown.			⊻		5+6+7 N =13 REC =8"		*5.4" O.D. Dr bit used from to 18.5 ft. *4-3/4" O.D. Drag bit below 18.5 ft.
- - - -	fine to medium grained, light orangeish brown and light grayish brown.  continued on next page					3+4+4 N =8 REC =10"		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant **B-438A Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SM yellowish brown and light brownish gray, 3+3+3 trace coarse gravel. N =6 **REC =11"** 32.0 74.0 CLAYEY SAND, fine to medium SC grained, wet, light orangeish brown and light gray. 33.8 72.2 3+4+4 SILTY SAND, fine to coarse grained, SM N =8 wet, yellowish brown, contains clayey REC =11" -35 sand pockets (coarse sand is subangular to subrounded). 37.0 69.0 FAT CLAY, wet, gray, with fine to СН medium sand, trace mica. 1+3+3 N =6 REC =18" moist, dark oliveish gray and dark gray, 2+3+3 trace fine to medium sand. N =6 REC =18" gray and light greenish gray, trace 3+5+6 organic matter (±<1%), contains sandy fat clay pockets and elastic silt lenses N =11 REC =18" (elastic silt lenses based on contrasting texture and appearance). 52.0 54.0 ELASTIC SILT, moist, gray and light МН greenish gray, trace fine to medium sand and mica, (soil may lab classify as CH). 4+6+9 N =15 REC =18" 57.0 49.0 FINE TO MEDIUM SANDY LEAN CL

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

CLAY, moist, gray, contains light gray to continued on next page

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Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-438A Boring Number:** Contract Number: 06120048

	el Engineering LOG		1		1		: 3 of 4	1
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	Ι.	AMPLING	TESTS	REMARKS
(1.7)	whiteigh alovey and poekets trace	CL	( ,		DEPTH	DATA		
	whiteish clayey sand pockets, trace mica.	CL				4+6+8		
1						N =14		
-					<u>⊢60</u> ⊣∐	REC =18"		
1								
62.0	SILTY SAND, fine to medium grained,	SM	44.0					
	moist, dark gray, trace mica, weak	Sivi						*Slight to
	cementation, (no visible HCl reaction).					04:50		moderately difficult rotary
+					H   X	24+50 N =50		advancemen
					_65—	REC =12"		from 64 to 66 ft (slow rotary
								advancemen
+								
4								
+								*5" O.D.
4	gray.					50/3" N =50/3"		Tri-cone rolle
						N =50/3" REC =4"		bit below 68.
٦					<del>70</del>			
4								
1								
-								
	wet, few fine to medium shell fragments				L JMI	33+38+26		
	(±10%), contains greenish gray lean clay lenses and black particles (1/16					N =64 REC =11"		
-	inch), strong HCl reaction.				<del>-75-</del>	REC - II		
4	mostly fine to medium shell fragments							
	(±50%) below 74 ft.							
1								
4								
	mostly fine to coarse shell fragments				L JM	8+15+14		
	(±70%), contains silt pockets.				l IXII	N =29 REC =18"		
$\dashv$					<u> </u>	REC = 10		
1								*Moderately
								difficult rotary
1								advancemen
4								from 82.5 to 83.5 ft (slow
	moist, mostly cemented sand (±100%),					50/2"		rotary
7	trace fine to medium shell fragments				]	N =50/2"		advancement *Very to
-	(±5%).				-85-	REC =1"		extremely
					L ]			difficult rotary advancemen
								from 83.5 to
+								87.5 ft (strong to very strong
1								rig chatter).
	wet, dark oliveish gray, trace fine to					7+10+12		
1	coarse shell fragments (±5%), (soil fines					N =22		
4	exhibit low cohesion - used as basis for potential successful tube push).				<u></u> —90—∐	REC =18"		
	potential successiul tube pusit).				_			
٦	continued on next page	[		1	1 7 1			

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.

**TEST B-438A** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SM gray, few fine to coarse shell fragments (±10%), (shell fragment approximately 2 inches in diameter and 1/4 inch thick). PP=NP tsf REC =14" -95 trace fine to medium shell fragments 8+13+17 (±1%), very weak HCl reaction. N = 30REC =18" 100.0 -100-6.0 BOTTOM OF BORING @ 100.0 FT.

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.



**Project:** Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Boring Number: B-439
Contract Number: 06120048

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

**Boring Foreman:** J. Evans **Drilling Method:** Mud Rotary

Drilling Equipment: Failing-1500 (Truck)Schnabel Representative: K. MegginsonDates Started: 7/5/06 Finished: 7/6/06

**Location:** Northing: 216340.49 ft Easting: 960948.68 ft

\_\_\_\_\_\_

Ground Surface Elevation: 113.8 (feet)

<b>Groundwater Observations</b>												
Date Time Depth Casing Caved												
Encountered	7/5		18.5'									
Start of day	7/6		14.0'									

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	s	AMPLING	TESTS	REMARKS
(FT)	STRATA DESCRIPTION	OLASS.	(FT)	VVL	DEPTH	DATA	12313	KEWAKKS
0.5	Crushed Stone FILL, moist, dark gray, contains root fragments, and silty gravel pockets.	FILL	113.3			6+6+6 N =12 REC =10"		
2.0 -	Lean Clay PROBABLE FILL, moist, brown, trace fine to medium sand.	SC	111.8			2+3+4		
	CLAYEY SAND, fine to medium grained, moist, brown, trace organic matter (±1%).		400.0			N =7 REC =14"		
4.5	SILTY SAND, fine to medium grained, moist, brown.	SM	109.3		5 -	2+2+3 N =5 REC =11"		
-								
-	fine to coarse grained.					3+4+6 N =10 REC =11"		
12.0	stratified brown and light brown below 11.5 ft.	SP-SM	101.8		10- 	4+5+8 N =13 REC =10"		
<u>-</u>	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, stratified light brown and orangeish brown.				 15-	4+6+10 N = 16 REC = 6"		
17.0 -	CILTY CAND fine to modium assined	SM	96.8					
-	SILTY SAND, fine to medium grained, wet, brown.	SIVI		$\bar{\Sigma}$				
_					20_	5+8+11 N =19 REC =6"		*Switched to 4-3/4" O.D. Drag bit below 18.5 ft.
22.0 -		011	91.8					10.5 IL.
-	SILTY GRAVEL, fine grained, wet, dark gray and brown, trace fine to coarse sand.	GM				WOH+3+9		
24.8			89.0			N =12 REC =5"		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-439 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** POORLY GRADED GRAVEL WITH GP-GM SILT, wet, dark gray and brown, fine to medium sand. 27.0 86.8 SILTY GRAVEL, fine to coarse grained, GM wet, dark gray and brown, trace fine to medium sand. WOH+2+7 N =9 REC =2" -30 1+2+6 trace fine to coarse sand N =8 REC =5" -35 2+3+6 dark gray, brown and red brown. 39.0 74.8 SM N =9 SILTY SAND, fine to medium grained, REC =10" wet, brown, trace coarse gravel, contains clayey sand layer from 39 to 39.1 ft. 42.0 71.8 SANDY LEAN CLAY, fine to medium, CL wet, mottled yellowish brown and light gray, trace mica, contains sandy fat clay pockets. 1+1+2 N = 3REC =18" 47.0 66.8 FAT CLAY, moist, light brownish gray CH and gray, trace fine to medium sand and mica, contains clayey sand pockets. 2+3+4 N =7 REC =18" gray and dark gray. 2+3+5 N =8 REC =18" light greenish gray and gray, trace organic matter (±1%).

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

continued on next page

TEST Project: Calvert Cliffs Nuclear Power Plant B-439 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH **DATA** СН gray, contains 2 inch thick dark gray 3+3+6 clayey sand layer from 59.3 to 59.5 ft. N = 9REC =18" gray and oliveish gray below 59.5 ft. 62.0 51.8 ELASTIC SILT, moist, gray and dark МН gray, trace fine to medium sand and mica, contains clayey sand lenses. 6+8+11 N =19 REC =18" 67.0 46.8 LEAN CLAY, moist, gray, dark gray and CL light greenish gray, with fine to medium sand, contains silty sand lenses and light gray to white clayey sand pockets. 5+6+11 N = 17REC =18" 72.0 41.8 \*Perceptible POORLY GRADED SAND, fine to SP increase in medium grained, moist, dark gray, trace rotary silt, contains indurated silty sand resistance from pockets. 37+50 73 to 73.5 ft. N = 50REC =12" -75 \*\*Resumed drilling at 10:30 AM on 7/6/05.  $\boxtimes$ 50/5" very weak HCl reaction. N = 50/5" \*Switched to 5 " REC =4" O.D. Tri-cone -80 roller bit below 78.5 ft. \*Moderately difficult rotary 82.0 31.8 advancement SILTY SAND, fine to medium grained, SM from 78.5 to wet, gray, mostly fine to coarse shell 83.5 ft (slow fragments (±70%), strong HCI reaction. rotary 16+15+16 advancement). N = 31REC =12" -85 \*Very difficult rotary advancement 0.88 25.8 SANDY SILT, fine to medium, moist, from 88 to 88.5 ML  $\boxtimes$ gray, moderate HCl reaction. 50/4" ft (strong rig N = 50/4" chatter). strongly cemented sand layer from 88.7 REC =4" \*Extremely to 88.8 ft. -90 difficult rotary advancement continued on next page

## Comments:

FEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST BORING LOG

TEST BORING LOG

Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Contract Number: 06120048 Sheet: 4 of 4

B-439

**SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA from 88.5 to  $\mathsf{ML}$ 93.5 ft (very strong rig chatter). 93.5 20.3 SILTY SAND, fine to medium grained, SM 7+7+12 wet, gray and oliveish gray, few fine to coarse shell fragments (±10%), contains black particles . N =19 ∐ REC =18" 97.0 16.8 CLAYEY SAND, fine to medium SC grained, wet, gray, trace fine to coarse shell fragments (±5%). 4+7+14 N =21 REC =18" -100-100.0 13.8 BOTTOM OF BORING @ 100.0 FT. TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

Schnabel Schnabel Engineering TEST BORING LOG

**Project:** Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Boring Number: B-4
Contract Number: 06120048

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings

Drilling Method: Mud Rotary

Drilling Equipment: CME-750 (ATV)

Schnabel Representative: M. Arles

Dates Started: 6/6/06 Finished: 6/7/06

**Location:** Northing: 216349.47 ft Easting: 961813.66 ft

**Ground Surface Elevation:** 56.3 (feet)

<b>Groundwater Observations</b>												
Date Time Depth Casing Caved												
Encountered	6/6		18.5'	0.0'								

OEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	SAMPLING DEPTH DATA	TESTS	REMARKS
0.5	Crushed Stone.		55.0		8+8+4		0-30' 4-1/4"
0.5	Sandy lean clay FILL, fine to coarse, moist, grayish orange.	FILL	55.8		N =12		drag bit
2.0	Clayey Sand FILL with gravel, fine to coarse grained, wet, orange.	FILL	54.3		5+6+4 N = 10	w=8.6%	
4.0	Poorly graded sand FILL with gravel, medium to coarse grained, moist, gray.	FILL	52.3		REC =9" 5		
-					REC =10"		
9.0	Clayey Sand FILL, fine to coarse	FILL	47.3		2+3+2 N =5 REC =0"		
_	grained, wet, gray, trace gravel, contains root fragments, contains wood fragments.				1+1+1 N = 2 REC =8"		
	with gravel, PROBABLE FILL.				5+4+5 N =9 REC =6"	w=16.1%	
17.0	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, gray.	SP-SM	- 39.3	Ā	9+15+35 N =50 REC =18"		
_ _ _	dark gray.				16+27+30 N =57 REC =12"	w=22.1%	
-	continued on next page				-25-  KEC = 12		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-440 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SP-SM 27.0 29.3 SANDY SILT, fine to medium, moist, ML greenish gray, contains cemented sand.  $|\boxtimes|$ 50/5" N = 50/5" 30-100 4-1/4" -30 tri-cone roller bit 32.0 24.3 SILTY SAND, fine to coarse grained, SM wet, gray and white, with fine to coarse shell fragments, strong HCI reaction, w=20.1% 70-80% shell frag. 13+24+36 N =60 REC =18" -35 moist, green, 35-45% shell frag 5+3+4 N =7 REC =14" w=27.1%

9.3

2.8

SC

SM

7+11+30 N =41 REC =18"

4+3+6 N =9 REC =18"

REC =24"

3+4+4

N =8 REC =18" 51' tube pushed

w=30.0%

LL=30 PL=21

-50

-55

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

47.0

53.5

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

25-35% shell frag.

green, no shells.

0-5% shell frag.

CLAYEY SAND, fine to medium

grainedt, dark green, trace fine to coarse shell fragments, weak HCl reaction, 0-5% shell frag.

SILTY SAND, wet, trace fine to medium

continued on next page

shell fragments, weak HCl reaction,

chnabel

**TEST** BORING LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

Schnab	pel Engineering LOG					Sheet	: 3 of 4	
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	DEPTH	SAMPLING I DATA	TESTS	REMARKS
- - -		SM			60-	REC =0"		58.5' pushed tube 60-63' rig chatter
- - - -	fine to coarse grained, green and white, with fine to coarse shell fragments, contains cemented sand, strong HCl reaction, 60-75%shell frag.				  65-	35+20+15 N =35 REC =18"	w=19.4%	
- - - -	20-30%shell frag.				  - 70	4+10+16 N =26 REC =18"		69.6' shell layer 1" thick
- - - -					   - 75	5+10+15 N =25 REC =18"		
- - - -	sandy, moderate HCl reaction, 10-15% shell frag.					6+7+9 N =16 REC =18"	w=41.0%	
82.0 -	LEAN CLAY, moist, green, trace fine to medium shell fragments, with silt, 0-5% shell frag.	CL	-25.7		  85	6+9+10 N =19 REC =18"		
87.0	SANDY SILT, fine to medium, moist, green, with fine to coarse shell fragments, moderate HCl reaction, 10-20% shell frag.	ML	-30.7		90	6+7+9 N =16 REC =18"		
	continued on next page							

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-440 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA  $\mathsf{ML}$ 92.0 -35.7 SILTY SAND, fine to medium grained, SM moist, green, with fine to coarse shell fragments, strong HCI reaction, 20-30% shell frag. 4+5+9 N =14 ∐ REC =18" moderate HCl reaction, 10-20% shell 7+7+9 N =16 frag. REC =12" -100-100.0 -43.7 BOTTOM OF BORING @ 100.0 FT.

## Comments:

TEST BORING LOG 06120048 PLOG SPT 300 & 400.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

chnabel Schnabel Engineering

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-701 Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 3

**Boring Contractor:** CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Reese

**Drilling Method:** 3-7/8" OD Tri-cone Roller Bit (Mud Rotary)

Drilling Equipment: CME-75 (Truck) Schnabel Representative: M. Arles

Dates Started: 6/28/06 Finished: 6/29/06

**Location:** Northing: 219485.54 ft Easting: 960507.6 ft

Ground Surface Elevation: 8.7 (feet)

	Groundy	vater Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	6/28		7.5'	7.5'	
Start of Day	6/29		7.0'	24.0'	
			·	·	

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	S	AMPLING	TESTS	REMARKS
(FT)			(FT)		DEPTH	DATA		
0.5	CRUSHED STONE.	FILL	8.2		l IM	4+6+7 N =13		
2.0	Poorly graded sand, PROBABLE FILL, with gravel, fine to coarse grained, moist, orange.		6.7			REC =16"		
-	POORLY GRADED SAND WITH CLAY, trace gravel, fine to coarse grained, moist, orange.	SP-SC				4+5+7 N =12 REC =16"		
5.5	SILTY SAND, fine to medium grained,	SM	3.2		5 -	6+6+7 N =13 REC =18"		
_	moist, brownish orange.					KLC - 16		7.5' switched
-	trace gravel, fine to coarse grained, wet, orange.			Ā		1+3+6 N =9 REC =12"	w=15.9% *	mud rotary fro hollow stem augers 8'-16' grinding
10.0	WELL GRADED SAND WITH SILT	SW-SM	-1.3		-10-		w=12.4%	
-						3+6+5 N =11 REC =12"	W-12.470	
13.0			-4.3					
_	SILTY SAND, fine to medium grained, moist, green and white, with fine to coarse shell fragments, strong HCl reaction, 70-90% shell frag.	SM				1+5+10 N =15 REC =2"		
-	fine to medium grained, moist, green, with fine to coarse shell fragments, strong HCl reaction, contains cemented sand, 30-40% shell frag.					4+10+13 N =23 REC =18"	w=28.2%	
-	fine to medium grained, wet, green, contains fine to coarse shell fragments, strong HCl reaction.					19+17+11 N =28 REC =2"		
	continued on next page				-25-L	REC =2		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-701 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 3 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SM w=37.3% 37+11+12 N =23 **REC =18"** -30 5+6+8 N =14 REC =18" -35 37.0 -28.3 ELASTIC SILT, with clay, moist, green, МН trace fine to coarse shell fragments, moderate HCl reaction, 0-5% shell frag. 5+8+7 N =15 REC =18" w=37.3% contains fine to medium shell REC =17" LL=54 fragments. PL=33 PP=4.00 tsf 47.0 -38.3 SILTY SAND, fine to medium grained, SM moist, oliveish green, with fine to coarse shell fragments, strong HCI reaction, w=33.1% 40-60% shell frag. 5+6+8 N =14 ∐ REC =18" 52.0 -43.3 SANDY SILT, fine to medium, moist, ML green, contains fine to coarse shell fragments, strong HCl reaction, 10-20% w=42.5% shell frag. 5+6+9 N =15 REC =18" 57.0 -48.3

## Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

МН

2. \* = See Appendix I for additional lab testing data.

green, moderate HCI reaction.

ELASTIC SILT, with clay, moist, oliveish

continued on next page

**TEST B-701** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** hnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 3 of 3 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA МН w=55.7% 6+7+9 N =16 REC =18" -53.3 62.0 SANDY SILT, fine to medium grained, MLmoist, oliveish green, with fine to coarse shell fragments, strong HCl reaction, w=40.4% 20-40% shell frag. 4.+5+6 N =11 REC =18" 67.0 -58.3 ELASTIC SILT, with clay, moist, oliveish green, with clay, moderate HCl reaction. MH w=48% 5+7+4 N =11 REC =18" 4+6+8 N =14 REC =18" -66.3 75.0 BOTTOM OF BORING @ 75.0 FT.

## Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

chnabel Schnabel Engineering

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

Sheet: 1 of 2

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Reese

Drilling Method: 3-7/8" OD Tri-cone Roller Bit (Mud Rotary)

Drilling Equipment: CME-75 (Truck) Schnabel Representative: M Arles

Dates Started: 6/29/06 Finished: 6/29/06

**Location:** Northing: 218980.62 ft Easting: 961183.23 ft

**Ground Surface Elevation:** 10.3 (feet)

		Groundy	vater Obs	ervations		
_		Date	Time	Depth	Casing	Caved
	Encountered	6/29		10.5'	8.0'	

DEPTH			ELEV.		SAMPLING		
(FT)	STRATA DESCRIPTION	CLASS.	(FT)	WL	DEPTH DATA	TESTS	REMARKS
0.5	ROOTMAT AND TOPSOIL.		9.8		1+4+4		0-24' hollow stem auger
2.0	POORLY GRADED SAND WITH CLAY, fine to coarse grained, moist, orange.	SP-SC	8.3		N =8   REC =14"		advanced to 24' to prevent mud
2.0	SILTY SAND, fine to coarse grained, moist, green, with fine to medium shell fragments, moderate HCl reaction, 10-20% shell frag.	SM	8.3		5+5+6 N =11 REC =14"		loss and hole cave in from gravel and loose soils, mud rotary drilling 24'-50'
5.5	POORLY GRADED SAND WITH CLAY, with gravel, fine to coarse grained, moist, orange.	SP-SC SP	4.8		8+11+15 N = 26 REC = 18"		
-	POORLY GRADED SAND, fine to coarse grained, moist, orangeish white. with gravel, contains clay, contains 1/8-1/4" clay lenses, yellowish orange.				6+8+10 N =18 REC =18"		
- - -	wet.			Ā	-10- 4+4+5 N =9 REC =18"		
14.0	grayish black, contains cemented sand, with fine to coarse shell fragments, shells are black, no HCl reaction.	SM	-3.7		5+3+5 N =8 REC =18"		
17.0	SILTY SAND, fine to medium grained, moist, green, with fine to coarse shell fragments, strong HCl reaction, 20-40% shell frag.  CLAYEY SAND, fine to coarse grained, wet, green, contains cemented sand,	SC	6.7		  		
_ _ _	with fine to coarse shell fragments, strong HCl reaction, 70-90% shell frag. fine to medium grained, moist, 30-40% shell frag.				4+9+5 N =14 REC =18"		
22.0 -	SILTY SAND, fine to medium grained, moist, green, with fine to coarse shell fragments, strong HCl reaction, 20-30% shell frag.	SM	-11.7		3+3+6 N =9		
	continued on next page				REC =18"		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-702 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 2 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SM trace fine to coarse shell fragments, weak HCl reaction, 0-5% shell frag. 4+6+5 N =11 **REC =18"** with fine to coarse shell fragments, 5+7+7 strong HCl reaction, 20-35% shell frag. N =14 REC =18" -35 4+5+7 N =12 REC =18" 42.0 -31.7 SANDY SILT, fine to medium grained, MLmoist, green, trace fine to medium shell fragments, strong HCl reaction, 0-10% shell frag. 5+6+7 N =13 REC =18" 5+6+7 N =13 REC =18" 50.0 -39.7 -50 BOTTOM OF BORING @ 50.0 FT.

## Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

<sup>2. \* =</sup> See Appendix I for additional lab testing data.



Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: T. Connelly

Drilling Method: 3-7/8" OD Tri-cone Roller Bit

Drilling Equipment: CME-550 (ATV) Schnabel Representative: K. Bell

Dates Started: 7/7/06 Finished: 7/10/06

**Location:** Northing: 218171 ft Easting: 960957.01 ft

Ground Surface Elevation: 45.4 (feet)

	Groundy	vater Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	7/7		23.5'		
Start of day	7/10		Dry		

DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL		AMPLING	TESTS	REMARKS
( )	ROOTMAT AND TOPSOIL.		(,		DEPTH	DATA		
0.7	CLAYEY SAND, fine to medium grained, moist, brown and yellowish brown.	SC	44.7			WOH+WOH +1 N =1		
2.5	SANDY LEAN CLAY, trace roots and wood fragments, moist, brown and orangeish brown.	CL	42.9			REC =8" 2+2+3 N =5 REC =10"		
-	iron staining				- 5 -	2+3+5 N =8 REC =16"		
-	weak cementation					3+4+4 N =8 REC =18"		
10.0	ORGANIC CLAY WITH SAND, moist, gray and orangeish brown.	ОН	35.4		10 \ 	2+3+4 N =7 REC =18"		
- - -	iron staining					3+2+2 N =4 REC =18"		
- - -					   -20-	REC =19"	w=45.1% PP=>4.5 tsf *	
22.0	SILTY SAND, fine to coarse grained, wet, reddish brown, contains fine to coarse shell fragments, 10-20%, weak cementation, HCl reaction strong.	SM	- 23.4	Ψ		WOH+2+2 N =4 REC =10"		Harder drilling
_	continued on next page				25  <u> </u>			

# Comments:

1. Ground water observation wells OW-703A and OW-703B installed at nearby locations.

B-703 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SM total fluid loss in mud tub 27.0 18.4 ELASTIC SILT, moist, gray and МН yellowish brown. resumed drilling on 7/10/06 @ 9:00am WOH/18" N = WOH/18" REC =10" -30 33.0 12.4 SILTY SAND, fine to medium grained, wet, gray and white, contains fine to coarse shell fragments, 20-30%, HCI SM furthest 4+4+7 advancement of N = 11hollow stem reaction strong. REC =16" augers -35 Rig chatter greenish gray, trace fine to medium 4+4+6 shell fragments, 2-5%, HCl reaction N =10 REC =18" moderate 3+3+6 N =9 REC =18" 47.0 -1.6 SANDY LEAN CLAY, wet, greenish gray CL and white, contains fine to coarse shell fragments, 30-40%, HCl reaction strong. 3+5+7 N =12 ∐ REC =18" -50 52.0 -6.6 SILTY SAND, fine to medium grained, SM wet, gray and white, with fine to coarse shell fragments, 50-60%, strong cementation, HCI reaction strong. 8+11+7 N =18 REC =18" Rig chatter continued on next page

Calvert Cliffs Nuclear Power Plant

## Comments:

FEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

TEST

Project:

TEST Project: Calvert Cliffs Nuclear Power Plant B-703 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SM greenish gray and white, contains fine 5+7+10 to medium shell fragments, 20-30%, N =17 REC =16" HCI reaction moderate 62.0 -16.6 SANDY SILT, wet, gray and white, MLcontains fine to coarse shell fragments, 20-30%, strong cementation, HCI reaction strong. 11+23+50/4" N =73/10" REC =16" Rig chatter 67.0 -21.6 SILTY SAND, fine to medium grained, SM wet, greenish gray and white, contains fine to coarse shell fragments, 20-30%, HCI reaction moderate. 5+8+12 N =20 REC =18" REC =10" -75 77.0 -31.6 SANDY SILT, moist, greenish gray, trace fine to medium shell fragments, ML 2-5%, HCl reaction moderate. 6+7+10 N =17 REC =18" 82.0 -36.6 CLAYEY SAND, fine to medium SC grained, wet, greenish gray, trace fine to medium shell fragments, 2-5%, HCI reaction moderate. 5+7+9 N =16 **REC =18"** -85 contains fine to coarse shell fragments, 7+15+15 20-30%, HCI reaction strong N = 30REC =18" -90 continued on next page

## Comments:

FEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

**TEST** Project: **B-703** Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **DEPTH SAMPLING** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SC 92.0 -46.6 SANDY SILT, fine to medium grained, MLwet, greenish gray, trace fine to coarse shell fragments, 2-5%, HCl reaction moderate. 5+7+12 N =19 REC =18" 7+10+12 N =22 REC =18" 100.0 -54.6 -100-BOTTOM OF BORING @ 100.0 FT.

## Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08



Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

B-704 **Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 2

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: T. Connelly

Drilling Method: 3-7/8" OD Tri-cone Roller Bit

Drilling Equipment: CME-550 (ATV) Schnabel Representative: K. Bell

Dates Started: 7/6/06 Finished: 7/7/06

**Location:** Northing: 217991.06 ft Easting: 960926.05 ft

**Ground Surface Elevation:** 39.6 (feet)

	Groundy	vater Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	7/6		23.5'		
Start of Day	7/7	-	23.0'	-	

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	s	AMPLING	TESTS	REMARKS
(FT)	OTTAL DECOME HOR	JEAGG.	(FT)	***	DEPTH	DATA	1.2010	TALIFICATION OF THE PARTY OF TH
0.6	ROOTMAT AND TOPSOIL.		39.0					
	CLAYEY SAND, trace roots and wood fragments, fine to medium grained, moist, reddish brown.	SC				woh+1+2 N =3 REC =7"		
2.5	SANDY LEAN CLAY, trace wood fragments, moist, reddish brown and orangeish brown.	CL	37.1			2+2+3 N =5 REC =6"		
	iron staining, weak cementation.				5 -	2+2+2 N =4 REC =15"		
-						2+4+4 N =8 REC =15"		
10.0	CANDY FAT OLAY Areas root	СН	29.6		-10-			-tt -ft
-	SANDY FAT CLAY, trace root fragments, moist, reddish brown and orangeish brown, iron staining, weak cementation.	Сн				2+2+2 N =4 REC =16"		start of mud rotary drilling
13.0	SANDY SILT, moist, blueish gray.	ML	26.6					
-	State 1 Siz 1, molec, station gray.	IWE			- 15-	3+4+5 N =9 REC =18"		
-								
17.0			22.6					
-	SILTY SAND, fine to medium grained, moist, gray and white, contains fine to coarse shell fragments, 30-40%, strong cementation, HCl reaction strong.	SM				40+29+16 N =45 REC =18"		Rig chatter
7								
1				$\nabla$	    -			
4					├ - M	4+8+6 N =14		
4	and toward a second second				25_	REC =18"		
	continued on next page	1	1					

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

<sup>2. \* =</sup> See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-704 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 2 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SM contains fine to coarse shell fragments, 5+7+7 20-30%, HCl reaction moderate. N =14 resumed drilling **REC =18"** on 7/7/06 @ 7:30am Rig chatter 32.0 7.6 CLAYEY SAND, fine to medium SC grained, wet, blueish gray, trace fine to coarse shell fragments, 2-5%, HCI reaction weak. 3+3+5 N =8 REC =18" -35 3+3+4 N =7 REC =18" 42.0 -2.4 SANDY FAT CLAY, wet, gray and white, СН contains fine to coarse shell fragments, 20-30%, HCl reaction moderate. 2+3+6 N =9 REC =18" Rig chatter 47.0 -7.4 SILTY SAND, fine to medium grained, SM wet, white and gray, contains fine to coarse shell fragments, 20-30%, strong cementation, HCl reaction strong. 14+16+11 N = 27REC =18" 50.0 -10.4 -50 BOTTOM OF BORING @ 50.0 FT.

## Comments:

FEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.



Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 2

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: W. Wolfe

Drilling Method: 3-7/8" OD Tri-cone Roller Bit Drilling Equipment: CME-550X (ATV) Schnabel Representative: K. Bell

Dates Started: 6/26/06 Finished: 6/27/06

**Location:** Northing: 217581.3 ft Easting: 960917.9 ft

**Ground Surface Elevation:** 46.8 (feet)

	Groundwater Observations											
	Date	Time	Depth	Casing	Caved							
Encountered	6/27		13.5'									

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	s	AMPLING	TESTS	REMARKS
(FT)	OTRATA DEGORII TION	OLAGO.	(FT)	***	DEPTH	DATA	12010	KEWAKKO
0.6	ROOTMAT AND TOPSOIL.		46.2					
2.5	CLAYEY SAND, trace wood and root fragments, fine to medium grained, moist, orangeish brown.	SC				2+3+2 N =5 REC =5"		
2.5	SANDY FAT CLAY, trace root fragments, moist, orangeish brown and gray.	СН	44.3			3+3+5 N =8 REC =5"		
4.5	CLAYEY SAND, trace root fragments, fine to medium grained, moist, gray and orangeish brown.	SC	42.3		- 5 - X	3+3+5 N =8 REC =16"		
7.0	SILTY SAND, fine to medium grained, moist, gray and orangeish brown, with yellow sand lenses.	SM	39.8			4+5+6 N =11 REC =18"		
-	gray and reddish brown, weak cementation, iron staining				10 	2+5+16 N =21 REC =11"		resumed drill on 6/27/06 @ 7:30am
13.0	POORLY GRADED SAND WITH CLAY, fine to medium grained, wet, yellowish brown and gray.	SP-SC	33.8	$\nabla$		5+12+8 N =20 REC =10"		
17.0	SILTY SAND, fine to medium grained, wet, gray and white, contains fine to	SM	29.8		-  -  -			
-	medium shell fragments, 20-30%, HCl reaction moderate.					15+14+10 N =24 REC =15"		
22.0	SANDY ELASTIC SILT, moist, gray, trace fine to medium shell fragments,	MH	24.8					
	2-5%, HCl reaction weak.					3+3+4 N =7 REC =18"		
-	continued on next page				├-25 <i>-</i>  └	1120 - 10		

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.
   Ground water observation well OW-705 installed at nearby location.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-705 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 2 ELEV. **SAMPLING DEPTH** STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA МН 27.0 19.8 Rig chatter SILTY SAND, fine to medium grained, SM wet, light gray, contains fine to coarse shell fragments, 20-30%, strong cementation, HCl reaction strong.  $\boxtimes$ 50/5" N = 50/5"REC =5" -30 32.0 14.8 CLAYEY SAND, fine to medium SC grained, wet, gray, contains fine to coarse shell fragments, 30-40%, HCI reaction strong. 5+5+6 N = 11REC =15" -35 5+6+11 N =17 REC =18" softer drilling 42.0 4.8 SILTY SAND, fine to medium grained, SM wet, greenish gray, trace fine to coarse shell fragments, 2-5%, HCl reaction weak. 4+5+7 N =12 REC =18" 3+3+4 N =7 REC =18" 50.0 -3.3 -50 BOTTOM OF BORING @ 50.0 FT.

## Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-705 installed at nearby location.

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**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-706 Boring Number:** Contract Number: 06120048 Sheet: 1 of 2

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings

**Drilling Method:** 3-7/8" O.D. Drag Bit (Mud Rotary)

Drilling Equipment: CME-750 (ATV) Schnabel Representative: K. Megginson Dates Started: 5/15/06 Finished: 5/16/06

**Location:** Northing: 217140.14 ft Easting: 961339.74 ft

**Ground Surface Elevation:** 77.4 (feet)

	Groundy	water Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	5/15		5.0'		
Start of day	5/16		0.0'		

DEPTH			ELEV.			S	AMPLING		
(FT)	STRATA DESCRIPTION	CLASS.	(FT)	WL	DEPT		DATA	TESTS	REMARKS
0.3	Rootmat and topsoil.  SILTY SAND, fine to coarse grained, moist, brown, contains root fragments.	SM	77.1			M	1+5+3 N =8 REC =17"		*NWJ rods used.
-					 		2+4+6 N =10 REC =11"		
4.5	CLAYEY SAND, fine to medium grained, wet, brown, trace organic matter (±1%).	SC	72.9	Ā	5 	XII	2+2+1 N =3 REC =14"		
7.0	SANDY LEAN CLAY, fine to medium grained, moist, yellowish brown and light gray.	CL	70.4		 	XII	2+2+1 N =3 REC =18"		
9.5	FAT CLAY, with fine to medium sand, trace mica, moist, mottled yellowish brown and grayish brown.  trace fine to medium sand, gray.	СН	67.9		10 		2+2+2 N =4 REC =18"		
- - -	trace fine sand.				 15		1+4+4 N =8 REC =0"		
17.0 -	ELASTIC SILT, trace fine to medium sand and mica, moist, light greenish gray and dark gray.	МН	60.4		  - 20- 	IXII	2+4+4 N =8 REC =18"		
- - -	trace fine sand, light greenish gray and light gray.  continued on next page				  25	IXII	3+6+6 N =12 REC =18"		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-706 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 2 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA МН 27.0 50.4 SANDY LEAN CLAY, trace mica, fine to CL medium grained, moist, gray. 8+9+12 N =21 **REC =18"** 9+9+18 34.0 43.4 CLAYEY SAND, trace mica, fine to SC N =27 medium grained, moist, dark orangeish brown and light brown, (shell REC =18" -35 impressions observed in soil sample). 37.0 40.4 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, moist, light brown.  $\boxtimes$ 50 REC =6" light brown and orangeish brown. 50 REC =5" 47.0 30.4 SANDY LEAN CLAY, trace mica, fine to CL medium grained, moist, light greenish gray, trace fine to medium shell fragments (±5%), weak HCl reaction. \*\*Resumed grouting at 7:10 PP=2.00 tsf WOH+3+4 N =7 AM on 5/16/06. REC =18" 50.0 27.4 -50 BOTTOM OF BORING @ 50.0 FT.

## Comments:

FEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

<sup>2. \* =</sup> See Appendix I for additional lab testing data.

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Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-707 Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 2

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings

**Drilling Method:** 3-7/8" OD Drag Bit (Mud Rotary)

**Drilling Equipment:** CME-750

Schnabel Representative: B. Bradfield Dates Started: 5/2/06 Finished: 5/2/06

**Location:** Northing: 217396.98 ft Easting: 961481.84 ft

**Ground Surface Elevation:** 67.4 (feet)

Groundwater Observations										
	Date	Time	Depth	Casing Caved						
Encountered	5/2		25.0'							

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	S	AMPLING	TESTS	REMARKS
(FT)		OLAGO.	(FT)		DEPTH	DATA	120.0	
0.3	TOPSOIL.	CL	67.1			2+3+4		
-	SANDY LEAN CLAY, moist, orangeish brown and gray.	OL .				N =7 REC =18"		
2.5	SANDY FAT CLAY, moist, gray, contains mica.	СН	64.9			4+6+4 N =10 REC =18"	w=27.3%	
_	with sand.				- 5 - X	4+4+5 N =9 REC =18"		
- - -	fine to medium sandy, greenish gray and dark gray.					3+3+4 N =7 REC =18"	w=32.8% LL=59 PL=21 *	
_ - -	with sand, gray.					2+5+5 N =10 REC =18"		
- - -					- - -15-	4+6+8 N =14 REC =18"	w=32.7%	
- - -					 	0.7.0		
- - -					20	3+7+9 N =16 REC =18"		
22.0	CLAYEY SAND, fine to medium grained, moist, dark gray, contains mica.	SC	45.4		-  -  -	6+6+9	w=29.5%	
24.6	continued on next page		42.8	Ā	_25_	N =15 REC =18"		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-707 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 2 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA CLAYEY SAND, trace gravel, wet, SC orangeish brown and yellowish brown, limonitic cementation & Fe oxide staining 27.0 40.4 МН ELASTIC SILT with sand, moist, gray, contains mica. 8+8+10 N =18 **REC =18"** organic odor. w=45.5% 6+8+8 LL=59 N =16 PL=45 REC =18" -35 brown, contains organic matter. 2+4+4 N =8 REC =17" 42.0 25.4 Harder drilling POORLY GRADED SAND WITH SILT, SP-SM fine to coarse grained, wet, gray and brownish white, with fine to coarse shell fragments, strong HCl reaction. 30+15+12 N =27 REC =18" brownish white, with fine to coarse shell fragments, strong HCl reaction. w=27% 5+7+26 N = 33REC =16" 50.0 17.4 -50

## Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

2. \* = See Appendix I for additional lab testing data.

BOTTOM OF BORING @ 50.0 FT.

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.



**Project:** Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Boring Number: B-708
Contract Number: 06120048

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings

**Drilling Method:** 3-7/8" O.D. Drag Bit (Mud Rotary)

Drilling Equipment: CME-750 (ATV)Schnabel Representative: K. MegginsonDates Started: 5/8/06 Finished: 5/9/06

**Location:** Northing: 217585.84 ft Easting: 961810.64 ft

Ground Surface Elevation: 37.4 (feet)

	Groundy	vater Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	5/8		5.0'		
Start of day	5/9		0.5'		

DEPTH (FT) STRATA DESCRIPTION	STRATA DESCRIPTION	CLASS.	ELEV. WL		SAMPLING		TESTS	REMARKS
	OLAGO.	(FT)	***	DEPTH	DATA	12313	INCHIAIN (NO	
0.4	Rootmat and topsoil.	SC	37.0		M	1+3+4		
2.0	CLAYEY SAND, fine to coarse grained, moist, brown, contains root fragments.	30	35.4		├ <u> </u>	N =7 REC =14"		
	SILTY SAND, fine to medium grained, moist, mottled orangeish brown and grayish brown.	SM				2+2+1 N =3 REC =12"		
4.5	SILT, wet, dark brown, with fine to medium sand, trace mica.	ML	32.9	∑	- 5 - \	WOH/18" N = WOH/18" REC =11"		
7.0	CLAYEY SAND, fine to coarse grained, moist, brown, (coarse sand is angular to subangular).	SC	30.4			1+3+3 N =6 REC =12"		
9.5	SILTY SAND, fine to coarse grained, wet, reddish brown and light orangeish brown, (coarse sand is subrounded to rounded).	SM	27.9		10 	10+10+13 N =23		
12.0	SILTY GRAVEL, fine to coarse grained, wet, orangeish brown and brown, (maximum dimension of subangular to subrounded fine gravel is 3/4 inch).	GM	25.4			REC =10"		
14.0	SILTY SAND, fine to medium grained, wet, dark orangeish brown, contains cemented sand pockets, (no observed HCL reaction with cemented sand pockets).	SM	23.4			N =12 REC =9"		
17.0	CLAYEY SAND, fine to medium grained, wet, light brown, few fine to coarse shell fragments (±10%), contains silty sand pockets, strong HCI reaction.	SC	20.4		  - 20 -	WOH+2+3 N =5 REC =18"		
22.0	SILTY SAND, fine to medium grained, wet, gray, little fine to medium shell fragments (±20%), strong HCL reaction.	SM	15.4		-	5+19+18 N =37		
-	light gray, mostly fine to coarse shell continued on next page				-25-V	REC =14"		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-708A installed at nearby location.

TEST Project: Calvert Cliffs Nuclear Power Plant B-708 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** fragments (±>50%), contains strongly SM cemented sand lense (1/4 inch thick) at 24.9 ft, strong HCI reaction, (maximum dimension of shell fragment is 1/2 inch). trace fine to medium shell fragments (±5%), weak HCI reaction. 4+4+5 N = 9**REC =18"** 32.0 5.4 CLAYEY SAND, fine to medium SC grained, wet, gray, trace fine to medium shell fragments (±5%), weak HCl reaction. 3+2+4 N =6 REC =18" -35 37.0 0.4 SILTY SAND, fine to medium grained, SM wet, gray, little fine to coarse shell fragments (±20%), strong HCl reaction. 6+9+16 N =25 \*Very difficult **REC =18"** rotary advancement at 41 ft; moderate difficulty in rotary advancement below 42 ft. light gray and light oliveish gray, mostly 7+14+14 fine to coarse shell fragments (±70%), N =28 contains strongly cemented sand REC =12" pockets, (maximum dimension of cemented sand pockets is 1-1/2 inches). light greenish gray, few fine to coarse 7+11+26 shell fragments (±10%). N = 37REC =16" \*Relative difficultly in rotary advancement 52.0 -14.7 below 51 ft. SANDY SILT, fine to medium, moist, ML \*Switched to light greenish gray, trace fine to medium 3-7/8" O.D. shell fragments (±5%), moderate HCI Tri-cone roller reaction. 5+9+14 bit below 53.5 N =23 REC =10" 57.0 -19.7SILTY SAND, fine to medium grained, SM wet, gray, few fine to medium shell continued on next page

## Comments:

FEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-708A installed at nearby location.

TEST Project: Calvert Cliffs Nuclear Power Plant B-708 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** fragments (±10%), strong HCl reaction. SM 11+11+11 N = 22REC =18" 62.0 -24.7 SANDY SILT, fine to medium, moist, MLgray, trace fine to coarse shell fragments (±5%), strong HCl reaction, (shell fragments easily crumble and roll 6+8+12 with slight finger pressure). N =20 REC =18" trace fine to medium shell fragments 6+6+9 N =15  $(\pm 1\%).$ REC =18" 72.0 -34.7 SANDY LEAN CLAY, fine to medium, moist, light greenish gray, trace fine to CL coarse shell fragments (±5%), contains dark brownish particles (< 1/8 inch), 8+6+13 (dark brownish particles may be fish N =19 scales). REC =18" \*\*Resumed drilling at 6:55 AM on 5/9/06. 77.0 -39.7 \*Slight to SILTY SAND, fine to medium grained, SM moderate rig wet, gray, little fine to coarse shell chatter from 75 fragments (±20%), contains subrounded to 76 ft. to rounded black particles (1/16 inch), REC =12" strong HCI reaction. -80 82.0 -44.7 SILT, moist, greenish gray, with fine to MLmedium sand, trace mica and fine to medium shell fragments (±5%), weak HCI reaction. 6+7+13 N = 20**REC =18"** 87.0 -49.7 LEAN CLAY, moist, greenish gray, trace CL fine to medium sand and mica, weak HCI reaction. 8+7+11 N =18 REC =18" -90 continued on next page

## Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-708A installed at nearby location.

**TEST B-708** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA CL with fine to medium sand, trace fine to 4+5+7 medium shell fragments (±5%), N =12 REC =18" moderate HCl reaction. dark greenish gray, weak HCl reaction. 6+7+9 N =16 REC =18" 100.0 -62.7 -100-BOTTOM OF BORING @ 100.0 FT.

## Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-708A installed at nearby location.

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**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-709 Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 2

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings

**Drilling Method:** 3-7/8" O.D. Drag Bit (Mud Rotary)

Drilling Equipment: CME-750 (ATV) Schnabel Representative: K. Megginson Dates Started: 5/9/06 Finished: 5/9/06

**Location:** Northing: 217642.82 ft Easting: 961978.18 ft

**Ground Surface Elevation:** 31.3 (feet)

	Groundy	vater Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	5/9		7.5'		

DEPTH STRATA DESCRIPTION		STRATA DESCRIPTION CLASS.		WL	S	AMPLING	TESTS	REMARKS
(FT)	511511112201111111111		(FT)		DEPTH	DATA	5.0	
0.4	Rootmat and topsoil.	SM	30.9		M	WOH+2+2		*NWJ rods
2.0 -	SILTY SAND, fine to coarse grained, moist, brown, contains root fragments and clayey sand pockets.		29.3			N =4 REC =14"		used.
-	LEAN CLAY, moist, orangeish brown and grayish brown, with fine to medium sand.	CL				2+3+2 N =5 REC =8"		
4.5 — –	SILTY SAND, moist, fine to medium grained, dark orangeish brown.	SM	26.8		5 -	3+2+3 N =5 REC =12"		
7.0 -	CLAYEY SAND, fine to coarse grained, wet, mottled dark orangeish brown and grayish brown (high percentage of fines).	SC	24.3	⊻		WOH/18" N = WOH/18" REC =12"	w=27.3%	
9.5	SANDY SILT, fine to medium, wet, dark orangeish brown.	ML	21.8		10 	2+2+3		
11.7			19.6			N =5 REC =13"		
- - - -	SILTY SAND, fine to medium grained, moist, dark orangeish brown and dark gray, (dark gray color is a 2 inch thick layer from 11.5 to 11.7 ft).  wet, dark brown and orangeish brown (bottom of sample vertically two different colors).  gray below 14.5 ft.	SM				WOH+WOH +1 N =1 REC =12"	w=29.1% *	
- - -	moist, light gray, mostly fine to medium strongly cemented sand (±100%), strong HCl reaction.  wet, gray, trace fine to medium shell fragments (±5%) below 19.5 ft.					19+4+1 N =5 REC =10"		
22.0 -	CLAYEY SAND, fine to medium	SC	9.3		<u> </u>			
-	grained, wet, gray, weak HCl reaction.	30				2,2,2	w=30.4%	
_						3+3+3 N =6 REC =18"	**-50. <del>1</del> 70	
	continued on next page	I						

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-709 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 2 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SC 2+4+4 trace fine to medium shell fragments (±5%), contains black particles (1/16 N =8 inch). **REC =18"** 32.0 -0.8 SANDY SILT, fine to medium, wet, gray ML and light gray, mostly fine to coarse shell fragments (±50%), strong HCI w=33.8% reaction. 5+5+11 N =16 REC =18" -35 \*Slight to moderate rig 37.0 -5.8 SILTY SAND, fine to medium grained, SM chatter from 37 wet, gray and light gray, some fine to to 38.5 ft. coarse shell fragments (±40%), contains clayey sand lenses (1/4 inch thick) and 13+15+17 black particles (1/16 inch), strong HCl N =32 reaction. REC =10" light gray, trace fine to coarse shell 11+28+23 fragments (±5%), contains strongly N =51 cemented sand pockets, moderate HCI REC =13" reaction. 47.0 -15.8 SANDY LEAN CLAY, fine to medium, CL moist, gray, few fine to coarse shell fragments (±10%), contains black particles (< 1/8 in), strong HCl reaction, w=23% 8+11+30 (some shell fragments are orange N =41 REC =18" brown). 50.0 --18.8 -50 contains moderately cemented sand lense below 49.8 ft. BOTTOM OF BORING @ 50.0 FT.

## Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

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Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-710 Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 3

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings

**Drilling Method:** 3-7/8" O.D. Drag Bit (Mud Rotary)

Drilling Equipment: CME-750 (ATV) Schnabel Representative: K. Megginson Dates Started: 5/9/06 Finished: 5/10/06

**Location:** Northing: 217542.51 ft Easting: 962136.88 ft

Ground Surface Elevation: 48.0 (feet)

	Ground	water Obs	ervations	i	
	Date	Time	Depth	Casing	Caved
Encountered	5/10		23.5'		

DEPTH   (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL		AMPLING	TESTS	REMARKS
( , ,			(' ')		DEPTH	DATA		
0.5	Forest litter, rootmat and topsoil.	FILL	47.5			2+4+3 N =7		*NWJ rods used.
2.0	Clayey sand PROBABLE FILL, fine to medium grained, moist, brown, contains root fragments and fine to medium silty	FILL	46.0		- <u>-</u>	REC =6"		uscu.
-	sand pockets.  Fat Clay PROBABLE FILL, moist, light yellowish brown and light grayish brown, with fine to medium sand, contains silty sand lenses.					3+2+3 N =5 REC =10"		
-	trace fine sand, contains root fragments, mostly mottled light yellowish brown and light grayish brown.				- 5 -	2+2+2 N =4 REC =6"		
9.5	mottled yellowish brown, light brownish gray and orangeish brown, contains leaf fragments, trace organic matter (±1%).		38.5			2+2+2 N =4 REC =8"		
9.5	LEAN CLAY, moist, brown, with fine to medium sand.	CL	38.5		10	3+3+4 N =7 REC =10"		*Continued water loss as rotary advanced to 10.5 ft.
- - -	light brown and light orangeish brown (mostly transecting curvilinear laminations), trace fine sand and mica.				15	2+4+5 N =9 REC =16"		*Boring grout from depth of 15 ft to groun surface due t continued mu loss from 7.5 15 ft.
17.0	FAT CLAY, moist, brown, trace fine sand (NOTE: hydrated bentonite observed in top of spoon, dry bentonite observed in shoe of spoon).	СН	31.0		-	7+5+3		1311.
-	contains fine to medium cemented sand pockets below 19.5 ft (no observed HCl reaction with cemented sand pockets).				20	N =8 REC =6"		
22.0 -	SANDY LEAN CLAY, fine to medium, wet, dark orangeish brown and dark reddish brown, trace organic matter (±1%).	CL	26.0	∑		7+5+3 N =8 REC =7"		
-	continued on next page				<u> </u>	REU =/		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-710 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 3 **DEPTH SAMPLING** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** CL 27.0 21.0 SILTY SAND, fine to medium grained, SM wet, light orangeish brown and grayish WOR/18" N = WOR/18" REC =12" brown and light gray, trace fine to 6+7+7 medium shell fragments (±5%), strong N = 14HCl reaction, (shell fragments easily REC =12" -35 crumble and roll with slight finger pressure). gray, few fine to coarse shell fragments (±10%), strong HCl reaction below 34.5 37.0 11.0 ft (shell fragments are rigid). CL LEAN CLAY, wet, light brown and orangeish brown, with fine sand, trace WOH+10+8 39.0 9.0 N =18 SM SILTY SAND, fine to medium grained, REC =10" moist, gray, mostly fine to medium strongly cemented sand (±>50%), trace fine to medium shell fragments (±5%), strong HCI reaction. wet, trace fine to medium shell fragments (±5%), weak HCl reaction. 3+3+5 \*No return of N =8 rotary cuttings **REC =18"** below 40 ft. Hollow stem augers used to 40 ft in order to case borehole 47.0 1.0 LEAN CLAY, moist, gray, with fine to ML and prevent significant mud medium sand, few fine to coarse shell fragments (±10%), strong HCl reaction. loss. 3+4+8 N =12 REC =18" 52.0 -4.0 CLAYEY SAND, fine to medium SC grained, moist, gray and light gray, some fine to coarse shell fragments (±40%), strong HCl reaction. 23+15+7 N =22 REC =18" 57.0 -9.0 SANDY LEAN CLAY, fine to medium, CL moist, light greenish gray and gray, continued on next page

## Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-710 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 3 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA trace fine to medium shell fragments CL (±5%) and mica, strong HCl reaction. 5+5+13 N =18 59.5 -11.5 REC =18" CLAYEY SAND, fine to medium SC grained, moist, light greenish gray and gray, trace fine to medium shell fragments (±5%) and mica, strong HCI reaction. 62.0 -14.0 MLSANDY SILT, fine to medium, moist, light greenish gray, trace fine to coarse shell fragments (±5%), contains dark 6+16+36 brownish particles (1/16 inch), strong N =52 HCI reaction. REC =18" 67.0 -19.0 LEAN CLAY, moist, greenish gray, with fine to medium sand, few fine to coarse shell fragments (±10%), strong HCI CL reaction, (some shell fragments are 8+7+16 dark reddish brown). N =23 REC =18" 72.0 -24.0 SANDY SILT, fine to medium, moist, ML greenish gray, trace fine to medium shell fragments (±5%), weak HCl reaction. 5+7+13 N = 20REC =18" -27.0 75.0 BOTTOM OF BORING @ 75.0 FT.

## Comments:

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

<sup>2. \* =</sup> See Appendix I for additional lab testing data.

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Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-711 Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 2

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings

**Drilling Method:** 3-7/8" O.D. Drag Bit (Mud Rotary)

Drilling Equipment: CME-750 (ATV) Schnabel Representative: K. Megginson Dates Started: 5/11/06 Finished: 5/11/06

**Location:** Northing: 216755.7 ft Easting: 961743.5 ft

Ground Surface Elevation: 53.0 (feet)

	Groundy	vater Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	5/11		28.5'		

DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL		AMPLING	TESTS	REMARKS
0.3	Rootmat and topsoil.		52.7		DEPTH	<b>DATA</b> 3+2+3		*NWJ rods
2.0 -	CLAYEY SAND, fine to coarse grained, moist, light brown and brown, contains root fragments.	SC	51.0			N =5 REC =12"		used.
=	FAT CLAY, moist, light orangeish brown and light gray, trace fine sand.	СН				4+5+6 N =11 REC =14"		
4.5 	ELASTIC SILT, moist, mottled orangeish brown and light gray, trace fine sand, (orangeish brown particles appear to be weathered shell fragments based on shape).	МН	48.5		5 -	4+4+7 N =11 REC =18"		
7.0 - -	SANDY SILT, fine to medium, moist, orangeish brown and light grayish brown, trace mica (high percentage of sand).	ML	46.0			4+4+5 N =9 REC =18"		
9.5	CLAYEY SAND, fine to medium grained, moist, dark gray.	SC	43.5		10 	3+6+5 N =11		
12.0 -	light brown and dark reddish brown, contains fine to medium weakly cemented sand pockets, trace fine to medium shell fragments (±5%), below 11.5 ft (shell fragments are stained dark orangeish brown due to oxidation).  SILTY SAND, fine to medium grained, moist, dark orangeish brown and dark reddish brown, (oxidized).	SM	41.0			REC =16"  32+50 N =50 REC =12"		
17.0 -	LEAN CLAY, moist, gray, trace fine to medium sand and mica.	CL	36.0			5+3+5 N =8 REC =14"		
_	with fine to medium sand.					3+3+2 N =5 REC =18"		
	continued on next page				-			

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- \* = See Appendix I for additional lab testing data.
   Ground water observation well OW-711 installed at nearby location.

**TEST B-711** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering Sheet: 2 of 2 LOG ELEV. **SAMPLING DEPTH** STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA CL \*Slight to moderate rig chatter as 27.0 26.0 SILTY SAND, fine to medium grained, SM rotary advanced wet, gray, few fine to coarse shell fragments (±10%), strong HCl reaction.  $\overline{\triangle}$ below 27 ft. 5+8+9 N =17 **REC =18"** -30 \*Moderate difficultly in rotary advancement 9+4+6 below 33 ft. N = 10REC =16" -35 7+8+10 N =18 REC =17" trace fine to medium shell fragments 4+4+7 (±5%), weak HCI reaction. N =11 REC =18" 47.0 6.0 CLAYEY SAND, fine to medium SC grained, wet, light greenish gray and gray, trace fine to medium shell fragments (±5%), weak HCl reaction. 1+3+4 N =7 REC =18" 50.0 3.0 -50 BOTTOM OF BORING @ 50.0 FT.

## Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-711 installed at nearby location.

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048

Schnabel Engineering LOG		Sheet: 1 of 2								
Boring Contractor: CONNELLY AND ASS	OCIATES INC	Groundwater Observations								
FREDERICK, MARYLA				Date	Time	Depth	Casing	Caved		
Boring Foreman: D. Reese		Enco	untered	5/22		19.0'	9.0'			
<b>Drilling Method:</b> 2-15/16" OD Tri-cone Rolle	r Bit (Mud Rotar	y)								
Drilling Equipment: CME-75 (Truck)										
Schnabel Representative: M. Arles										
Dates Started: 5/22/06 Finished: 5/22/	06									
Location: Northing: 216506.16 ft Easting: 961997.56 ft										
Ground Surface Elevation: 42.4 (feet)										

STRATA DESCRIPTION	CLASS.	ELEV.	WL	SAMPLING	TESTS	REMARKS
		(FT)		DEPTH DATA	120.0	
ROOTMAT AND TOPSOIL.	SM	42.2		1+3+2		0-9' hollow stem auger
SILTY SAND, fine to medium grained, noist, brown, contains root fragments.		40.4		N =5 REC =14"		sterri auger
SANDY SILT, fine to medium, moist, nottled orangeish brown, contains root ragments.	ML	40.4		2+3+3 N =6 REC =10"		
nottled brownish orange.				3+3+4 N =7 REC =18"		
orangeish gray.				2+3+4 N = 7 REC =18"		9-50' 2-15/1" mud rotary
nottled grayish orange. <sub>I</sub> ray.				10   3+3+4   N = 7   REC = 18"		
POORLY GRADED SAND WITH SILT, ine to medium grained, moist, grayish green, with fine to coarse shell ragments, strong HCl reaction, 10-15% shell frag.	SP-SM	29.4		2+3+5 N =8 REC =18"		
SILTY SAND, fine to medium grained, vet, green, with fine to coarse shell ragments, strong HCl reaction, 25-35% shell frag.	SM	24.9	Ā	4+5+50/5" N =55/11" REC =17"		
POORLY GRADED SAND WITH SILT, ine to medium grained, moist, green, with fine to coarse shell fragments, strong HCl reaction, 10-20% shell frag.	SP-SM	19.9		2+3+4 N =7 REC =18"		
ine to vith fi	medium grained, moist, green, ne to coarse shell fragments,	medium grained, moist, green, ne to coarse shell fragments, HCl reaction, 10-20% shell frag.	medium grained, moist, green, ne to coarse shell fragments, HCl reaction, 10-20% shell frag.	medium grained, moist, green, ne to coarse shell fragments, HCI reaction, 10-20% shell frag.	RLY GRADED SAND WITH SILT, medium grained, moist, green, ne to coarse shell fragments, HCI reaction, 10-20% shell frag.	RLY GRADED SAND WITH SILT, medium grained, moist, green, ne to coarse shell fragments, HCI reaction, 10-20% shell frag.

Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
 \* = See Appendix I for additional lab testing data.

**TEST B-712** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 2 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SP-SM 4+4+4 15-25% shell frag. N =8 REC =18" 2+2+3 N =5 REC =18" -35 2+3+4 N =7 REC =18" 43.0 -0.6 SILTY SAND, fine to medium grained, SM moist, green and white, with fine to 28+16+21 coarse shell fragments, strong HCl reaction, 60-70% shell frag. N =37 REC =18" 9+7+6 30-40% shell frag. N =13 REC =18" 50.0 -7.6 -50 BOTTOM OF BORING @ 50.0 FT.

## Comments:

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

<sup>2. \* =</sup> See Appendix I for additional lab testing data.



Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 2

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings

**Drilling Method:** 3-7/8" O.D. Drag Bit (Mud Rotary)

Drilling Equipment: CME-750 (ATV) Schnabel Representative: K. Megginson Dates Started: 5/11/06 Finished: 5/11/06

**Location:** Northing: 216117.68 ft Easting: 962283.16 ft

**Ground Surface Elevation:** 58.0 (feet)

	Ground	water Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	5/11		33.5'		
Start of day	5/12		17.0'		

DEPTH STRATA DESCRIPTION		STRATA DESCRIPTION CLASS. EL		WL	s	AMPLING	TESTS	REMARKS
(FT)	OTTATA DESCRIPTION	OLAGO.	(FT)	**	DEPTH	DATA	12313	KEWAKK
-	silty sand FILL, fine to coarse grained, moist, brown, contains crushed stone.	FILL				2+3+4 N =7 REC =7"		*NWJ rods used.
2.0	LEAN CLAY, moist, brown, with fine to medium sand, contains root fragments.	CL	56.0			2+3+4 N =7 REC =10"		
4.5	FAT CLAY, moist, orangeish brown and light gray, trace fine to medium sand, contains fine to coarse sandy fat clay layers.	СН	53.5		5 -	7+3+4 N =7 REC =11"		
-	yellowish brown and light grayish brown (dark orangeish brown soil appears to be weathered shell fragments). light grayish brown, light orangeish brown and gray below 8.5 ft.					3+3+4 N =7 REC =18"		
12.0	fine sandy, gray, trace mica.  ELASTIC SILT, moist, light blueish gray and dark gray, trace fine sand.	MH	46.0			4+5+7 N =12 REC =18"		
_	and dark gray, trace line sand.				15	5+5+8 N =13 REC =18"		
17.0	SANDY SILT, fine to medium, moist, gray, trace mica.	ML	41.0		 			
-						4+3+5 N =8 REC =18"		
22.0	LEAN CLAY, moist, gray, trace fine to medium sand and mica.	CL	36.0		 			
_	continued on next page					4+3+5 N =8 REC =18"		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-713 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 2 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA CL light greenish gray and gray, with fine to medium sand, weak HCl reaction. 5+4+5 N =9 **REC =18"**  $\nabla$ 50/2" wet, gray, trace fine to medium sand, N = 50/2"strong HCI reaction, contains fine to medium strongly cemented sand layer from 35.6 to 35.7 ft (strong HCL REC =2" -35 reaction on cemented sand only). 37.0 21.0 CLAYEY SAND, fine to medium SC grained, wet, light gray, some fine to coarse shell fragments (±30%), contains fine to medium strongly cemented sand 7+50/5" \*Moderate pockets, strong HCl reaction. N = 50/5" difficultly in REC =11" rotary advancement below 39 ft. dark gray, trace fine to coarse shell 3+5+7 fragments (±5%), contains black N =12 particles (1/16 inch), moderate HCl REC =18" reaction. 47.0 11.0 SILTY SAND, fine to medium grained, SM \*\*Resumed wet, dark gray, trace fine to coarse shell grouting at 7:00 fragments (±5%), weak HCl reaction. AM on 5/12/06. 4+5+8 N =13 REC =18" 50.0 8.0 -50 BOTTOM OF BORING @ 50.0 FT.

## Comments:

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

<sup>2. \* =</sup> See Appendix I for additional lab testing data.



**Project:** Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Boring Number: B-714

Contract Number: 06120048 Sheet: 1 of 2

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: T. Connelly

Drilling Method: 4-1/4" ID Hollow Stem Auger
 Drilling Equipment: Diedrich D-50 (ATC)
 Schnabel Representative: R. Vinzant
 Dates Started: 6/27/06 Finished: 6/27/06

**Location:** Northing: 215705.73 ft Easting: 962034.37 ft

Ground Surface Elevation: 116.0 (feet)

Groundwater Observations												
Date Time Depth Casing Caved												
Encountered	6/27		Dry									
Water Reading	7/25		44.0'									

(FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	DEPTH	DATA	TESTS	REMARKS
0.5	TOPSOIL.		115.5		DEFIN	DATA		
2.0 -	SILTY SAND, fine to medium grained, moist, yellowish brown, contains root fragments.	SM	114.0			2+2+4 N =6 REC =18"		
- -	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, orangeish brown.	SP-SM				2+3+2 N =5 REC =18"		
_	Light orangeish brown.				- 5 -	3+3+4 N =7 REC =18"		
-	Med coarse sand.					3+4+6 N =10 REC =18"		
- -	Contains root fragments.				10 	4+6+6 N =12 REC =18"		
-	No root fragments.					4+5+6 N =11 REC =18"		
- - - -	Light orangeish white.					3+4+6 N =10 REC =18"		
- -	Fine - med. sand.					4+5+7 N =12 REC =18"		

- 1. Ground water observation well OW-714 installed in boring upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST B-714** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 2 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SP-SM Light orangeish brown, Med. - coarse 6+7+10 N =17 REC =18" 7+7+9 Yellowish orange, Fine - med. sand. N =16 REC =18" -35 Orangeish brown. 12+13+16 N =29 REC =18" 42.0 74.0 CLAYEY SAND, fine to medium SC grained, moist, mottled grayish orange. 7+1+2 N = 3REC =18" TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08 PP=1.50 tsf REC =24" 50.0 66.0 -50 BOTTOM OF BORING @ 50.0 FT.

- 1. Ground water observation well OW-714 installed in boring upon completion.
- 2. \* = See Appendix I for additional lab testing data.

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Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 2

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: T. Connelly

Drilling Method: 3-7/8" OD Tri-cone Roller Bit Drilling Equipment: Diedrich D-50 (ATC) Schnabel Representative: R. Vinzant Dates Started: 6/1/06 Finished: 6/1/06

**Location:** Northing: 214951.76 ft Easting: 962639.59 ft

Ground Surface Elevation: 86.3 (feet)

Groundwater Observations  Date Time Depth Casing Caved										

DEDTU			EL EV			SAMPLING	,	
DEPTH (FT)	STRATA DESCRIPTION	CLASS	· ELEV.	WL	DEPTH		TESTS	REMARKS
0.5	TOPSOIL.		85.8					
0.0	SILTY SAND, fine to medium grained, moist, dark brown, with organic matter, and root fragments.	SM	00.0			1+1+2 N =3 REC =12"		
-	Dark orangeish brown, trace root fragments.					3+3+3 N =6 REC =17"		
6.0			80.3		5 -	3+3+2 N =5		
-	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, light orangeish brown.	SP-SM			  -  K	REC =18"		
-						N =6 REC =18"		
- - -	Wet, orangeish brown.			Ā		6+7+10 N =17 REC =11"		Change from hollow stem auger to mud rotary drilling
					  15-	9+10+13 N =23 REC =17"		
-								
-	Reddish brown.					N =25 REC =16"		
-								
-								
-	Dark reddish brown, contains organic matter.					9+6+5 N =11 REC =18"		Brown return water
	continued on next page				25 <sup>L</sup>			

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** B-715 Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 2 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SP-SM 26.0 60.3 LEAN CLAY, moist, mottled grayish CL orange, with sand. 4+3+4 N =7 REC =18" 2+3+4 Gray. N =7 REC =18" -35 2+4+5 N =9 REC =18" 4+5+6 N =11 REC =18" 5+7+9 N =16 REC =18" 50.0 36.3 -50 BOTTOM OF BORING @ 50.0 FT.

# Comments:

Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
 \* = See Appendix I for additional lab testing data.

chnabel Schnabel Engineering

Boring Foreman: T. Chew

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 2

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Drilling Method: 3-7/8" O.D. Tri-cone roller bit (Mud Rotary)

Drilling Equipment: Diedrich D-50 Turbo (Track) Schnabel Representative: K. Megginson Dates Started: 7/20/06 Finished: 7/20/06

**Location:** Northing: 215003.21 ft Easting: 961364.57 ft

**Ground Surface Elevation:** 82.4 (feet)

`.		ervations				
		Date	Time	Depth	Casing	Caved
	Encountered	7/20		13.5'		
/)						

DEDTI			EL E\			AMPLING			•
DEPTH   (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL			TEST	s	REMARKS
0.3	Forest litter, rootmat and topsoil.		82.1		DEPTH	<b>DATA</b> 1+1+2		*/	WJ rods
0.3	SILT, moist, brown, trace fine to	ML	02.1			N =3			sed.
	medium sand, contains root fragments.					REC =18"			
1									
+	light brown and brown, trace organic matter (±1%).				M	2+5+6 N =11			
_					_	REC =18"			
					- 5 -				-1/4" I.D. ollow Stem
	brown and dark brown.				_	5+6+7 N =13		Aı	ugers used
-						REC =18"		*8	om 0 to 5 ft. Switched to
7.0	LEAN CLAY, moist, mottled orangeish	CL	75.4					3-   Tr	7/8" O.D. i-cone rolle
	brown and light gray, with fine to				_	8+10+11			t below 5 ft.
	medium sand.				M	N =21 REC =18"			
9.5	CILTY CAND fine to seems argined	CN4	72.9						
+	SILTY SAND, fine to coarse grained, moist, orangeish brown and grayish	SM			-10-				
4	brown, contains moderately cemented sand pockets, trace fine gravel, (coarse				M	8+11+12 N =23			
_	sand and fine gravel is subangular to subrounded; maximum dmension of fine				_	REC =14"			
	gravel is 1/4 inch).								
	wet derk vellewich brown light grov			$\bar{\Delta}$		2,1,2			
1	wet, dark yellowish brown, light gray, and light grayish brown.				-	2+1+2 N =3			
-					—15⊣ <sup>∐</sup>	REC =12"			
4					- 4				
17.0			65.4						
17.0	FAT CLAY, wet, gray, with fine to medium sand, trace mica.	СН	00.4						
1					_  _				
+						3+2+3 N =5			
_					_ <sub>20</sub> _	REC =18"			
					_				
1					- 1				
+									
4	moist, gray and dark gray, trace fine to medium sand, contains clayey sand and				M	3+3+3 N =6			
	sandy fat clay lenses.				_25_	REC =18"			
	continued on next page								

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

B-716 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 2 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** CH gray, trace organic matter (±1%), 4+4+5 contains light grayish sandy fat clay and N =9 clayey sand pockets. **REC =18"** 3+5+6 34.3 48.1 N = 11ELASTIC SILT, moist, gray, trace fine to МН REC =18" -35 medium sand and mica. 37.0 45.4 SANDY LEAN CLAY, moist, gray and CL light gray, contains light grayish clayey sand pockets. 5+7+10 N =17 REC =18" 40.4 42.0 SILTY SAND, fine to medium grained, SM moist, dark gray, trace fine to medium shell fragments (±5%), mostly cemented sand layers (±95%), (no observable HCl reaction with cemented sand layers). 38+50/3" \*Moderate to N = 50/3" difficult rotary REC =10" advancement from 44 to 48.5 ft (slow advancement). wet, gray, mostly fine to medium shell 12+50 49.0 33.4 fragments (±80%), strong HCl reaction. N =50 SP-SM 49.5 32.9 REC =12" POORLY GRADED SAND WITH SILT, fine to medium grained, wet, gray, few fine to medium shell fragments (±10%), moderate HCl reaction. BOTTOM OF BORING @ 49.5 FT.

Calvert Cliffs Nuclear Power Plant

## Comments:

FEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

TEST

Project:

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

<sup>2. \* =</sup> See Appendix I for additional lab testing data.

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Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 2

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings

**Drilling Method:** 4-1/4" O.D. Drag Bit (Mud Rotary)

Drilling Equipment: CME-750 (ATV) Schnabel Representative: M. Arles

Dates Started: 7/14/06 Finished: 7/14/06

**Location:** Northing: 214302.45 ft Easting: 962349.27 ft

Ground Surface Elevation: 90.7 (feet)

Groundwater Observations												
	Date	Time	Depth	Casing	Caved							
Encountered	7/14		13.5'	0.0'								

DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	SAMPLING	TESTS	REMARKS
(, ,,	TOROGU		( ,		DEPTH DATA		
0.5	TOPSOIL  SILTY SAND, fine to coarse grained, moist, brown, contains root fragments.	SM	90.2		WOH+WOH +1 N =1		
2.0	SANDY LEAN CLAY, fine to medium, moist, brown, contains root fragments.	CL	88.7		REC =18"  WOH+2+4 N =6 REC =14"		
4.5	POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, orangeish brown.	SP-SM	86.2		9+10+9 N =19 REC =17"		
7.0 +	POORLY GRADED SAND, with gravel, fine to coarse grained, moist, orange.	SP	83.7		8+13+13 N =26 REC =18"		
10.0	POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, reddish orange.	SP-SM	80.7		10 - 4+7+7 N =14 REC =16"		
12.0	SILTY SAND, fine to coarse grained, wet, orange.	SM	- 78.7	⊻	6+5+6 N =11 REC =16"		
- - - - -	fine to medium grained, wet, mottled grayish orange.				WOH+WOH +1 N =1 REC =18"		
_					WOH+WOH +4 N =4		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST B-717** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 2 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SM REC =18" 27.0 63.7 SANDY SILT, fine to medium, moist, ML 1+2+2 N =4 **REC =18"** 32.0 58.7 SILTY SAND, fine to medium grained, SM moist, gray. 1+2+3 N =5 REC =18" -35 3+3+7 N =10 REC =18" 42.0 48.7 FAT CLAY, moist, gray, with silt. СН 2+4+5 N =9 REC =18" 4+5+6 N =11 REC =18" 50.0 40.7 -50 BOTTOM OF BORING @ 50.0 FT.

## Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

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Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 2

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: T. Connelly

Drilling Method: 3-7/8" OD Tri-cone Roller Bit

Drilling Equipment: CME-750 (ATV) Schnabel Representative: R. Vinzant

Dates Started: 6/19/06 Finished: 6/19/06

**Location:** Northing: 214130.52 ft Easting: 961929.05 ft

Ground Surface Elevation: 117.5 (feet)

Groundwater Observations											
	Date	Time	Depth	Casing	Caved						
Encountered	6/19		8.0'								

			1				
DEPTH   (FT)	STRATA DESCRIPTION	CLASS	ELEV.	WL	SAMPLING	IESIS	REMARKS
(' ')			(1 1)		DEPTH DAT	Ά	
0.5	FL, R AND TOPSOIL.	SM	117.0		2+3+5 N =8		
1	SILTY SAND, fine to medium grained, moist, reddish brown, contains mica.	Sivi			REC =18	3"	
4	moist, reddish brown, contains mica.				1		
					6+13+17		
7					│		
4.5			440.0		REC =18	5"	Change to mu
4.5	POORLY GRADED SAND, fine to	SP-SC	113.0		5 - 5		rotary drilling
	medium grained, moist, light orange, with clay.				6+6+8 N =14		from hollow stem auger
1	3.2).				REC =18	3"	otom aagor
-							
	Wet, Med coarse sand.			$\nabla$	_		
				_	N =17 REC =18	2"	
1						,	
-					-10-		
					2+2+2		
					N =4 REC =10	\"	
10.5			105.0			'	
12.5	POORLY GRADED SAND WITH SILT,	SP-SM	105.0				
	fine to medium grained, moist, light orangeish brown.				8+9+9		
7	· ·				X    N = 18	N	
-						5"	
_					L		
1							
4					<u> </u>		
	Light brown.				9+12+16		
					N =28 REC =16	<b>\</b> "	
-					-20-KEC-16		
-							
-					t 1_l		
4	Med coarse sand.				8+12+15		
					N =27 REC =15	5"	
$\neg$	continued on next page				-25-      REC =15		

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.
   Ground water observation well OW-718 installed at nearby location.

**TEST B-718** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** hnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 2 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SP-SM Wet. 11+15+17 N = 32REC =16" 11+13+13 Moist, light orangeish brown. N =26 REC =17" -35 Dark reddish brown, Fine - med. sand. 7+10+12 N =22 REC =18" 42.0 75.5 CLAYEY SAND, fine to medium SC grained, moist, mottled grayish orange. 2+1+2 N = 3REC =18" 2+1+2 N =3 REC =18" 50.0 67.5 -50 BOTTOM OF BORING @ 50.0 FT.

## Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-718 installed at nearby location.



**Project:** Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Boring Number: B-719

Contract Number: 06120048 Sheet: 1 of 2

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Reese

Drilling Method: 3-7/8" OD Tri-cone Roller Bit
 Drilling Equipment: Diedrich D-50 (ATC)
 Schnabel Representative: B. Bradfield
 Dates Started: 6/15/06 Finished: 6/16/06

**Location:** Northing: 213978.69 ft Easting: 961500.2 ft

Ground Surface Elevation: 75.2 (feet)

<b>Groundwater Observations</b>											
Date Time Depth Casing Caved											
Encountered	6/15		10.5'								
Start of day	6/16		5.0'								

	Juliace Lievation: 75.2 (leet)								L .	
DEPTH (FT)	STRATA DESCRIPTION	CLASS	ELEV. (FT)	WL	DEPT		MPLING DATA	TEST	s	REMARKS
0.2	FL, R AND TOPSOIL.	ML	75.0			$\overline{}$	2+2+2			0-9'- Advanced
2.0 -	SANDY SILT, fine to medium, moist, brown and light brown, comtains wood fragments, contains root fragments.	SM	73.2		 	X    1	N =4 REC =7"			4-1/4" HSA
- 4.5	SILTY SAND, fine to medium grained, moist, light orangeish brown and yellowish brown, trace root fragments, slightly mottled.	Civi	70.7		 	X   i	3+5+6 N =11 REC =18"			
4.5  -	SANDY SILT, fine to medium, moist, light orangeish brown and yellowish brown, slight layering <1/2" thick.	ML	70.7		5 	X   I	4+7+9 N =16 REC =13"			
7.0 - - -	CLAYEY SAND, fine to medium grained, moist, grayish white and light yellowish brown.	SC	68.2		 	X    1	4+5+5 N =10 REC =12"		1	9'- Changed to mud rotary with 3-7/8" tri-cone
10.0 —	SILTY SAND, fine to medium grained, wet, light orangeish brown and light gray.  1" layer of moderately cemented sand, dark orangeish brown .	SM	65.2	ĪΨ	10 	X    1	3+6+5 N =11 REC =13"			roller bit
-	mottled orangeish brown and light gray.				  15	X    1	1+2+1 N =3 REC =14"			
- - - -						X   i	2+1+2 N =3 REC =16"		1	17'- Color change in mud return from ligh prown to prangeish prown
22.0 -	LEAN CLAY with sand, moist, gray, contains mica.	CL	53.2						f	22'- mud return from orangeish orown to gray
_	continued on next page				 25	X   i	2+3+4 N =7 REC =18"			

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-719 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 2 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA CL 27.0 48.2 FAT CLAY with sand, moist, gray, CH contains mica. 2+4+5 N =9 **REC =18"** 32.0 43.2 SANDY ELASTIC SILT, fine to medium, МН moist, dark gray, contains mica. 3+4+6 N = 10REC =18" 35'- Start of day -35 on 6/16/06 37.0 38.2 SANDY LEAN CLAY, fine to medium, CL with sand, moist, gray and dark gray, contains mica. 5+7+8 N =15 REC =18" 33.2 42.0 CLAYEY SAND, fine to coarse grained, SC moist, dark gray, contains mica, moderate cementation. 7+11+21 N =32 REC =18" 45-48.5'-Harder drilling 47.0 28.2 POORLY GRADED SAND WITH CLAY, SP-SC 47.5'- Rig wet, dark gray and brownish white, chatter 50-60% fine to medium shell fragments, 37+50/5" N =50/5" contains mica, strong HCI reaction. 49.4 25.8 BOTTOM OF BORING @ 49.4 FT.

## Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

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Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 3

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings

**Drilling Method:** 4-1/4" O.D. Drag Bit (Mud Rotary)

Drilling Equipment: CME-750 (ATV) Schnabel Representative: M. Arles

Dates Started: 7/17/06 Finished: 7/18/06

**Location:** Northing: 215674.48 ft Easting: 962378.47 ft

Ground Surface Elevation: 73.5 (feet)

<b>Groundwater Observations</b>											
Date Time Depth Casing Caved											
Encountered	7/17		11.0'	0.0'							

	Guirace Lievation. 75.5 (leet)		1				
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	SAMPLING DEPTH DATA	TESTS	REMARKS
0.3	FL, R AND TOPSOIL.		73.2		1+2+1		
2.0 -	POORLY GRADED SAND, fine to coarse grained, moist, brown, contains root fragments.	SP	71.5		N =3 REC =18"		
-	POORLY GRADED SAND WITH CLAY, fine to coarse grained, moist, yellowish white.	SP-SC			3+3+5 N =8 REC =18"		
4.5 	CLAYEY SAND, fine to coarse grained, moist, yellowish orange.	SC	69.0		2+2+4 N =6 REC =16"		
7.0 - - -	SANDY LEAN CLAY, fine to coarse, moist, yellowish gray.	CL	66.5		2+2+3 N =5 REC =17"		
10.0 —	FAT CLAY, wet, brownish gray, with sand.	СН	63.5	Ā	1+1+1 N = 2 REC =18"		
13.0 -	POORLY GRADED SAND, fine to coarse grained, wet, orangeish white.	SP	60.5		4+3+2 N =5 REC =10"		
17.0 - - - -	FAT CLAY, moist, gray, with sand.	СН	56.5		WOH+2+3 N =5 REC =18"		
- - -	continued on next page				2+2+3 N =5 REC =18"		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-720 **Boring Number:** hnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 3 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA CH 3+4+7 N =11 REC =18" fine to medium sandy 4+7+8 N =15 REC =18" -35 37.0 36.5 ELASTIC SILT, moist, gray, with sand. МН 4+4+6 N =10 REC =18" fine to medium sandy, greenish gray. 4+4+8 N =12 REC =18" with sand. 5+6+10 N =16 REC =18" 52.0 21.5 SILTY SAND, fine to medium grained, SM moist, green, with fine to coarse shell fragments, strong HCI reaction, 10-20% shell frag. 4+7+12 N =19 REC =18" 57.0 16.5 POORLY GRADED SAND WITH SILT, SP-SM

## Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

fine to medium grained, wet, green, with continued on next page

**TEST B-720** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 3 of 3 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SP-SM fine to coarse shell fragments, strong HCl reaction, 20-40% shell frag. 8+9+11 N =20 REC =18" 63-75' grinding 10-30% shell frag. -65 67.0 6.5 SILTY SAND, fine to medium grained, wet, green, with fine to coarse shell fragments, strong HCl reaction, 5-15% SM shell frag. 5+8+11 N =19 REC =18" 0-5% shell frag. 3+6+8 N =14 REC =18" 75.0 -1.5 BOTTOM OF BORING @ 75.0 FT.

## Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.



Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings

**Drilling Method:** 4-1/4" O.D. Drag Bit (Mud Rotary)

Drilling Equipment: CME-750 (ATV) Schnabel Representative: M. Arles

Dates Started: 7/18/06 Finished: 7/19/06

**Location:** Northing: 215545.8 ft Easting: 962462.1 ft

**Ground Surface Elevation:** 101.3 (feet)

1 2112 211 1 21 1											
<b>Groundwater Observations</b>											
Date Time Depth Casing Caved											
Encountered	7/18		33.5'	0.0'							
Start of day	7/19		8.0'	0.0'							

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	SAMPLING		TESTS	REMARKS
(FT)			(FT)		DEPTH	DATA		
_	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, brown.	SP-SM			<del> </del>	1+1+1 N =2 REC =6"		
- -	orangeish brown.					4+4+5 N =9 REC =14"		
4.5	POORLY GRADED SAND, with gravel, fine to coarse grained, moist, orange.	SP	96.8		5 -	3+3+4 N =7 REC =14"		
7.0 -	POORLY GRADED SAND WITH CLAY, fine to coarse grained, moist, orange, trace gravel.	SP-SC	94.3			7+12+15 N =27 REC =16"		
-					-10-	4+5+8 N =13 REC =14"		
13.0 -	POORLY GRADED SAND, fine to coarse grained, moist, yellowish white, trace gravel.	SP	88.3		  15-	5+8+12 N =20 REC =12"		
- - -	no gravel.					5+8+12 N =20 REC =10"		
- - -	continued on next page					6+8+10 N =18 REC =9"		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-721 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SP 6+8+7 orange. N =15 REC =9" -30- $\overline{\nabla}$ 4+6+6 wet. N =12 REC =14" -35 37.0 64.3 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, wet, orange. 2+9+9 N =18 REC =16" 59.3 42.0 SILT, wet, reddish orange, with sand, ML with clay. 5+3+4 N =7 REC =12" 45.0 56.3 SANDY FAT CLAY, fine to medium, CH moist, gray. 2+4+4 N =8 REC =18" trace sand, with silt. 4+5+5 N =10 REC =18" continued on next page

## Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

B-721 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering Sheet: 3 of 4 LOG ELEV. **SAMPLING DEPTH** STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA CH 3+6+7 N = 13REC =18" 39.3 62.0 SILTY SAND, fine to medium grained, SM moist, dark grayish green. 2+4+5 N =9 REC =18" 67.0 34.3 ELASTIC SILT, moist, gray, with sand. MH 2+4+5 N =9 REC =18" fine sandy, greenish gray. 3+4+6 N = 10REC =18" 77.0 24.3 SILTY SAND, fine to medium grained, moist, greenish gray, contains SM cemented sand, with fine to coarse shell fragments, strong HCI reaction, 50/1" 80-100% shell frag. N =50/1" REC =1" -80 wet, green, 40-60% shell frag. 20+11+9 N =20 REC =18" -85 5+10+14 20-40% shell frag. N =24 ||\_\_|| REC =18" -90 continued on next page

Calvert Cliffs Nuclear Power Plant

## Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

**TEST** 

Project:

2. \* = See Appendix I for additional lab testing data.

**TEST B-721** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SM 9.3 92.0 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, moist, green, with fine to coarse shell fragments, strong HCI reaction, 20-30% shell frag. 6+9+15 N =24 REC =16" 6+12+19 N =31 REC =12" -100-100.0 1.3 BOTTOM OF BORING @ 100.0 FT.

## Comments:

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

<sup>2. \* =</sup> See Appendix I for additional lab testing data.

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**Project:** Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Boring Number: 06120048

Contract Number: 06120048 Sheet: 1 of 3

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings

**Drilling Method:** 4-1/4" O.D. Drag Bit (Mud Rotary)

**Drilling Equipment:** CME-750 (ATV) **Schnabel Representative:** M. Arles

Dates Started: 7/18/06 Finished: 7/18/06

**Location:** Northing: 215386.1 ft Easting: 962467 ft

Ground Surface Elevation: 99.8 (feet)

Groundwater Observations										
Date Time Depth Casing Caved										
Encountered	7/18		28.5'	0.0'						

TESTS REMARKS	TESTS	AMPLING	S	WL	ELEV.	CLASS.	STRATA DESCRIPTION	DEPTH
. LO. O		DATA	DEPTH		(FT)	32,400.	ondan people non	(FT)
		WOH+1+2	$\square$			SP-SM	POORLY GRADED SAND WITH SILT,	
		N =3	L ⊣IXI				fine to medium grained, moist, brownish	4
		REC =18"					gray, contains root fragments.	
								+
		3+3+2	$  \square  $				fine to coarse grained, orangeish brown,	
		N =5					trace gravel.	7
		REC =16"	L JU				-	4
					95.3	0.0	DOODLY ODADED CAMP (	4.5
w=3.5%	w=3.5%	5+6+10	<u> </u>			SP	POORLY GRADED SAND, fine to coarse grained, moist, orange, with	$\dashv$
*	*	N =16	l IIXI				gravel.	
		REC =15"					9.2	1
			L		92.8			7.0
					02.0	SP-SM	POORLY GRADED SAND WITH SILT,	7.0
		5+8+12 N =20	⊢ - M				fine to coarse grained, moist, orange, trace gravel, with silt.	4
		REC =12"	<u> </u>				trace graver, with sit.	
								1
			-10-		89.8			10.0
			.		00.0	SP	POORLY GRADED SAND, fine to	10.0
		6+8+11 N =19	⊦ - M				coarse grained, moist, yellowish orange, with gravel.	4
		REC =12"	\ <u> </u>				with graver.	
		INCO 12	├ <i>┤</i> └					1
···=12.49/	w=12 40/							
w=12.4%	W=12.4%	4+9+9 N = 40	⊦ - M					4
		N =18 REC =10"	\ <u> </u>					
		TREO - 10	├─15 <i>─</i>  └┘					-
			<u> </u>					4
			<b>├</b>					+
		6+12+16	L JM					
		N =28						7
		REC =12"	<u> </u>					4
								+
			L J		77.8			22.0
					11.0	ML	SANDY SILT, fine to medium, moist,	22.0
			<u> </u>				reddish orange, with clay.	4
w=21.1%	w=21.1%	3+8+9						
*	*				75.0			٦, ٢
		REC =16"	L25_  \		/5.3	SP-SM	POORLY GRADED SAND WITH SILT,	24.5
			25				continued on next page	
*	*	N =17	25		75.3	SP-SM		24.5

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant **B-722 Boring Number:** hnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 3 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SP-SM fine to medium grained, moist, orange. 27.0 72.8 SILTY SAND, fine to medium grained, SM wet, orange.  $\overline{\triangle}$ 3+4+5 N =9 REC =18" -30 w=26.8% REC =24" PP=0.50 tsf -35 WOH+4+2 trace sand. N =6 REC =14" 57.8 42.0 FAT CLAY, moist, gray, with sand. СН w=37.1% 2+3+4 N =7 REC =18" 2+4+4 N =8 REC =18" w=41.9% moist, gray. 3+3+6 N =9 REC =18" continued on next page

## Comments:

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

<sup>2. \* =</sup> See Appendix I for additional lab testing data.

**TEST B-722** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 3 of 3 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA СН fine to medium sandy 3+5+5 N =10 REC =18" w=47.5% 3+3+4 N =7 REC =7" 3+4+6 N =10 REC =18" 72.0 27.8 SILTY SAND, fine to medium grained, wet, greenish gray, contains cemented SM sand, with fine to coarse shell w=18.8% fragments, moderate HCl reaction, 50/5" 73.9 25.9 70-90% shell frag/cemented sand. N =50/5" REC =5" -75 BOTTOM OF BORING @ 75.0 FT.

## Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

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Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 3

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: T. Connelly

Drilling Method: 3-7/8" OD Tri-cone Roller Bit Drilling Equipment: Diedrich D-50 (ATC) Schnabel Representative: R. Vinzant Dates Started: 6/1/06 Finished: 6/1/06

**Location:** Northing: 215108 ft Easting: 963000.8 ft

**Ground Surface Elevation:** 90.0 (feet)

	Groundwater Observations								
	Date	Time	Depth	Casing	Caved				
Encountered	6/1		6.0'						

Journal Surface Elevation: 90.0 (leet)			<u> </u>				
DEPTH (FT)	STRATA DESCRIPTION	CLASS	ELEV. (FT)	WL	SAMPLING DEPTH DATA	TESTS	REMARKS
0.5	FOREST LITTER, ROOTMAT AND TOPSOIL.  POORLY GRADED SAND WITH SILT, fine to medium grained, moist, dark brown.  Light brown, trace root fragments.	SP-SM	89.5		1+1+1 N = 2 REC = 16" 3+4+6 N = 10 REC = 18"		Change from
5.0 -	POORLY GRADED SAND, Wet, light brown.	SP	85.0	Ā	2+3+5 N =8 REC =12"		hollow stem auger to mud rotary drilling
7.5	POORLY GRADED SAND WITH SILT, Reddish brown.	SP-SM	82.5		10+14+20 N =34 REC =18"		
- - -	Light orange.				10   10+16+21 N = 37 REC = 18"		
- - -	Moist, orangeish brown, Mottles of gray clay.				9+8+7 N =15 REC =18"		
18.5	POORLY GRADED SAND WITH CLAY, fine to medium grained, moist, mottled grayish orange.	SP-SC	71.5		w.o.h.+1+2 N = 3 REC =18"		
- - -	Contains mica.				2+2+2 N =4 REC =18"		
7	continued on next page				-25-KI REC = 18		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST B-723** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 3 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SP-SC 27.0 63.0 FAT CLAY, moist, gray СН w=31.9% REC =20" LL=56 PL=15 -30 PP=1.50 tsf with sand, contains mica, Fine - med. w.o.h.+2+4 grained sand. N =6 REC =18" -35 w=33.9% REC =24" LL=64 PL=19 PP=3.00 tsf 3+5+6 N =11 REC =18" 4+5+7 N =12 REC =18" -50 53.5 36.5 SILTY SAND, fine to medium grained, SM 6+6+7 moist, gray, contains mica. N =13 REC =18" -55 continued on next page

### Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

Schnabel
Schnabel Engineering

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

Schnab	el Engineering LOG			,		Sheet	: 3 of 3	0120040
DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL		SAMPLING	TESTS	REMARKS
(FT)		SM	(F1)		DEPTH	DATA		
-		Sivi			L 4	3+3+6 N =9		
_					L_60-	REC =18"		
	With cemented sand, moderate HCl					50/3"		Drilling penetration ra
1	reaction.					N =50/3" REC =4"		penetration ra slower
					-65-			
1					† 1			
1					† †			
1						7		
+	Greenish gray, strong HCl reaction, 15% med coarse shell fragments.				$+ \parallel$	9+14+50/5" N =64/11"		
$\dashv$					-70-L	REC =17"		
+					+ +			
+					+ +			
+					+ +			
4	25% shell fragments.				F -	4+5+10 N =15		
75.0	BOTTOM OF BORING @ 75.0 FT.		15.0		-75-V	REC =18"		
	BOTTOM OF BORING @ 73.011.							

Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
 \* = See Appendix I for additional lab testing data.



Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: T. Connelly

Drilling Method: 3-7/8" OD Tri-cone Roller Bit **Drilling Equipment:** Diedrich D-50 (ATC) Schnabel Representative: R. Vinzant Dates Started: 6/2/06 Finished: 6/5/06

**Location:** Northing: 214780 ft Easting: 963106.2 ft

Ground Surface Elevation: 97.0 (feet)

Groundwater Observations												
	Date	Time	Depth	Casing	Caved							
Encountered	6/2		10.5'									
Start of day	t of day 6/5		23.5'									

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	S	AMPLING	TESTS	REMARKS
(FT)			(FT)		DEPTH	DATA		
0.5	FL, R AND TOPSOIL.  POORLY GRADED SAND WITH SILT, fine to medium grained, dry, orangeish brown, contains organic matter.	SP-SM	96.5			woh+2+1 N =3 REC =18"		
-	Moist.					3+4+4 N =8 REC =18"		
-	Med coarse sand.				5 -	3+6+7 N =13 REC =18"		
-	Light orangeish brown.					5+6+6 N =12 REC =18"		
- - -	Wet.			Ā		4+6+6 N =12 REC =16"		Change from hollow stem auger to mu rotary drilling
-	Moist, yellowish brown.					5+9+11 N =20 REC =16"		
- - - -	Wet, light orangeish brown, Fine - med. sand.					9+12+13 N =25 REC =14"		
22.0	POORLY GRADED SAND WITH CLAY, fine to medium grained, moist, mottled grayish orange.	SP-SC	75.0			7+5+4 N =9 REC =18"		
	continued on next page				-25-L	1		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-724 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SP-SC 26.0 71.0 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, moist, mottled orangeish gray. 2+6+6 N =12 REC =17" 2+2+2 N =4 REC =18" -35 36.0 61.0 SILTY SAND, fine to medium grained, SM moist, gray, contains mica. 3+4+4 N =8 REC =18" 3+6+6 N =12 REC =18" 46.0 51.0 LEAN CLAY, moist, gray, with sand, CL contains mica. woh+3+4 N =7 REC =18" 3+4+5 N =9 REC =18"

### Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

continued on next page

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-724 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA CL 3+5+5 N =10 REC =18" 4+6+8 N =14 REC =18" 66.0 31.0 SILTY SAND, fine to medium grained, SM moist, dark greenish gray, contains 4+5+5 N =10 REC =18" 23.5 73.5 w=31.9% SANDY ORGANIC CLAY, moist, OL REC =22" LL=45 geenish gray PL=24 -75 PP=4.00 tsf 78.5 18.5 LEAN CLAY with cemented sand, weak CL 15+45+39 HCl reaction, 3% med. coarse shell N =84 fragments. REC =18" Light greenish gray, strong HCI 18+50/5" N = 50/5" reaction, 40% med. - coarse fragmented shell. **REC =11"** -85 Greenish gray. 5+5+12 N =17 ∐ REC =18" -90 continued on next page

### Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST B-724** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG DEPTH **SAMPLING** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA CL Weak HCl reaction, 5% med. - coarse 11+8+9 shell. N =17 REC =18" 6+9+12 N =21 REC =18" 100.0 -100--3.0 BOTTOM OF BORING @ 100.0 FT.

# Comments:

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.



**Project:** Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Boring Number: B-7

Contract Number: 06120048 Sheet: 1 of 3

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: T. Connelly

Drilling Method: 3-7/8" OD Tri-cone Roller Bit
Drilling Equipment: Diedrich D-50 (ATC)
Schnabel Representative: R. Vinzant
Dates Started: 6/5/06 Finished: 6/6/06

**Location:** Northing: 214664.3 ft Easting: 963219.4 ft

-

<b>Groundwater Observations</b>														
	Date Time Depth Casing Caved													
Encountered	6/5		8.0'											
Start of day	6/6		9.0'											

(FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	DEPTH	AMPL	ING DATA	TEST	s	REMARKS
0.5	FL, R AND TOPSOIL.	ML	58.5			1+2+	2			
2.0	SILT, moist, light brown, with sand, and organic matter.		57.0			N =4 REC				
-	POORLY GRADED SAND WITH SILT, medium to coarse grained, moist, yellowish brown.	SP-SM	07.0			2+3+; N =5 REC				
7.0			50.0		5 -	3+3+3 N =6 REC				
7.0	CLAYEY SAND, medium to coarse grained, wet, mottled grayish brown, contains gravel.	SC	52.0	Ā		1+2+ N =6 REC			h	hange from ollow stem uger to mud
10.0	SILTY SAND, fine to medium grained, wet, reddish brown.	SM	49.0			3+6+: N =11 REC	1		S	stary drilling tart of drillin r the day
13.0	LEAN CLAY, moist, gray, with sand, Fine - med. sand.	CL	46.0		- - -15-	2+4+ N =8 REC				
- - - -						3+4+ N =10 REC	)			
	continued on next page					3+4+ N =10 REC	)			

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-725 installed in nearby location.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-725 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 3 ELEV. **SAMPLING DEPTH** STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA CL Greenish gray. 4+7+8 N =15 **REC =18"** 3+4+6 N = 10REC =18" -35 38.0 21.0 SANDY SILT, fine to medium, moist, ML dark greenish gray. 3+6+50/3" N =56/9" REC =19" 17.0 42.0 SILTY SAND, fine to medium grained, SM moist, dark greenish gray, 25% med. coarse shell fragments. 5+9+14 N =23 REC =18" 48.0 11.0 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, moist, greenish 7+6+6 gray, 25% medium to coarse shell N =12 fragments. 7+8+13 N =21 REC =18" 57.0 2.0 SILTY SAND, fine to medium grained, SM moist, greenish gray, 5% medium to continued on next page

### Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-725 installed in nearby location.

**TEST** Project: **B-725** Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 3 of 3 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SM coarse shell fragments, weak HCl reaction. 5+5+7 N =12 REC =18" PP=2.50 tsf REC =18" -65 3+6+5 N =11 REC =18" strong HCI reaction. 8+14+11 N =25 REC =18" 75.0 --16.0 BOTTOM OF BORING @ 75.0 FT. TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- \* = See Appendix I for additional lab testing data.
   Ground water observation well OW-725 installed in nearby location.



**Project:** Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Boring Number: B-726
Contract Number: 06120048

Contract Number: 06120048 Sheet: 1 of 3

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: T. Chew

Drilling Method: 2-15/16" OD Tri-cone Roller Bit
Drilling Equipment: Diedrich D-50 (ATC)
Schnabel Representative: B. Bradfield
Dates Started: 8/1/06 Finished: 8/1/06

**Location:** Northing: 215564.67 ft Easting: 961709.57 ft

Ground Surface Elevation: 78.3 (feet)

<b>Groundwater Observations</b>												
Date Time Depth Casing Cave												
Encountered	8/1		4.0'									

DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	SAMPLING	TESTS	REMARKS
0.3	FL, R AND TOPSOIL.		78.0		DEPTH   DATA     1+2+2		0'- 4 1/4" HSA
-	SILTY SAND, fine to coarse grained, moist, light brown and orangeish brown, some iron staining.	SM			N =4 REC =15"		drilled to 4 fee
2.5	POORLY GRADED SAND WITH SILT, fine to coarse grained, wet, light brown and orangeish brown, trace gravel.	SP-SM	75.8	Ā	4+5+6 N =11 REC =18"		4'- Begin muc rotary with 3 7/8" tri-cone
4.5 	SILTY SAND, fine to coarse grained, wet, light brownish orange and brown.	SM	73.8		4+7+4 N =11 REC =18"		roller bit
7.0 - - -	SANDY SILT,fine to medium, wet, light orangeish brown and dark reddish brown, contains mica, gray lenses <1/16" throughout sample.	ML	71.3		1+2+1 N =3 REC =14"		
-					10 REC =0"		
13.0 -	SILTY SAND, fine to medium grained, wet, gray and light oliveish gray, contains mica.	SM	- 65.3		1+2+3 N =5 REC =15"		
17.0 - - -	SANDY ELASTIC SILT, moist, gray, contains mica.	МН	- 61.3		2+2+3 N =5 REC =15"		
22.0 -	FAT CLAY, moist, gray, trace sand, contains mica.	СН	- 56.3		  		
_	continued on next page				REC =19"	w=35.7% LL=69 PL=22	

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

<sup>2. \* =</sup> See Appendix I for additional lab testing data.

B-726 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering Sheet: 2 of 3 LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA CH 27.0 51.3 LEAN CLAY with sand, moist, gray, CL contains mica. 3+4+5. N =9 REC =18" 4+6+8 N =14 REC =18" -35 37.0 41.3 CLAYEY SAND, fine to medium SC grained, wet, dark gray, trace mica. 4+5+5 N =10 REC =18" 7+20+48 Weak cementation, some 1/4-1/2" pockets of lean clay. N =68 REC =18" 47.0 31.3 POORLY GRADED SAND, fine to SP medium grained, wet, dark gray, trace clay, contains mica. 8+10+12 N =22 REC =14" -50 Gray and brownish white, 30-40% fine 4+6+8 to medium shell fragments, strong HCI N =14 REC =14" reaction. continued on next page

Calvert Cliffs Nuclear Power Plant

### Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

**TEST** 

Project:

2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant Schnabel **Boring Number:** BORING LOG Calvert County, Maryland Contract Number: 06120048

Schnab	el Engineering LOG		_		Shee	t: 3 of 3	7120040
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	SAMPLING	TESTS	REMARKS
58.0	POORLY GRADED GRAVEL, fine to medium grained, wet, gray, trace sand, trace clay, strong HCl reaction, strong cementation, gravel is actually cemented sand fragments.	GP	20.3		DEPTH DATA  50/2" N =50/2" REC =2"		
62.0	SILTY SAND, fine to medium grained, wet, gray and brownish white, 20-30% fine to coarse shell fragments, strong HCl reaction.	SM	- 16.3		5+8+9 N =17 REC =16"		
67.0	CLAYEY SAND, fine to medium grained, wet, gray and brownish white, 20-30% fine to coarse shell fragments, strong HCI reaction.	SC	- 11.3		7+7+9 N =16 REC =18"		
72.0	POORLY GRADED SAND WITH CLAY, fine to medium grained, wet, gray and brownish white, 0-10% fine to coarse shell fragments, moderate HCI reaction, HCI reaction localized to shell fragments.		6.3		6+7+11 N =18 REC =18"		

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.

Schnabel Schnabel Engineering

TEST BORING LOG **Project:** Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Boring Number: 06120048

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Bender

**Drilling Method:** 3-7/8" OD Tri-cone Roller Bit (Mud Rotary)

**Drilling Equipment:** CME-550X (ATV) **Schnabel Representative:** K. Bell

Dates Started: 5/11/06 Finished: 5/11/06

**Location:** Northing: 215300.85 ft Easting: 961884.98 ft

Ground Surface Elevation: 104.9 (feet)

Groundwater Observations												
	Date Time Depth Casing											
Encountered	5/10		23.5'	-	-							
Start of Day	5/11		36.0'	-								

Ground 8	Surface Elevation: 104.9 (feet)									
DEPTH (FT)	STRATA DESCRIPTION	CLAS	s. ELEV.	WL	DEP.		AMPLING DATA	TEST	s	REMARKS
0.0	ROOTMAT AND TOPSOIL.		104.2			Ϊ	2,11,1			
2.0	CLAYEY SAND, fine to medium grained, moist, orangeish brown and brown, trace wood and root fragments.	SC	104.3				1+2+5 N =7 REC =18"			
	LEAN CLAY with sand, moist, orangeish brown and gray, trace root fragments.	CL	102.0		- ·		4+2+3 N =5 REC =18"			
4.5	SILTY SAND, fine to coarse grained, moist, orangeish brown and yellowish brown.	SM	100.4		- 5 -		1+5+6 N =11 REC =14"			
7.0	POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, yellowish brown and orange.	SP-S	97.9		- ·		5+7+7 N =14 REC =15"			
9.5	SILTY SAND, fine to medium grained, moist, orangeish brown and reddish brown.	SM	95.4		10- -		5+6+6 N =12 REC =11"			
-	fine to coarse grained, orangeish brown and yellowish brown.				- · - · ·		3+6+9 N =15 REC =15"			
17.0	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, orangeish brown and yellowish brown.	SP-S	M 87.9		- · · · · · · · · · · · · · · · · · · ·		6+9+12 N =21 REC =10"			
- - -	wet.  continued on next page			⊻	_ _ 25_		6+8+12 N =20 REC =9"			

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-727 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 4 Schnabel Engineering LOG ELEV. **SAMPLING DEPTH** STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SP-SM 77.9 27.0 SANDY ELASTIC SILT, wet, orangeish MH brown and gray. 2+2+2 N =4 REC =15" 2+2+5 reddish brown. N =7 gray. REC =18" -35 37.0 67.9 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, wet, yellowish brown. 4+5+8 N =13 REC =12" 62.9 42.0 СН FAT CLAY with sand, wet, gray. 3+3+4 N =7 REC =20" PP=2.50 tsf REC =22" -50 Resumed drilling on moist. 3+5+7 5/11/06 at 7:30 N =12 am REC =18" 50.0 54.9 SILTY SAND, fine to medium grained, SM wet, gray. 57.0 47.9 FAT CLAY with sand, moist, gray. CH

### Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

continued on next page

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

<sup>2. \* =</sup> See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-727 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** CH 2+3+5 N =8 REC =19" PP=>4.5 tsf REC =20" -65 67.0 37.9 SILTY SAND, fine to medium grained, SM moist, light gray and oliveish gray. 28+27+50/5" N =77/11" REC =20" 72.0 32.9 CLAYEY SAND, fine to medium SC grained, moist, light gray and white.  $\boxtimes$ 50/5" N =50/5" REC =5" -75 77.0 27.9 SILTY SAND, fine to medium grained, SM wet, gray and white, with fine to coarse shell fragments, HCl reaction strong. 4+9+11 N = 20REC =14" 82.0 22.9 CLAYEY SAND, fine to medium SC grained, wet, greenish gray and white, with fine to coarse shell fragments, HCI reaction strong. 9+8+6 N =14 **REC =16"** -85 87.0 17.9 SILTY SAND, fine to medium grained, SM wet, greenish gray and white, trace fine to coarse shell fragments, HCl reaction moderate. 6+6+7 N = 13REC =20" -90 continued on next page

### Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST B-727** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SM contains fine to coarse shell fragments. 6+8+9 N =17 ∐ REC =18" light gray and greenish gray, trace fine to medium shell fragments, HCl reaction 6+8+12 N =20 weak. REC =20" 100.0 -100-4.9 BOTTOM OF BORING @ 100.0 FT.

# Comments:

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.

Schnabel Engineering

Boring Foreman: D. Bender

TEST BORING LOG

**Project:** Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Encountered** 

Boring Number: B-72

Casing

Caved

Contract Number: 06120048 Sheet: 1 of 3

Depth

13.5'

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

**Drilling Method:** 3-7/8" OD Tri-cone Roller Bit (Mud Rotary)

**Drilling Equipment:** CME-550X (ATV) **Schnabel Representative:** K. Bell

Dates Started: 5/11/06 Finished: 5/12/06

**Location:** Northing: 215163.63 ft Easting: 961910.05 ft

**Groundwater Observations** 

Time

5/11

OEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	DEPTH	SAMP 	LING DATA	TEST	s	REMARKS
0.4	ROOTMAT AND TOPSOIL.	21	111.9							
2.0 -	SANDY LEAN CLAY, moist, brown and orangeish brown, trace root and wood fragments.	CL SC	110.3			3+3 N =6 REC				
_	CLAYEY SAND, fine to medium grained, moist, reddish brown and orangeish brown, trace root fragments.	30				3+6- N = 1 REC	+5 11 C =18"			
4.5 	SILTY SAND, fine to medium grained, moist, orangeish brown and reddish brown.	SM	107.8		- 5 - 	4+3 N =7 REC				
_						3+3 N = 1 REC				
	fine to coarse grained, orangeish brown and white.				10  	3+4 N =9 REC	+5 ) C =11"			
- -	fine to medium grained, wet, orangeish brown and yellowish brown.			⊻	- 15	5+5 N = 1 REC				
17.0 -	POORLY GRADED SAND WITH SILT, fine to coarse grained, wet, orangeish brown and yellowish brown.	SP-SM	95.3			5+6 N = REC	+10 16 C =12"			
-	fine to medium grained.					N =2	0+12 22 ) =9"			

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**B-728 Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 3 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SP-SM 5+7+9 orangeish brown and reddish brown. N =16 REC =9" 80.3 32.0 SILTY SAND, fine to medium grained, SM wet, orangeish brown and reddish gray, (color change at 39.9 feet). 5+3+4 N =7 REC =14" -35 37.0 75.3 SANDY LEAN CLAY, wet, gray and CL greenish gray. 3+2+3 N =5 REC =18" 70.3 42.0 SILTY SAND, fine to medium grained, SM wet, orangeish brown and gray. 2+2+10 N =12 REC =16" 65.3 47.0 FAT CLAY with sand, wet, orangeish СН brown and gray. 2+3+2 N =5 REC =19" gray, trace sand. PP=2.50 tsf REC =23" -55 57.0 55.3 ELASTIC SILT, moist, greenish gray, МН trace sand. continued on next page

Calvert Cliffs Nuclear Power Plant

### Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

**TEST** 

Project:

2. \* = See Appendix I for additional lab testing data.

**TEST B-728** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 3 of 3 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA МН 2+4+4 N =8 REC =18" PP=>4.5 tsf REC =23" -65 67.0 45.3 FAT CLAY with sand, moist, light gray CH and greenish gray. 5+7+5 N =12 REC =18" gray and greenish gray, cemented 2/16ths inch silt lense. 8+10+16 Harder drilling N =26 REC =18" 37.3 75.0 BOTTOM OF BORING @ 75.0 FT.

# Comments:

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

<sup>2. \* =</sup> See Appendix I for additional lab testing data.



**Project:** Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Boring Number: B=7

Contract Number: 06120048 Sheet: 1 of 3

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Reese

**Drilling Method:** 3-7/8" OD Tri-cone Roller Bit (Mud Rotary)

**Drilling Equipment:** CME-75 (Truck) **Schnabel Representative:** M. Arles

Dates Started: 5/18/06 Finished: 5/19/06

**Location:** Northing: 214861.87 ft Easting: 962454.6 ft

Groundwater Observations											
	Date	Time	Depth	Casing	Caved						
Encountered	5/18		Dry								
Start of day	5/19		15.0'	-							

OEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	DEPTI		MPLING DATA	TEST	s	RI	EMARKS
0.5	Forest litter, rootmat and topsoil.		116.8			M	1+1+2				in. hollow auger
	CLAYEY SAND, fine to medium grained, moist, brown, contains root fragments.	SC			 		N =3 REC =16"				nced to 4
_	mottled brownish red.				 	XII	4+7+7 N =14 REC =18"	w=169	%		switched t " tri-cone bit
					- 5 - 	XII	2+5+5 N =10 REC =14"				
7.0 +	POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, reddish orange.	SP-SM	110.3			XII	5+8+8 N =16 REC =13"	w=13.5	5%		
9.5	POORLY GRADED SAND, fine to coarse grained, moist, yellowish orange, trace silt, with fine gravel.	SP	107.8		—10— 	XII	8+14+16 N =30 REC =13"				
12.0	SILTY SAND, fine to coarse grained, wet, orange, trace gravel.	SM	105.3								
14.7	SANDY FAT CLAY, fine to medium,	CH	102.6		 15	XII	7+5+4 N =9 REC =16"				
-	moist, orange.	Cit									
17.0	POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, yellowish orange.	SP-SM	100.3		 						
-					 20-	XII	5+7+8 N =15 REC =12"	w=14.2	2%		
-											
-					-	XII	11+14+20 N =34				
_	continued on next page				-25-		REC =12"				

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-729 installed at nearby location.

TEST Project: Calvert Cliffs Nuclear Power Plant B-729 **Boring Number:** hnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 3 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SP-SM w=12.5% 12+17+17 with gravel. N =34 REC =14" 32.0 85.3 POORLY GRADED SAND, fine to SP coarse grained, moist, yellowish orange, trace silt and gravel. 4+14+15 N =29 REC =18" -35 37.0 80.3 SILTY SAND, fine to coarse grained, SM moist, orange. w=18.4% 2+2+6 N =8 REC =12" 75.3 42.0 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, moist, reddish orange, with silt. 16+21+24 N =45 REC =14" 70.3 47.0 SANDY SILT, fine to medium, moist, ML grayish orange. w=28.2% WOH+1+1 N =2 REC =18" 65.3 52.0 SILTY SAND, fine to medium grained, SM wet, orangeish brown and gray, slight layering, almost mottled. 3+1+1 N =2 REC =14" continued on next page

### Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-729 installed at nearby location.

**TEST B-729** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 3 of 3 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SM w=28.8% 6+5+6 N =11 REC =6" 55.3 62.0 ORGANIC CLAY, fine to medium, moist,  $\mathsf{OH}$ gray, contains mica. 1+3+4 N =7 REC =18" w=32.8% REC =24" with sand. LL=56 PL=18 72.0 45.3 LEAN CLAY with sand, moist, gray, CL contains mica. 2+4+4 N =8 REC =18" 42.3 75.0 BOTTOM OF BORING @ 75.0 FT.

### Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-729 installed at nearby location.

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Boring Foreman: D. Reese

TEST **BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

B-730

Sheet: 1 of 3

CONNELLY AND ASSOCIATES, INC. **Boring Contractor:** 

FREDERICK, MARYLAND

**Drilling Method:** 3-7/8" OD Tri-cone Roller Bit (Mud Rotary)

Drilling Equipment: CME-75 (Truck) Schnabel Representative: M. Arles

Dates Started: 5/17/06 Finished: 5/18/06

Location: Northing: 214728.5 ft

**DEPTH** 

(FT)

0.5

2.5

5.0

9.5

13.0

FEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

Easting: 962523.84 ft

**Ground Surface Elevation:** 115.4 (feet)

	Date	Time	Depth	Casing	Caved
Encountered	5/22	1:32	Dry		

**Groundwater Observations** 

ELEV. SAMPLING STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) DEPTH **DATA** 0-4' hollow ROOTMAT AND TOPSOIL. 1+2+3 114.9 stem auger SM N = 5SILTY SAND, fine to coarse grained, REC =18" moist, brown, contains root fragments. 112.9 POORLY GRADED SAND WITH SILT SP-SM 5+7+5 N =12 and gravel, fine to coarse grained, 4-75' 3 7/8" moist, brown and red. REC =18" roller bit, mud rotary drilling 110.4 5 Start of day POORLY GRADED SAND, fine to SP 3+5+6 5/18/06 coarse grained, moist, reddish brown, N = 11trace silt and gravel. REC =15" yellowish orange, with gravel. 6+11+13 N = 24REC =12" 105.9 SILTY SAND, fine to medium grained, SM -10 moist, orange, trace gravel. 4+5+6 N =11 REC =15" 102.4 POORLY GRADED SAND WITH SILT, SP-SM fine to coarse grained, moist, orange 6+7+7 N = 14and red. REC =14" orange, with gravel. 10+13+13 N =26 REC =14" trace gravel. 9+15+17 N = 32REC =15" -25 continued on next page

### Comments:

2. \* = See Appendix I for additional lab testing data.

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-730 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering Sheet: 2 of 3 LOG ELEV. **SAMPLING DEPTH** STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SP-SM 27.0 88.4 POORLY GRADED SAND, fine to SP coarse grained, moist, yellow, trace silt, with gravel. 8+11+13 N =24 REC =14" -30 9+7+10 N =17 REC =13" -35 37.0 78.4 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, moist, reddish orange. 9+13+9 N =22 REC =14" fine to coarse grained (small 1/16" 5+11+18 lenses of clay). N =29 44.8 70.6 REC =14" SILTY SAND, fine to medium grained, SM moist, reddish orange. 46.5 68.9 SANDY SILT, fine to medium, moist, ML orange. 1+2+2 N =4 -50 53.0 62.4 SILTY SAND, fine to medium grained, SM moist, orange. REC =0" -55

### Comments:

FEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

continued on next page

**TEST B-730** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 3 of 3 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SM 10+9+8 N =17 REC =12" 62.0 53.4 СН FAT CLAY, moist, dark gray, with sand. 1+2+4 N =6 REC =18" PP=2.50 tsf REC =24" trace sand. 71.0 44.4 LEAN CLAY, moist, dark gray, with CL sand. 3+4+6 N =10 REC =18" 40.4 75.0 BOTTOM OF BORING @ 75.0 FT.

# Comments:

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

<sup>2. \* =</sup> See Appendix I for additional lab testing data.

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**Project:** Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Boring Number: 06120048

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: T. Connelly

Drilling Method: 3-7/8" OD Tri-cone Roller Bit
Drilling Equipment: Diedrich D-50 (ATC)
Schnabel Representative: R. Vinzant
Dates Started: 5/31/06 Finished: 5/31/06

**Location:** Northing: 214546.48 ft Easting: 962547.88 ft

Ground Surface Elevation: 115.7 (feet)

Groundwater Observations											
	Date	Time	Depth	Casing	Caved						
Encountered	5/31		14.0'								

DEPTH	STRATA DESCRIPTION CL	CLASS.	ELEV.	WL	SAMPLING		TESTS	REMARKS	
(FT)			(FT)		DEPTH	DATA			
0.5	FL, R AND TOPSOIL.	ML	115.2			1+3+3 N =6			
-	SANDY SILT, moist, dark oliveish brown, with organic matter, and root fragments, Fine - med. sand.	IVIL			<u> </u>	REC =9"			
2.5	SILTY SAND, fine to medium grained, moist, light orangeish brown.	SM	113.2		X  ı	5+9+13 N =22 REC =18"		Change from	
-					L _  X   ı	2+4+11 N =15 REC =18"		hollow stem auger to mud rotary drilling	
-	Reddish brown.					5+7+9 N =16 REC =18"			
10.5	POORLY GRADED SAND WITH SILT,	SP-SM	105.2			7+7+7			
	fine to medium grained, moist, mottled grayish orange.					N =14 REC =18"			
-	Wet, light orangeish brown.			Ā	X  ı	8+9+9 N =18 REC =15"			
_									
_	Moist.				Γ 7 X  ₁	10+12+16 N =28 REC =18"			
	Wet, Med coarse sand.					4+8+11 N =19			
-	continued on next page				├-25-  <sup> </sup> └   '	REC =14"			

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST B-731** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SP-SM 9+12+15 Moist. N =27 REC =18" 20+20+20 Wet, light yellowish brown. N = 40REC =18" -35 Light orangeish brown. 17+23+26 N =49 REC =18" 43.5 72.2 SILTY SAND, fine to medium grained, SM 3+5+5 moist, dark gray, contains mica. N =10 REC =18" Oliveish gray. 3+4+4 N =8 REC =18" 1+3+4 N =7 REC =18"

# Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

continued on next page

B-731 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 3 of 4 Schnabel Engineering LOG ELEV. **SAMPLING DEPTH** STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SM PP=1.50 tsf SILTY SAND, fine to medium grained, REC =24" moist, oliveish gray, contains mica. -60 63.5 52.2 CLAYEY SAND, fine to medium SC 3+2+10 N =12 grained, moist, mottled grayish orange. REC =18" 68.5 47.2 LEAN CLAY, greenish gray, moist, with fine to medium grained sand, contains CL 3+3+5 N =8 REC =18" 3+5+6 N =11 REC =18" 3+5+7 N =12 REC =18" 83.5 32.2 SILTY SAND, fine to medium grained, SM 5+6+8 moist, oliveish gray, contains mica. N =14 REC =18" -85 23+25+50/5" Contains cemented sand. N =75/11" ☐ REC =17" -90 continued on next page

Calvert Cliffs Nuclear Power Plant

### Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

**TEST** 

Project:

2. \* = See Appendix I for additional lab testing data.

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

**TEST** Project: **B-731** Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG DEPTH **SAMPLING** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SM 11+17+14 N =31 REC =18" Shell fragments, weak HCl reaction, 5% 4+50/5" 99.3 16.4 N =50/5" REC =11" BOTTOM OF BORING @ 99.3 FT.

# Comments:

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.

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**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 3

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: T. Connelly

Drilling Method: 3-7/8" OD Tri-cone Roller Bit **Drilling Equipment:** Diedrich D-50 (ATC) Schnabel Representative: R. Vinzant Dates Started: 6/8/06 Finished: 6/9/06

**Location:** Northing: 215034.1 ft Easting: 961594.7 ft

Ground Surface Elevation: 90.7 (feet)

<b>Groundwater Observations</b>													
	Date Time Depth Casing Caved												
Encountered	6/8		6.0'										

DEDT!!			EL EV		SAMPLING		
DEPTH   (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL		TESTS	REMARKS
` _	FL, R AND TOPSOIL.		<u> </u>		DEPTH DATA		
0.5	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, yellowish brown, with silt, trace organic matter, and root fragments.  Light brown, no organic.	SP-SM	90.2		1+1+2 N = 3 REC =15" - V 5+6+7 N = 13 REC =18"		
_	Wet, reddish brown, no root fragments.			Ā	2+3+3 N =6 REC =18"		
	Orangeish brown, med coarse sand.		04.7		3+5+6 N =11 REC =18"		
9.0	POORLY GRADED SAND WITH CLAY, medium to coarse grained, wet, orangeish brown.	SP-SC	81.7				Change from hollow stem auger to mud rotary drilling
12.0	CLAYEY SAND, fine to medium grained, moist, mottled grayish orange.	SC	78.7		/NREC =13" 		
_					3+3+4 N = 7 REC =16" REC =24"	w=23.1% LL=26 PL=19 PP=1.50 tsf	
20.0	POORLY GRADED SAND WITH CLAY, fine to medium grained, wet, orange.	SP-SC	- 70.7		1+2+2 N =4 REC =18"		
- - -					     1+2+5 N = 7 REC = 18"		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**B-732 Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 3 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA 25.0 65.7 LEAN CLAY, moist, gray, with sand, CL contains mica. 2+3+3 N =6 REC =18" 2+3+4 N =7 REC =18" -35 2+4+4 N =8 REC =18" 4+5+7 N =12 REC =18" 4+6+6 N =12 REC =18" 50.0 40.7 SILTY SAND, fine to medium grained, SM moist, dark gray. 50/4" N = 50/4" REC =4" -55 continued on next page

Calvert Cliffs Nuclear Power Plant

# Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
 \* = See Appendix I for additional lab testing data.

**TEST** 

Project:

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Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

Schnab	el Engineering LOG			1		She	et: 3 of 3	T
DEPTH (FT)	STRATA DESCRIPTI	ON CLASS	ELEV.	WL		AMPLING	TESTS	REMARKS
+		SM	(, ,,		DEPTH	DATA		
4	Gray, moderate HCl reaction, - coarse shell fragments.				L 1	25+50/5" N =50/5"		
	- coarse shell fragments.				-60-	REC =11"		
1					T 1			
+					<b>-</b> -			
4					<u> </u>			
	Light gray, strong HCl reaction	ո, 25%			L 1M	14+12+15		
	med coarse shell fragments				65_  \( \)	N =27 REC =18"		
					65			Drilling
+					<u> </u>			penetration ra
4					-			Slower
_								
	Greenish gray, trace cemente	d sand,				35+13+10		
	Greenish gray, trace cemente moderate HCl reaction, 5% mocoarse sand.	ed				N =23 REC =18"		
-	coarse sand.				<del>-70-</del>	INLO - 10		
71.0	LEAN CLAY, dark greenish gr	ray, CL	19.7		<del> </del>			
_	LEAN CLAY, dark greenish gr moderate HCl reaction, 15% r coarse shell fragments.	ned			<u> </u>			
	coarse sileii fragments.							
						6+7+7		
1						N =14		
75.0	BOTTOM OF BORING @ 75.	0 FT.	15.7		<del>-75-</del>	REC =18"		

Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
 \* = See Appendix I for additional lab testing data.



**Project:** Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Boring Number: B-733

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: T. Connelly

Drilling Method: 3-7/8" OD Tri-cone Roller Bit

Drilling Equipment: Diedrich D-50 (ATC)

Schnabel Representative: R. Vinzant

Dates Started: 6/7/06 Finished:

Location: Northing: 214866.8 ft Easting: 961697.7 ft

<b>Groundwater Observations</b>												
Date Time Depth Casing Caved												
Encountered	6/7		7.5'									
Start of day	6/8		13.0'									

DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	SAMPI DEPTH	LING TEST	S REMARKS
0.5	FL, R AND TOPSOIL.		87.4				
-	SANDY SILT, fine to medium, moist, light yellowish brown, trace root fragments, and organic matter.	ML			2+1+ N =3 REC	}	
4.5			83.4				
-	CLAYEY SAND, fine to medium grained, moist, mottled grayish orange.	SC	00.4		6+9+ N =2 REC		
7.0 - 8.5	POORLY GRADED SAND WITH SILT, medium to coarse grained, wet, reddish brown.	SP-SM	79.4	$\bar{\Delta}$	6+9+ N =2	29	
9.0 -	SANDY SILT, fine to medium, moist, light orangeish brown, contains gravel.	ML SC	78.9		L _    REC	=12"	
 - -	CLAYEY SAND, fine to medium grained, moist, mottled grayish orange.				2+3+ N =6 REC	;	Change from hollow stem auger drilling mud rotary
- - -	Mottled orangeish gray.				2+2+ N =5 REC		
18.0 -	POORLY GRADED SAND WITH CLAY,	SP-SC	- 69.9				
-	fine to medium grained, moist, mottled grayish orange, with clay.				2+1+ N =3 REC	3	
22.0 -			65.9				
-	FAT CLAY, moist, oliveish gray, contains mica, and sand, fine to med. grained.	СН			REC	=24" W=33.2 LL=5	1
_	continued on next page				_25_ <b> </b>	PL=1	5

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

Project: B-733 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA PP=2.00 tsf CH 2+2+3 N =5 REC =18" 2+3+4 N =7 REC =18" -35 2+4+4 N =8 REC =18" 42.0 45.9 SILTY SAND, fine to medium grained, SM moist, dark gray. 5+6+8 N =14 REC =18" 15+35+50/3" Trace cemented sand, weak HCI reaction. N =85/9" REC =16" -50 Light gray, strong HCl reaction, 35-45% 24+22+28 med. - coarse shell fragments. N =50 REC =18" continued on next page

Calvert Cliffs Nuclear Power Plant

### Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

**TEST** 

2. \* = See Appendix I for additional lab testing data.

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**TEST** BORING LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

Schnak	el Engineering LOG				Sheet	Sheet: 3 of 4		
DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL		SAMPLING	TESTS	REMARKS
(FT)			(FT)		DEPTH	DATA		
- - -	Contains cemented sand, strong HCI reaction, 35-45% med coarse shell fragments.	SM			-60-	50 REC =6"		Drilling penetration rate slower
-	And cemented sand, weak HCl reaction, <5% med coarse shell fragments.				E 65-	<sup>1</sup> 50/4" N =50/4" REC =4"		
- - -								
- - - -	Light greenish gray, strong HCl reaction, <5% med coarse shell fragments.				 70	15+23+11 N =34 REC =18"		
- - - -	Weak HCl reaction, 10-20% med coarse shell fragments.					5+6+8 N =14		
- - -	Moderate HCl reaction, 10-20% med coarse shell fragments.				-80	20+9+8 N =17 REC =18"		Harder drilling
- - - -	Dark greenish gray, no shell fragments.				85-	7+6+6 N =12 REC =18"		
- - - -	strong HCI reaction, 10-20% med coarse shell fragments.					REC =24"	PP=4.00 tsf	
	continued on next page							

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** BORING LOG Calvert County, Maryland Contract Number: 06120048

Schnat	pel Engineering LOG					Sheet:	<b>Sheet:</b> 4 of 4		
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	SAI DEPTH		AMPLING DATA	TESTS	REMARKS
		SM			DEPI	П	DATA		
92.0 -	POORLY GRADED SAND WITH CLAY fine to medium grained, moist, light gray, with clay, strong HCl reaction, 35-45% med coarse shell fragments.	SP-SC	4.1		  95-	X	17+14+11 N =25 REC =18"		
96.0	SILTY SAND, fine to medium grained,	SM	-8.1		-				
-	moist, light greenish gray, strong HCl reaction, 20-30% med coarse shell fragments.	SIM			 	M	18+32+38		
100.0			-12.1		100-	M	N =70 REC =18"		
	BOTTOM OF BORING @ 100.0 FT.								

Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
 \* = See Appendix I for additional lab testing data.



Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 3

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: T. Connelly

Drilling Method: 3-7/8" OD Tri-cone Roller Bit **Drilling Equipment:** Diedrich D-50 (ATC) Schnabel Representative: R. Vinzant Dates Started: 6/6/06 Finished: 6/7/06

**Location:** Northing: 214589.6 ft Easting: 961812.5 ft

Ground Surface Elevation: 105.7 (feet)

Groundwater Observations												
	Date	Time	Depth	Casing	Caved							
Encountered	6/6		8.0'									
Start of day	6/7		15.5'									

-	ourrace Lievation. 105.7 (leet)		-					
DEPTH (FT)	STRATA DESCRIPTION	CLAS	s. ELEV.	WL		AMPLING	TESTS	REMARKS
	FL, R AND TOPSOIL.		+ ` ′		DEPTH	<b>DATA</b> 1+1+1		
0.5 - 2.0 -	SILTY SAND, fine to medium grained, moist, light brown, contains organic	SM	105.2			N =2 REC =14"		
2.0 - - -	matter, and root fragments.  POORLY GRADED SAND WITH SILT, fine to medium grained, moist, light brown.	SP-SM	103.7			5+5+5 N =10 REC =18"		
_	Light orangeish brown.				5 -	2+3+4 N =7 REC =18"		
-	Wet, light reddish brown.			⊻		2+2+2 N =4 REC =18"		
- - -					-10-	2+3+4 N =7 REC =13"		Change from hollow stem auger to mud rotary drilling
- -	Light orangeish brown.					2+4+6 N =10 REC =13"		
- -					 			
-						4+4+5 N =9 REC =12"		
- -					 			
-	Med coarse sand.  Moist, dark reddish brown.					3+4+16 N =20 REC =11"		
_	continued on next page				-25-			

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-734 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 3 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SP-SM 7+10+7 Wet, light orangeish brown. N =17 REC =14" 32.0 73.7 SANDY LEAN CLAY, fine to medium, CL moist, mottled grayish orange. 4+3+2 N =5 REC =18" -35 2+1+3 N =4 39.5 66.2 SILTY SAND, fine to medium grained, REC =12" SM moist, gray, contains mica. 3+4+4 N =8 REC =18" 46.0 59.7 LEAN CLAY, moist, dark gray, contains CL Start of drilling PP=3.00 tsf REC =24" for the day -50 2+4+4 N =8 REC =18" continued on next page

#### Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 3 of 3 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS** (FT) (FT) DEPTH DATA CL Dark greenish gray. 3+5+5

33.7

30.7

SM

N =10 REC =18"

3+5+6 N =11 REC =18"

5+7+9

N =16 REC =18"

25+15+30 N =45 REC =18" **B-734** 

**REMARKS** 

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

72.0

75.0

### Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

Dark gray, with sand, Fine - med. sand.

SILTY SAND, fine to medium grained, moist, light greenish gray, contains cemented sand, strong HCI reaction,

40% med. - coarse shell fragments.

BOTTOM OF BORING @ 75.0 FT.



Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 3

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: T. Connelly

Drilling Method: 3-7/8" OD Tri-cone Roller Bit **Drilling Equipment:** Diedrich D-50 (ATC) Schnabel Representative: R. Vinzant Dates Started: 6/28/06 Finished: 6/28/06

**Location:** Northing: 214805.48 ft Easting: 961021.83 ft

**Ground Surface Elevation:** 91.2 (feet)

	Groundwater Observations													
Date Time Depth Casing Caved														
Encountered	6/28		Dry											
Water Reading	7/27		52.0'											

						4 14 D. IV. C		
EPTH   (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	S DEPTH	AMPLING DATA	TESTS	REMARKS
0.5	FL, R AND TOPSOIL.		90.7		DEFIN			
0.5	POORLY GRADED SAND WITH SILT, medium to coarse grained, contains organic matter, moist, orangeish brown.	SP-SM	90.7			1+1+3 N =4 REC =18"		
- - -	Fine - med. sand.					2+2+2 N =4 REC =18"	w=7.6% *	
_	Yellowish orange, Med coarse sand, no organic matter.				- 5 - \	2+4+7 N =11 REC =18"		
7.0	SILTY SAND, fine to medium grained, moist, yellowish brown, contains organic matter.	SM	84.2			3+5+4 N =9 REC =18"		
-	No organic matter.				10 	3+4+5 N =9 REC =18"	w=13.5% *	
-	Mottled grayish orange, trace mica.					3+5+5 N =10 REC =18"		
- - - -						2+2+1 N =3 REC =18"	w=28.7%	Change from hollow stem auger to mud rotary drilling
-	Mottled grayish orange.					3+4+2 N =6 REC =18"		
	continued on next page							

- 1. Ground water observation well OW-735 installed in boring upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-735 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 3 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SM 27.0 64.2 FAT CLAY, moist, gray, with sand, CH contains mica, Fine - med. sand. w=32.3% REC =24" LL=51 PL=16 PP=3.00 tsf -30 3+3+4 Dark greenish gray. N =7 REC =18" -35 4+3+5 N =8 REC =18" w=39.6% 4+7+8 LL=85 N =15 PL=30 REC =18" 47.0 44.2 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, moist, oliveish gray, contains mica. 4+5+7 N =12 REC =18" -50 Wet, mottled reddish orange. 22+50 N =50 REC =12" -55 continued on next page

#### Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Ground water observation well OW-735 installed in boring upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant **B-735 Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 3 of 3 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SP-SM w=20.9% Gray. 32+31+19 N =50 REC =18" 63.0 28.2 SILTY SAND, medium to coarse SM grained, moist, light gray, 40% medium to coarse shell fragments, strong HCl 10+12+11 N =23 REC =18" reaction. 15+10+10 greenish gray, fine - med. grained. N =20 REC =18" w=24.5% Moderate HCI reaction, 15% med. -5+6+10 coarse shell fragments. N =16 REC =18" 16.2 75.0 BOTTOM OF BORING @ 75.0 FT.

#### Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Ground water observation well OW-735 installed in boring upon completion.
- 2. \* = See Appendix I for additional lab testing data.

Schnabel Engineering

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048 Sheet: 1 of 3

**Boring** 

**Boring Drilling** 

Drilling Schnab **Dates** 

Location

Ground

Contractor: CONNELLY AND ASSOCIATES, INC.		Ground	water Obs	ervations		
FREDERICK, MARYLAND		Date	Time	Depth	Casing	Caved
Foreman: T. Chew	Encountered	7/18		23.5'		
g Method: 3-7/8" O.D. Tri-cone Roller Bit (Mud Rotary	)					
g Equipment: Diedrich D-50 Turbo (Track)						
bel Representative: K. Megginson						
<b>Started:</b> 7/18/06 <b>Finished:</b> 7/19/06						
on: Northing: 214681.67 ft Easting: 961154.26 ft						
d Surface Elevation: 98.3 (feet)						

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	s	AMPLING	TESTS	REMARKS
(FT)	OTTATA DECOME TION	JEAGO.	(FT)		DEPTH	DATA	.23.3	
0.4	Forest litter, rootmat and topsoil.	00	97.9		/	1+2+2		*AWJ rods used.
1.0	CLAYEY SAND, fine to medium grained, moist, brown, contains root fragments.	SC SM	97.3			N =4 REC =18"		*4-1/4" I.D. Hollow Stem Augers used
	SILTY SAND, fine to medium grained, moist, brown, contains root fragments. fine to coarse grained.					2+1+2 N =3 REC =18"		from 0 to 23.5 ft.
4.5	POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, stratified light orangeish brown and light brown, with silt, trace fine gravel	SP-SM	93.8		5 -	4+3+2 N =5 REC =14"		
9.5	light brown and orangeish brown, dark orangeish/reddish brown weakly to moderately cemented sand layer at 8.5 ft.		88.8			3+4+6 N =10 REC =16"		
-	POORLY GRADED SAND, fine to coarse grained, moist, stratified light brown and light orangeish brown.	SP			10- 	3+7+10 N =17 REC =14"		
_	stratified yellowish brown, orangeish brown, and light brown.				15	6+10+14 N =24 REC =16"		
17.0	SILTY SAND, fine to medium grained, moist, orangeish brown.	SM	81.3					
-	moo, cangoon brown.					4+8+10 N =18 REC =14"		
22.0	CLAYEY SAND, fine to medium	SC	76.3					
-	grained, wet, yellowish gray and light gray.			$\bar{\Delta}$		2+4+4 N =8 REC =18"		*Switched to 3-7/8" O.D. Tri-cone rolle bit below 23.5
-	continued on next page				├-25-  <sup>Ľ</sup>	1120 - 10		

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.

B-736 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 3 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** ft. SC 27.0 71.3 SILTY SAND, fine to medium grained, SM wet, yellowish brown and light gray. 3+2+2 N =4 **REC =18"** dark yellowish brown and orangeish 3+1+3 34.0 64.3 CL N =4 REC =18" SANDY LEAN CLAY, fine to medium, -35 moist, gray, trace mica. 37.0 61.3 FAT CLAY, moist, gray, trace fine to СН medium sand and mica. 2+3+4 N =7 REC =18" 56.3 42.0 ELASTIC SILT, moist, gray, trace fine to MH medium sand, mica, and organic matter (±1%). 2+4+5 N =9 REC =18" gray and dark gray. 3+5+5 N =10 5+7+9 N =16 fine to medium sandy, gray and light greenish gray below 54.5 ft. REC =18" contains clayey sand and silty sand layers below 54.9 ft. 57.0 41.3 CLAYEY SAND, fine to medium SC grained, moist, gray, trace mica, continued on next page

Calvert Cliffs Nuclear Power Plant

#### Comments:

FEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

TEST

Project:

2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-736 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 3 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SC contains indurated clayey sand pockets. 4+3+20 N = 23REC =18" dark gray below 59.5 ft. 61.0 37.3 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, wet, gray, very weak HCl reaction. 13+26+33 N =59 REC =15" 4+3+9 N =12 69.5 28.8 REC =18" SILTY SAND, fine to medium grained, SM wet, gray, mostly fine to medium shell fragments (±50%), strong HCl reaction. \*Moderate to 72.0 26.3 CLAYEY SAND, fine to medium SC difficult rotary grained, moist, gray and light greenish advancement gray, trace fine to coarse shell from 73 to 73.3 ft (strong rig fragments (±5%), weak HCl reaction. 4+4+12 N =16 chatter). 74.5 23.8 REC =18" SILTY SAND, fine to medium grained, SM 23.3 75.0 moist, gray and oliveish gray, mostly strongly cemented sand (±70%), some fine to coarse shell fragments (±30%), strong HCI reaction. BOTTOM OF BORING @ 75.0 FT.

#### Comments:

FEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

chnabel Schnabel Engineering

Boring Foreman: T. Chew

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

**Boring Contractor:** CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Drilling Method: 3-7/8" O.D. Tri-cone Roller Bit (Mud Rotary)

Drilling Equipment: Diedrich D-50 Turbo (Track)

Schnabel Representative: K. Megginson Dates Started: 7/19/06 Finished: 7/20/06

**Location:** Northing: 214511.91 ft Easting: 961147.4 ft

**Ground Surface Elevation:** 63.5 (feet)

	<b>Groundwater Observations</b>												
		Date	Time	Depth	Casing	Caved							
	Encountered	7/19		7.5'									
)	Start of day	7/20		13.5'									

		'	E1 =1:		SAMPLING		
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL		TESTS	REMARKS
0.3	Forest litter, rootmat and topsoil.		63.2		<b>DEPTH DATA</b> 1+1/12"		*AWJ rods
0.5	SILTY SAND, fine to medium grained,	SM	05.2		L _  X   N =1/12"		used.
	moist, brown, contains root fragments.				REC =17"		
1							
4	fine to coarse grained, moist, brown.				-    3+3+3    N =6		
					REC =18"		
4.5	CLAYEY SAND, fine to coarse grained,	SC	59.0		_		
_	moist, brown, trace fine gravel.				2+1+3		
-					N =4 REC =18"		
_							
	wet, light grayish brown, orangeish			$\nabla$	5+4+6		
7	brown, and yellowish brown.				N =10 REC =18"		
9.5			54.0		L JUNEC = 10		
9.5	FAT CLAY, moist, light gray and orangeish brown, trace fine to medium	СН	34.0		_10_		
	sand.				REC =24"	w=37.6%	
						PP=1.50 tsf	
1					<b>├</b>   <b> </b>		*4-1/4" I.D.
-							hollow stem
	light brown, grayish brown, and				3+4+5		augers used from 0 to 13.5
14.5	orangeish brown.	CL	49.0		N =9 REC =18"		ft.
	SANDY LEAN CLAY, fine to medium, moist, gray, trace mica.	OL.			-15- L  REC = 16		*Switched to 3-7/8" O.D.
+							Tri-cone rolle
17.0	FAT OLAY maint many topic for the	011	46.5				ft.
	FAT CLAY, moist, gray, trace fine to medium sand and mica.	CH					
7					3.416		
+					_		
4					REC =18"		
22.0	CLAYEY SAND, fine to medium	SC	41.5		† †		
+	grained, moist, gray, trace mica.						
_					3+4+9		
					N =13		
					REC =18"		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-737 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SC 27.0 36.5 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, wet, gray, with 6+15+18 N = 33**REC =18"** -30 1+6+9 34.0 29.5 SILTY SAND, fine to medium grained, SM N =15 wet, gray, some fine to medium shell REC =17" \*Moderate to -35 fragments (±30%), strong HCl reaction. difficult rotary advancement 27.5 36.0 CLAYEY SAND, fine to medium SC from 36 to 38.5 grained, wet, oliveish gray, gray and light greenish gray, little fine to coarse ft (slight rig chatter). shell fragments. 5+19+19 N = 38REC =18" 42.0 21.5 SILTY SAND, fine to medium grained, SM wet, gray, little fine to coarse shell fragments (±25%), strong HCl reaction. 10+8+9 N =17 REC =18" few fine to coarse shell fragments 4+5+9 (±10%), weak HCI reaction. N =14 | REC =18" trace fine to medium shell fragments 4+6+8 N =14 (±5%). REC =18"

#### Comments:

FEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

continued on next page

TEST Project: Calvert Cliffs Nuclear Power Plant B-737 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **DEPTH SAMPLING** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SM trace fine to medium shell fragments 4+4+7 (±1%), very weak HCl reaction. N =11 REC =18" 62.0 1.5 CLAYEY SAND, fine to medium SC grained, moist, gray, little fine to coarse \*Moderate to shell fragments (±20%), strong HCI difficult rotary reaction. 6+6+30 advancement N = 36from 64.7 to 64.7 -1.2 REC =18" SILTY SAND, fine to medium grained, 65.5 ft SM (moderate to wet, gray, mostly fine to medium shell fragments (±50%), contains black strong rig particles (1/16 inch), strong HCl chatter). reaction. \*Difficult to very difficult rotary advancement from 65.5 to 66 some fine to coarse shell fragments 10+13+17 ft (strong rig N = 30(±40%). chatter). REC =18" trace fine to medium shell fragments \*Moderate to difficult rotary (±5%) below 69 ft. advancement from 67.5 to 68 ft (moderate rig chatter). \*Intermittent moderate to difficult rotary 13+20+27 oliveish gray and light greenish gray, advancement contains moderately cemented sand N = 47from 71.5 to pockets. REC =18" 73.5 ft. 77.0 -13.5 CLAYEY SAND, fine to medium SC grained, wet, gray, little fine to coarse shell fragments (±20%), contains sandy silt lenses, strong HCl reaction. 7+11+14 N =25 REC =18" 82.0 -18.5 SILTY SAND, fine to medium grained, SM wet, gray and greenish gray, with silt, trace fine to coarse shell fragments (±5%), moderate HCl reaction, contains 14+17+24 clayey sand pockets. N = 41REC =24" -85 87.0 -23.5 CLAYEY SAND, fine to medium SC grained, wet, greenish gray, trace fine to medium shell fragments (±1%), very weak HCl reaction. 5+9+15 N =24 REC =18"

-90

#### Comments:

FEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

2. \* = See Appendix I for additional lab testing data.

continued on next page

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-737 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SC 92.0 -28.5 SANDY SILT, fine to medium, moist, ML greenish gray, trace fine to medium shell fragments (±1%), and mica, very weak HCl reaction. 6+8+11 N =19 REC =18" trace fine to coarse shell fragments 7+12+13 (±<5%), contains black particles (1/16 N =25 inch), weak HCl reaction. REC =18" 100.0 -100--36.5BOTTOM OF BORING @ 100.0 FT.

#### Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

2. \* = See Appendix I for additional lab testing data.

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

chnabel Schnabel Engineering

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 3

**Boring Contractor:** CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Reese

Drilling Method: 3-7/8" OD Tri-cone Roller Bit **Drilling Equipment:** Diedrich D-50 (ATC) Schnabel Representative: B. Bradfield Dates Started: 6/13/06 Finished: 6/13/06

**Location:** Northing: 213826.3 ft Easting: 961679.62 ft

Ground Surface Elevation: 87.3 (feet)

Groundwater Observations												
Date Time Depth Casing Caved												
Encountered	6/13		10.5'									

DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	SAMPLING	TESTS	REMARKS
0.2	Forest litter, rootmat and topsoil.		87.1		<b>DEPTH DATA</b>		0-9'- Drilled wit
2.0	SANDY SILT, fine to medium, moist, yellowish brown, contains wood fragments.	ML SP-SM	85.3		N =4 REC =12"		4 1/4" HSA
4.0	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, orangeish brown and yellowish brown.		83.3		6+7+8 N =15 REC =18"		
_	SILTY SAND, fine to coarse grained, moist, orangeish brown and yellowish brown.	SM			- 5 - 8+13+14 N =27	w=9% *	
6.0 -	POORLY GRADED SAND, fine to coarse grained, moist, grayish white and yellowish brown, trace gravel, 1 1/2" rounded piece of gravel in spoon shoe.	SP	81.3		REC =18"  6+8+11 N =19		9'- Switched to
-				∑	/\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	w=12.3%	mud rotary wit 3 7/8" tri-cone roller bit
12.0	wet, yellowish brown and orangeish brown, trace silt.  SILTY SAND, fine to medium grained,	SM	75.3		7+8+9 N =17 REC =14"	W-12.370 *	
- - -	wet, dark orangeish brown and mottled yellowish brown, contains mica.				5+6+6 N =12 REC =13"		
16.0	SANDY FAT CLAY, fine to medium, wet, orangeish brown and gray, strong layering, gray lenses 1/16" thick.	СН	71.3				
20.0			67.3		2+2+2 N =4 REC =18"	w=24.2% *	
- - -	SANDY ELASTIC SILT, fine to medium, wet, light orangeish brown and gray, layered, gray lenses <1/8" thick.	МН					
-					1+2+2 N =4 REC =18"		
-	continued on next page				-25- LI  REC = 18		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant **B-738 Boring Number:** hnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 3 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** МН w=28.4% 2+2+4 N =6 **REC =18"** 30.0 57.3 -30 CLAYEY SILTY SAND, fine to medium SC-SM grained, wet, gray, contains mica. 4+4+5 N = 9REC =18" -35 w=26.4% REC =24" LL=26 PL=22 REC =24" 38.0 49.3 SANDY LEAN CLAY, fine to medium, CL moist, gray, contains mica. 4+5+5 N =10 REC =18" with sand, moist, gray and light gray. 3+4+7 N =11 REC =18" 46.0 41.3 FAT CLAY with sand, moist, gray, CH contains mica. w=32.1% 5+6+7 N =13 52.0 35.3 LEAN CLAY with sand, moist, light gray CL and blackish gray, contains mica, blackish gray pockets <1" consist of sandy clay. 4+7+8 N =15 REC =18" 56.0 31.3 CLAYEY SAND, fine to medium SC grained, moist, gray, contains mica, weak HCl reaction, <5% fine shell fragments.

#### Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

continued on next page

chnabel

**TEST** BORING LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

	el Engineering LOG				_		t: 3 of 3	
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	l .	MPLING	TESTS	REMARKS
-		SC	( /		1    X    1	<b>DATA</b> 7+11+18 N =29	w=28.7%	
-					-60-    F	REC =18"		
62.0	POORLY GRADED SAND, fine to coarse grained, wet, gray and brownish white, 60-70% fine to coarse shell fragments, trace silt, strong HCl reaction.	SP	- 25.3		1    X    1	29+31+20 N =51 REC =16"		62'- Harder drilling
67.0	SANDY LEAN CLAY, fine to medium, moist, gray, contains mica, weak HCl reaction, <5% shell fragments, HCl reaction limited to shell fragments.	CL	- 20.3		1   X   1	1+4+5 N =9 REC =18"	w=30.9%	
71.0	CLAYEY SAND, fine to medium grained, wet, gray and brownish white, 20-30% fine to coarse shell fragments, trace silt, moderate HCl reaction.	SC	- 16.3					71-73.5'- Rig chatter
75.0	BOTTOM OF BORING @ 75.0 FT.		12.3		1    X    1	25+22+11 N =33 REC =18"		

Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
 \* = See Appendix I for additional lab testing data.



Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Reese

Drilling Method: 3-7/8" OD Tri-cone Roller Bit **Drilling Equipment:** Diedrich D-50 (ATC) Schnabel Representative: B. Bradfield Dates Started: 6/13/06 Finished: 6/15/06

**Location:** Northing: 23719.6 ft Easting: 961793.32 ft

Ground Surface Elevation: 100.4 (feet)

Groundwater Observations												
	Date	Time	Depth	Casing	Caved							
Encountered	6/13		23.5'									
Start of day	6/14		16.0'									

O O O O O	Surface Elevation: 100.4 (feet)						
DEPTH (FT)	STRATA DESCRIPTION	CLASS	ELEV. (FT)	WL	SAMPLING DEPTH DATA	TESTS	REMARKS
0.4	Forest litter, rootmat, and topsoil.		100.0		2+1+3		0-9'- Drilled with
2.0	SILTY SAND, fine to medium grained, moist, light brown, contains root	SM	98.4		N =4 REC =12"		4 1/4" HSA 85'- Hard drilling with rig
-	fragments.  POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, light brown and orangeish brown.	SP-SM	1 90.4		11+12+10 N =22 REC =18"		chatter
6.0	Moist, orangeish brown and yellowish brown.		94.4		7+5+5 N =10		
-	POORLY GRADED SAND, fine to coarse grained, moist, orangeish brown and yellowish brown.	SP					
-	,				4+4+6 N =10 REC =18"		9'- Switched to mud rotary using 3 7/8" tri-cone roller
-	Orangeish brown and yellowish white, stratified into 1/2" to 1" lenses of alternating color.				5+6+6 N = 12 REC = 18"		bit
000000	Yellowish brown and gray, stratified into 1/2" to 1" lenses of alternating color.				4+5+6 N =11 REC =14"		
17.0 - 17	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, orangeish brown and yellowish gray, slight stratification, trace medium grained rounded gravel.	SP-SM	83.4		8+10+9 N =19 REC =15"		
22.0	SILTY SAND, fine to coarse grained,	SM	78.4				
	wet, orangeish brown and dark brown.	Sivi		Ā	10+15+16 N = 31		
	continued on next page				REC =18"		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-739 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering Sheet: 2 of 4 LOG ELEV. **SAMPLING DEPTH** STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SM 27.0 73.4 SANDY SILT, fine to medium, wet, ML mottled orangeish brown and light gray. 3+2+3 N =5 **REC =18"** 2+2+2 N =4 REC =18" -35 37.0 63.4 CLAYEY SAND, fine to medium SC grained, wet, mottled orangeish brown and gray. 2+1+3 N =4 REC =18" 58.4 42.0 SILTY SAND, fine to medium grained, SM wet, dark gray. 3+3+5 N =8 REC =17" Contains mica. 4+6+8 N =14 -50 50.5 49.9 CLAYEY SAND, fine to medium SC grained, wet, dark gray, trace mica. REC =12" 53.0 47.4 FAT CLAY with sand, moist, light gray CH and dark gray, contains mica. 2+4+4 N =8 REC =18"

#### Comments:

FEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

continued on next page

B-739 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** CH 3+5+6 N = 11REC =18" 62.0 38.4 SANDY LEAN CLAY, fine to medium, CL moist, dark gray, contains mica. 5+5+7 N =12 REC =18" With sand. 5+9+9 N = 18REC =18" 72.0 28.4 CLAYEY SAND, fine to medium SC grained, moist, dark gray and brownish white, 10-20% fine to coarse shell fragments, contains mica, strong HCI 14+31+50/4" reaction. N =81/10" **REC =16"** -75 Wet, gray and brownish white, 70-80% 9+8+9 fine to medium shell fragments, N = 1779.5 20.9 contains mica, strong HCl reaction. CL -80 LEAN CLAY with sand, moist, gray, 0-10% fine to medium shell fragments, contains mica, weak HCl reaction. fine to medium sandy, gray and brownish white, 10-20% fine to coarse REC =5" 84.0 16.4 SP-SC 50/2" 85'- Hard shell fragments. N = 50/2"drilling with rig -85 REC =2" POORLY GRADED SAND WITH CLAY, chatter fine to medium grained, moist, gray, 10-20% fine to coarse shell fragments, 87.0 strong HCI reaction, strong 13.4 SM cementation. SILTY SAND, fine to coarse grained, wet, light gray and brownish white, 7+12+50/5" 60-70% fine to medium shell fragments, N =62/11" strong HCI reaction, weak cementation. □ REC =18" -90 continued on next page

Calvert Cliffs Nuclear Power Plant

#### Comments:

FEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

TEST

Project:

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

<sup>2. \* =</sup> See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-739 chnabel **Boring Number: BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 4 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** 91.0 9.3 POORLY GRADED SAND WITH SILT, SP-SM fine to coarse grained, moist, light gray and white, 60-70% fine to medium shell fragments, strong HCI reaction, moderate cementation. 11+10+10 Wet, gray and brownish white, 30-40% fine to coarse shell fragments, HCI N =20 reaction limited to shell fragments. REC =18" -95 REC =10" And, 20-30% fine to coarse shell 96.8 fragments, HCl reaction limited to shell 3.6 SC fragments. CLAYEY SAND, fine to medium grained, wet, gray and brownish white, 30-40% fine to medium shell fragments, 8+9+50/4" N =59/10" strong HCI reaction. 99.6 0.8 REC =15" SP-SM 99.8 0.5 POORLY GRADED SAND WITH SILT, fine to medium grained, wet, gray and brownish white, 30-40% fine to coarse shell fragments, HCl reaction limited to shell fragments. BOTTOM OF BORING @ 99.8 FT.

#### Comments:

FEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

<sup>2. \* =</sup> See Appendix I for additional lab testing data.

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**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 3

**Boring Contractor:** CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: T. Chew

Drilling Method: 3-7/8" O.D. Tri-cone Roller bit (Mud Rotary)

Drilling Equipment: Diedrich D-50 Turbo (Track) Schnabel Representative: K. Megginson Dates Started: 7/20/06 Finished: 7/21/06

**Location:** Northing: 213605.13 ft Easting: 961781.13 ft

**Ground Surface Elevation:** 74.3 (feet)

Groundwater Observations												
Date Time Depth Casing Caved												
Encountered	7/20		13.5'									
Start of day	7/21		4.0'									

	, ,		1				
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	SAMPLING DEPTH DATA	TESTS	REMARKS
0.5	Forest litter, rootmat and topsoil.		73.8		1+1+2		*AWJ rods
2.0 -	SILTY SAND, fine to medium grained, moist, brown, trace fine gravel, contains root fragments.	SM	73.6		N =3 REC =18"		used.
3.0 -	SANDY LEAN CLAY, fine to medium, moist, brown, contains root fragments.	CL ML	71.3		4+8+12 N =20		
4.5 —	SANDY SILT, fine to medium, moist, light grayish brown, yellowish brown, and orangeish brown.	SM	69.8		REC =18"		
-	SILTY SAND, fine to coarse grained, moist, orangeish brown and brown, trace fine gravel, contains clayey sand				15+13+14 N =27 REC =18"		
7.0 -	layers.	SC	67.3				
8.0 -	CLAYEY SAND, fine to coarse grained, moist, yellowish brown and light grayish brown, contains root fragments.	SM	66.3		4+5+5 N =10 REC =18"		
9.5	SILTY SAND, fine grained, moist, stratified orangeish brown and light brown.	SC	64.8		<u></u> 10−		
-	contains poorly graded sand with silt layer below 8.8 ft.				3+3+3 N =6 REC =18"		
-	CLAYEY SAND, fine grained, moist, yellowish brown and light gray.			$\bar{\Sigma}$			*4-1/4" I.D. hollow stem augers used
14.5	wet, mottled dark yellowish brown and light gray.		59.8				from 0 to 13.5 ft.
-	SANDY SILT, fine to medium, wet, gray, trace organic matter (±1%), and mica.	ML	00.0		REC =18"		*Switched to 3-7/8" O.D. Tri-cone roller
47.0			F7.0				bit below 13.5 ft.
17.0 - -	SILTY SAND, fine grained, wet, gray.	SM	57.3				
-					3+3+4 N = 7		
_							
_					_		
- -	trace mica.				3+3+5 N =8		
_	continued on next page						

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

TEST Project: Calvert Cliffs Nuclear Power Plant B-740 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 3 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SM 47.3 27.0 FAT CLAY, moist, gray, with fine sand, CH trace mica. 3+4+5 N =9 **REC =18"** \*\*Resumed drilling at 7:00 AM on 7/21/06. gray and dark gray, trace fine to 4+5+7 medium sand and organic matter (±1%). N =12 REC =18" -35 with fine to medium sand, contains 5+7+10 clayey sand lenses. N =17 REC =18" 32.3 42.0 ELASTIC SILT, moist, gray, trace fine to MH medium sand, mica, and organic matter (±1%). 6+10+12 N =22 REC =18" 47.0 27.3 CLAYEY SAND, fine to medium SC grained, moist, dark gray and dark brownish gray. 30+50/4" \*Moderate to 49.0 25.3 SILTY SAND, fine to medium grained, N = 50/4" SM difficult rotary moist, dark gray, trace fine to medium REC =10" advancement -50 shell fragments (±5%), contains weak to from 49 to 50.5 moderately cemented sand layers, ft (strong rig strong HCl reaction. chatter). 52.0 22.3 SANDY LEAN CLAY, fine to medium, CL moist, gray, trace fine to medium shell fragments (±5%), moderate HCI reaction. 4+5+6 N = 11REC =18"

> \*Moderate difficulty in rotary advancement

#### Comments:

FEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

2. \* = See Appendix I for additional lab testing data.

continued on next page

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048 Sheet: 3 of 3

Schnab	el Engineering LOG			1		Sheet	: 3 of 3	T
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	SA DEPTH	MPLING DATA	TESTS	REMARKS
-	contains clayey sand pockets, moderat HCl reaction. oliveish gray below 59.8 ft.	CL				11+6+13 N =19 REC =18"		from 56.5 to 5 ft (slight rig chatter). *Intermittent moderate difficultly in
62.0	CLAYEY SAND, fine to medium grained, oliveish gray and dark gray, mostly fine to medium shell fragments (±50%), strong HCl reaction.	SC	- 12.3		1	50/3" N =50/3" REC =2"		rotary advancement from 58.5 to 63.5 ft (slight moderate rig chatter). *Moderate to difficult rotary advancement from 63.5 to 6
67.0	SILTY SAND, fine to medium grained, wet, gray, few fine to coarse shell fragments (±10%), moderate HCI reaction.	SM	7.3		1   X	5+6+8 N =14 REC =18"		ft (strong rig chatter). *Intermittent moderate difficultly in rotary advancemen from 68.5 to 73.5 ft (slight moderate rig chatter).
75.0	trace fine to medium shell fragments (±5%), weak HCl reaction.  BOTTOM OF BORING @ 75.0 FT.		0.7		1    X    1	24+11+12 N =23 REC =18"		
Comments								

Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
 \* = See Appendix I for additional lab testing data.

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Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 3

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings

**Drilling Method:** 4-1/4" O.D. Drag Bit (Mud Rotary)

Drilling Equipment: CME-750 (ATV) Schnabel Representative: M. Arles

Dates Started: 7/13/06 Finished: 7/13/06

**Location:** Northing: 213760.48 ft Easting: 961029.82 ft

**Ground Surface Elevation:** 81.4 (feet)

	Date	Time	Depth	Casing	Caved				
Encountered	7/13		53.5'	0.0'					

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	SAM	MPLING	TESTS	REMARKS
(FT)	OTTATA DEGGRAM THON	OLAGO.	(FT)		DEPTH	DATA	12010	KEMAKKO
0.5	FL, R AND TOPSOIL.		80.9			VOH/18"		
2.0	SANDY SILT, fine to medium, moist, orangeish brown, contains root fragments.	ML	79.4		NR	I = WOH/18" REC =12"		
_	POORLY GRADED SAND WITH SILT and gravel, fine to coarse grained, moist, brownish orange.	SP-SM			Γ ∏X∥n	+3+4 I =7 REC =16"		
4.5	POORLY GRADED SAND with gravel, fine to coarse grained, moist, brownish orange.	SP	76.9		L JIXII N	+5+7 I =12 REC =16"		
-					L JNR	+15+14 I =29 REC =15"		
-					X   N	+8+8 I =16 REC =14"		
13.0	SILTY SAND, fine to medium grained, moist, orange.	SM	68.4		Γ ∃IXII <b>n</b>	+3+4 I =7 REC =14"		
17.0	SANDY SILT, fine to medium, moist, orange.	ML	64.4					
-					X   <b>n</b>	+3+3 I =6 REC =14"		
-					  	REC =0"		
_	continued on next page				-25-			

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

B-741 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 3 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA ML27.0 54.4 ELASTIC SILT, moist, gray. MH 1+2+3 N =5 **REC =18"** 32.0 49.4 FAT CLAY, moist, gray. СН 3+4+6 N = 10REC =18" -35 4+5+6 N =11 REC =18" with sand, contains cemented sand, 5+6+7 small pods of sand and cemented sand. N =13 REC =18" 47.0 34.4 SILTY SAND, fine to medium grained, SM moist, dark greenish gray, contains cemented sand. 4+6+14 N =20 REC =18" -50 52.0 29.4 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, wet, dark green, with fine to coarse shell fragments, strong HCl reaction, 70-90%  $\overline{\Delta}$ 16+19+21 shell frag. N =40 REC =16" -55 57.0 24.4 SILTY SAND, fine to medium grained, SM moist, green, with fine to coarse shell continued on next page

Calvert Cliffs Nuclear Power Plant

#### Comments:

FEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

TEST

Project:

2. \* = See Appendix I for additional lab testing data.

**TEST B-741** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 3 of 3 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA fragments, moderate HCl reaction, SM 20-30% shell frag. 4+5+7 N =12 REC =18" 13+21+15 64' grinding N =36 REC =18" 67.0 14.4 SANDY SILT, fine to medium, moist, green, with fine to coarse shell fragments, strong HCl reaction, 30-40% ML 6+50/3" N =50/3" shell frag. REC =10" 71' grinding 72.0 9.4 SILTY SAND, fine to medium grained, moist, green, with fine to coarse shell SM fragments, strong HCI reaction, 20-30% shell frag. 5+6+9 N =15 REC =18" 75.0 6.4 BOTTOM OF BORING @ 75.0 FT.

#### Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

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Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-742 Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings

**Drilling Method:** 4-1/4" O.D. Drag Bit (Mud Rotary)

Drilling Equipment: CME-750 (ATV) Schnabel Representative: M. Arles

Dates Started: 7/11/06 Finished: 7/11/06

**Location:** Northing: 213472.84 ft Easting: 961217.19 ft

**Ground Surface Elevation:** 102.4 (feet)

	Groundwater Observations											
	Date	Time	Depth	Casing	Caved							
Encountered	7/11		23.5'	0.0'								

DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	DEP.		AMPLING DATA	TESTS	;	REMARKS
0.5	FL, R AND TOPSOIL.		101.9		J	<u> </u>	WOH+2+2			
-	SILT, moist, orangeish brown, with sand, contains root fragments.	ML				$ \mathbb{N} $	N =4 REC =14"			
2.0	SILTY SAND, fine to coarse grained, moist, orangeish brown, contains root fragments.	SM	100.4				3+2+3 N =5			
4.0	POORLY GRADED SAND, with gravel, fine to coarse grained, moist, orange.	SP	98.4		5 -		REC =15"			
_						$\mathbb{M}$	3+3+5 N =8 REC =12"			
7.0 -	POORLY GRADED SAND WITH CLAY and gravel, fine to coarse grained, moist, dark orange.	SP-SC	95.4		 		3+8+10 N =18 REC =14"			
- - -					10 		4+5.+8 N =13 REC =14"			
13.0 -	POORLY GRADED SAND, fine to coarse grained, moist, orange.	SP	89.4		 		5+7+10 N =17 REC =14"			
- - -					 					
-	trace clay.				20-		5+16+19 N =35 REC =14"			
-										
-	wet.			Ā			7+16+21 N =37			
_	continued on next page				25-		REC =10"			

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-742 **Boring Number:** hnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SP 27.0 75.4 SILTY SAND, fine to medium grained, SM wet, orange. 2+3+2 N =5 REC =14" moist, mottled grayish orange. 1+1+1 N = 2REC =18" -35 37.0 65.4 SANDY SILT, fine to medium, wet, ML mottled grayish orange. WOH/18" N = WOH/18" REC =18" 42.0 60.4 SILTY SAND, fine to medium grained, SM wet, gray. 1+2+3 N =5 REC =18" 2+3+4 N =7 REC =18"

50.4

45.4

1+2+4 N =6 REC =18"

CL

CH

### Comments:

57.0

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

52.0

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

SANDY LEAN CLAY, fine to medium,

FAT CLAY, moist, gray, trace sand.

continued on next page

moist, gray.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-742 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering Sheet: 3 of 4 LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA CH 2+5+7 N =12 REC =18" with silt. 4+7+8 N =15 REC =18" 5+7+7 N =14 REC =18" 72.0 30.4 SILTY SAND, fine to medium grained, SM moist, dark grayish green, contains cemented sand, trace fine to medium shell fragments, moderate HCI reaction, 6+18+30 0-5% shell frag. N =48 REC =18" REC =0" -80 82' Switched to 82.0 20.4 SANDY SILT, fine to medium, moist, ML roller bit green, with fine to coarse shell fragments, strong HCl reaction, 20-40% shell frag. 4+4+5 N =9 **REC =18"** -85 87.0 15.4 SILTY SAND, fine to medium grained, SM moist, green, with fine to coarse shell fragments, strong HCI reaction, 20-30% shell frag. REC =4" -90

#### Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

continued on next page

**TEST B-742** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SM wet, 50-70% shell frag. 6+8+10 N =18 REC =18" 97.0 5.4 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, wet, green, with fine to coarse shell fragments, moderate HCl reaction, 20-30% shell frag. 7+10+10 N =20 REC =18" 100.0 -100-2.4 BOTTOM OF BORING @ 100.0 FT.

#### Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

SC	hnabel
Schnab	el Engineering

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 3

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings

**Drilling Method:** 4-1/4" Drag Bit (Mud Rotary)

Drilling Equipment: CME-750 (ATV) Schnabel Representative: M. Arles

Dates Started: 7/10/06 Finished: 7/10/06

**Location:** Northing: 213315.7 ft Easting: 961232 ft

Ground Surface Elevation: 103.6 (feet)

Groundwater Observations												
	Date Time Depth Casing Caved											
Encountered	7/10		28.5'	0.0'								

DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV.	WL	s	AMPLING	TESTS	REMARKS
			(FT)	VVL	DEPTH	DATA	IESIS	
0.3	FL, R AND TOPSOIL.	ML	103.3			WOH/18"		
2.0	SILT, moist, orangeish brown, with sand, contains root fragments.	IVIL	101.6			N = WOH/18" REC =12"		
2.0	POORLY GRADED SAND WITH CLAY, fine to coarse grained, moist, brown, with clay.	SP-SC	101.6			1+2+3 N =5 REC =14"		
4.5	POORLY GRADED SAND, fine to coarse grained, moist, brownish yellow, with gravel.	SP	99.1		5 -	3+3+3 N =6 REC =12"		
-	brownish orange, with gravel, trace clay.					6+7+12 N =19 REC =15"		
12.0	trace gravel.		91.6			7+12+17 N =29 REC =14"		
-	POORLY GRADED GRAVEL, moist, brownish orange, with sand.	GP						
14.0 -	POORLY GRADED SAND, with gravel, trace clay, fine to coarse grained, moist, dark orangeish brown.	SP	89.6		15 	25+17+12 N =29 REC =16"		
19.6	brownish orange.  FAT CLAY, with silt, moist, orange.	СН	84.0			4+10+5 N =15 REC =12"		
22.0 -	LEAN CLAY, with fine to medium grained sand, moist, goldenish orange.	CL	81.6		 			
	continued on next next				 25	REC =19"	w=21.1% LL=38 PL=13	
	continued on next page							

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.
   Ground water observation well OW-743 installed at nearby location.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-743 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 3 Schnabel Engineering LOG ELEV. **SAMPLING DEPTH** STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA CL 27.0 76.6 POORLY GRADED SAND, fine to SP coarse grained, wet, yellowish orange.  $\overline{\triangle}$ 12+18+11 N = 29REC =12" -30 32.0 71.6 SILTY SAND, fine to medium grained, SM moist, mottled grayish orange. 2+2+2 N =4 REC =18" -35 REC =0" WOH+3+3 gray. N =6 REC =18" 47.0 56.6 POORLY GRADED SAND with silt, fine SP-SM to medium grained, moist, gray. 3+5+4 N =9 REC =18" 52.0 51.6 POORLY GRADED SAND, fine to SP medium grained, wet, gray. 4+8+7 N =15 REC =12" 57.0 46.6 FAT CLAY, moist, gray, trace sand. CH continued on next page

#### Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-743 installed at nearby location.

**TEST B-743** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 3 of 3 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA СН 3+5+7 N =12 REC =18" 3+6+8 N =14 REC =10" 6+8+10 N =18 REC =18" 9+10+14 29.6 74.0 SC CLAYEY SAND, fine to medium N =24 REC =18" grained, moist, gray. 75.0 28.6 BOTTOM OF BORING @ 75.0 FT.

#### Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-743 installed at nearby location.



**Project:** Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Boring Number: B-74

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: T. Connelly

Drilling Method: 3-7/8" OD Tri-cone Roller Bit
Drilling Equipment: Diedrich D-50 (ATC)
Schnabel Representative: R. Vinzant
Dates Started: 6/20/06 Finished: 6/21/06

**Location:** Northing: 216377.3 ft Easting: 959963.38 ft

Ground Surface Elevation: 113.3 (feet)

Groundwater Observations							
	Date	Time	Depth	Casing	Caved		
Encountered	6/20		18.5'				
Start of day	6/21		20.0'				

DEPTH (FT)	STRATA DESCRIPTION  FL, R AND TOPSOIL.	CLASS.	(F1)	VVL	SAMPLING		TESTS	REMARKS
					DEPTH	DATA		
2.0	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, light brown.	SP-SM	112.8			3+5+7 N =12 REC =18"		
-	POORLY GRADED SAND, fine to medium grained, moist, light grayish white.	SP				5+8+9 N =17 REC =18"		
4.0	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, light orangeish brown.	SP-SM	109.3		5 -	4+6+6 N =12 REC =18"		
- -	Med coarse sand.					5+5+6 N =11 REC =18"		
-	Light yellowish brown, Fine - med. sand.				10- 	4+4+6 N =10 REC =18"		
- - -	Light orangeish brown, Med coarse sand.					3+3+3 N =6 REC =10"		Change from hollow stem auger to mud rotary drilling
-	Wet, yellowish orange.			Ā		4+3+4 N =7 REC =18"		Totally driming
	Orangeish brown, contains gravel.					4+2+2 N =4 REC =18"		
	continued on next page				-25- <sup> </sup>	== .•		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-744 installed at nearby location.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-744 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SP-SM 27.0 86.3 CLAYEY SAND, fine to medium SC grained, moist, dark greenish gray, contains mica. 2+2+2 N =4 **REC =18"** 82.3 31.0 SANDY LEAN CLAY, fine to medium, CL moist, dark greenish gray, contains mica. 3+3+3 N =6 REC =18" -35 36.0 77.3 CLAYEY SAND, fine to medium SC grained, moist, dark greenish gray, contains mica. 4+3+4 N =7 REC =18" 71.3 42.0 LEAN CLAY, moist, dark greenish gray, CL with sand, contains mica, Fine - med. sand. 5+7+9 N =16 REC =18" 46.0 67.3 SILTY SAND, fine to medium grained, SM moist, dark greenish gray, contains mica. 5+6+9 N =15 ∐ REC =18" Contains cemented sand. 13+30+30 N =60 REC =18" continued on next page

#### Comments:

FEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-744 installed at nearby location.

B-744 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SM Weak HCI reaction. 4+6+7 N =13 REC =18" 62.0 51.3 CLAYEY SAND, fine to medium SC grained, moist, dark greenish gray, weak HCl reaction, <5% med. - coarse shell fragments, no cemented sand. 6+6+7 N =13 REC =18" 4+50/4" N =50/4" Strong HCl reaction, <10% shell fragments. REC =10" 72.0 41.3 SILTY SAND, fine to medium grained, SM moist, greenish gray, moderate HCl reaction, 10-20% shell fragments. 8+11+35 N =46 REC =18" Weak HCl reaction, 5-15% shell 7+7+9 fragments. N =16 REC =18" Moderate HCI reaction. 10+13+13 N =26 **REC =18"** -85 Weak HCI reaction. 5+8+11 N =19 REC =18" -90 continued on next page

Calvert Cliffs Nuclear Power Plant

#### Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-744 installed at nearby location.

**TEST** 

Project:

**TEST B-744** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SM No shell fragments. 5+8+11 N =19 REC =18" Strong HCI reaction, 20-30% shell 9+14+25 fragments. N =39 REC =18" 100.0 -100-13.3 BOTTOM OF BORING @ 100.0 FT.

### Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- \* = See Appendix I for additional lab testing data.
   Ground water observation well OW-744 installed at nearby location.

chnabel Schnabel Engineering

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 3

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Reese Drilling Method: 2-15/16" OD Tri-cone Roller Bit (Mud Rotal

Drilling Equipment: CME-75 (Truck) Schnabel Representative: M. Arles

Dates Started: 5/23/06 Finished: 5/24/06

**Location:** Northing: 215971.2 ft Easting: 960529.02 ft

**Ground Surface Elevation:** 111.7 (feet)

٥.	<b>Groundwater Observations</b>										
۱,		Date	Time	Depth	Casing	Caved					
	Encountered	5/23		Dry							
ar	y) Start of day	5/24		11.0'	4.0'						
- 1											

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	s	AMPLING	TESTS	REMARKS
(FT)	OTTATA BEGGIN HON	OLAGO.	(FT)	***	DEPTH	DATA	12010	
0.4	ROOTMAT AND TOPSOIL.	CL	111.3		l IM	1+2+4		0-4' Hollow stem auger
2.0	SANDY LEAN CLAY, fine to coarse, moist, brown, contains root fragments.	CL	100.7		├ <u> </u>	N =6 REC =15"		Stem auger
3.5	CLAYEY SAND, fine to medium grained, moist, brown, contains root fragments.	SC	109.7			5+6+5 N =11		4 40' 2 45/46
3.5	POORLY GRADED SAND WITH CLAY, fine to coarse grained, moist, brown.	SP-SC	100.2			REC =18"		4-40' 2-15/16 tri-cone roller bit
_						2+2+2 N =4 REC =11"		
7.0	POORLY GRADED SAND with gravel, fine to coarse grained, wet, yellowish brown.	SP	104.7			3+3+4 N =7 REC =10"		
-					10  	3+4+7 N =11 REC =11"		
13.0	POORLY GRADED SAND WITH CLAY and gravel, fine to coarse grained, moist, yellowish orange.	SP-SC	98.7			3+8+5 N =13 REC =10"		
-	orange.					4+5+7 N =12 REC =12"		
22.5	POORLY GRADED SAND with gravel, fine to coarse grained, moist, orange.	SP	- 89.2			3+4+7 N =11		
-	continued on next page				<u> </u>	REC =3"		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

B-745 **Boring Number:** hnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 3 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SP 27.5 84.2 POORLY GRADED SAND WITH SILT, SP-SM fine to coarse grained, moist, orange. 7+9+11 N =20 REC =8" 4+8+8 N =16 REC =10" -35 4+4+5 N =9 REC =10" trace gravel. 8+13+14 N =27 REC =18" 47.0 64.7 SILTY GRAVEL, fine and coarse GM grained, wet, orange, with sand. 3+8+6 N =14 REC =12" 58.7 53.0 FAT CLAY, moist, dark gray, with sand. CH 3+3+5 N =8 REC =18" 56.0 55.7 LEAN CLAY, moist, dark gray, with CL sand. continued on next page

Calvert Cliffs Nuclear Power Plant

### Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

**TEST** 

Project:

2. \* = See Appendix I for additional lab testing data.

**TEST B-745** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 3 of 3 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA CL 3+3+4 N =7 REC =18" 5+6+7 N = 13REC =18" 67.0 44.7 CLAYEY SAND, fine to medium SC grained, moist, greenish gray, with silt. 3+4+6 N =10 REC =18" 72.0 39.7 SILTY SAND, fine to medium grained, SM moist, greenish gray. 7+15+35 N =50 REC =18" 75.0 36.7 BOTTOM OF BORING @ 75.0 FT.

### Comments:

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

<sup>2. \* =</sup> See Appendix I for additional lab testing data.

Schnabel Engineering

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048 Sheet: 1 of 3

Boring Contractor: CONNELLY AND ASSOCIATES, INC.	Groundwater Observations									
FREDERICK, MARYLAND		Date	Time	Depth	Casing	Caved				
Boring Foreman: T. Chew	Encountered	7/18		7.5'						
Drilling Method: 3-7/8" O.D. Tri-cone Roller Bit (Mud Rotary	)									
Drilling Equipment: Diedrich D-50 Turbo (Track)										
Schnabel Representative: K. Megginson										
Dates Started: 7/18/06 Finished: 7/18/06										
Location: Northing: 215743.35 ft Easting: 960721.36 ft										
Ground Surface Elevation: 82.8 (feet)										

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	s	AMPLING	TESTS	REMARKS
(FT)	CHAIA DESCRIPTION	OLAGO.	(FT)		DEPTH	DATA	12010	
0.3	Forest litter, rootmat and topsoil.  LEAN CLAY, moist, brown, with fine to medium sand, contains root fragments.	CL	82.5		X	1/12+2" N =2 REC =18"		*AWJ rods used. *4-1/4" I.D. Hollow Stem
2.0	SILT, moist, yellowish brown and grayish brown, with fine to medium sand.  fine sandy below 3.5 ft.	ML	80.8			3+5+9 N =14 REC =18"	w=14.4%	Augers used from 0 to 13.5
4.5	CLAYEY SAND, fine to coarse grained, moist, yellowish brown and grayish brown.	SC	78.3		_ 5 -	5+9+11 N =20		
6.0	SILTY SAND, fine to coarse grained, moist, orangeish brown, trace fine	SM	76.8	$\nabla$	<u> </u>	REC =18"		
_	gravel.			<del>-</del> <u>-</u> -		2+2+1 N =3 REC =18"	w=25.1% *	
-						2+2+1 N =3 REC =18"		
13.5	CLAYEY SILTY SAND, moist, orangeish brown	SC-SM	69.3		  15 	REC =24"	w=27.2% LL=25 PL=21 *	*Switched to 3-7/8" O.D. Tri-cone roller bit below 13.5
- - - -	orangeish brown below 19 ft.					4+4+3 N =7 REC =18"		ft.
22.0	FAT CLAY, moist, gray, with fine to medium sand, contains clayey sand pockets and layers.	СН	60.8			3+4+4 N = 8	w=30.8% LL=52 PL=17	
-	continued on next page				-25-L	REC =18"		

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.

B-746 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 3 **DEPTH SAMPLING** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** CH 27.0 55.8 ELASTIC SILT, moist, gray and dark МН gray, trace fine to medium sand and mica, contains clayey sand pockets. 4+4+6 N = 10**REC =18"** -30 32.0 50.8 FAT CLAY, moist, gray and dark gray, СН trace fine to medium sand and mica. w=34.8% 3+3+6 LL=64 N = 934.5 contains silty sand layer from 34.2 to 48.3 PL=24 REC =18" МН 34.5 ft, wet. -35 ELASTIC SILT, moist, gray, trace fine to medium sand and mica. light greenish gray, contains sandy 6+8+9 elastic silt pockets. N =17 **REC =18"** 42.0 40.8 SANDY SILT, fine to medium, moist, ML gray, trace mica, contains clayey sand pockets and indurated lean clay w=29.2% pockets. 4+6+7 LL=40 N =13 PL=34 REC =18" \*Perceptible increase in 47.0 35.8 rotary SILTY SAND, fine to medium grained, SM resistance from wet, dark gray, little fine to coarse shell 47 to 48.5 ft. fragments (±15%), contains black particles (1/16 inch), moderate HCl 20+21+35 reaction, contains strongly cemented N =56 sand pockets. REC =18" trace fine shell fragments (±1%) below 49.8 ft. 52.0 30.8 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, wet, gray, trace fine to medium shell fragments (±1%), contains black particles (1/16 inch), 42+50/3" \*Increase in weak HCl reaction. N = 50/3" rotary REC =10" resistance from -55 53.5 to 58.5 ft (slight intermittent rig chatter). 57.0 25.8 SILTY SAND, fine to medium grained, SM wet, gray, few fine to medium shell continued on next page

Calvert Cliffs Nuclear Power Plant

### Comments:

FEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

TEST

Project:

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

<sup>2. \* =</sup> See Appendix I for additional lab testing data.

Schnabel Engineering

TEST BORING LOG **Project:** Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Boring Number: B-746
Contract Number: 06120048

Schnabel Engineering LOG Sheet: 3 of 3 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** fragments (±10%), contains black SM w=17.9% particles (1/16 inch) and shell bed 44+40+27 layers. N =67 REC =16" \*Moderate to difficult rotary advancement 62.0 20.8 from 62 to 63.5 CLAYEY SAND, fine to medium SC ft (slight to grained, moist, light greenish gray, few fine to coarse shell fragments (±10%), moderate rig chatter).  $\boxtimes$ contains moderately cemented sand 50/5" \*Difficult to very pockets, strong HCI reaction. N = 50/5" difficult rotary REC =5" advancement -65 from 63.5 to 65 ft and 66.5 to 67 ft (strong rig chatter). 67.0 15.8 SILTY SAND, fine to medium grained, SM wet, gray and greenish gray, few fine to coarse shell fragments (±15%), contains w=24.8% black particles (1/16 inch), strong HCl 5+7+9 reaction. N =16 REC =18" gray, little fine to coarse shell fragments 7+12+15 N =27 (±20%). REC =18" 7.8 75.0 BOTTOM OF BORING @ 75.0 FT. TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

<sup>2. \* =</sup> See Appendix I for additional lab testing data.

chnabel Schnabel Engineering

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 3

**Boring Contractor:** CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Reese

Drilling Method: 3-7/8" OD Tri-cone Roller Bit Drilling Equipment: Diedrich D-50 (ATC) Schnabel Representative: R. Vinzant Dates Started: 7/13/06 Finished: 7/13/06

**Location:** Northing: 216176.28 ft Easting: 959944.95 ft

**Ground Surface Elevation:** 90.3 (feet)

Groundwater Observations										
	Date	Time	Depth	Casing	Caved					
Encountered	7/13		14.0'							

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	s	AMPLING	TESTS	REMARKS
(FT)		JEAGO.	(FT)		DEPTH	DATA	12010	TALINIA MA
0.5	FL, R AND TOPSOIL.	SM	89.8			1+1+2		
	SILTY SAND, fine to medium, moist, yellowish brown, contains root	O.W.				N =3		
-	fragments, and organic matter.					REC =18"		
4						2+4+4 N =8	w=7.5% *	
4.0			86.3			REC =18"		
4.0	SANDY SILT, few root fragments, dark orangeish brown.	ML	00.0		_			
	orange on brown.				<del>-</del> 5 -	2+3+5	w=12.7%	
-					- 10	N =8 REC =18"		
7.0	POORLY GRADED SAND WITH SILT,	SP-SM	83.3					
	fine to medium grained, moist,	3F-3IVI			L 1M	5+7+8		
	orangeish brown.					N =15 REC =18"		
7								
$\dashv$					—10— <sub>—</sub>		00 00/	
-	Few root fragments.				M	1+2+2 N =4	w=20.3%	
4					$\bot$ $\bot$ $\bot$	REC =18"		
12.5	SILTY SAND, fine to coarse grained,	SM	77.8					
	wet, yellowish orange.			$\nabla$		3+2+2	w=26.6%	
1				<u>~</u>		N =4 REC =18"	*	
-					<del></del> 15	REC = 10		
4								
_								
	Orange.					3+2+1	w=23.9%	
1	Grange.				 	N =3	*	
-					-20-L	REC =18"		
4								
22.0	0 1 0 1 7 7		68.3		_			
	Sandy SILT, fine to medium grained, moist, gray, contains mica.	ML						
						2+2+3	w=28.2%	
1					├   X	N =5	*	
-	continued on next page				-25- <sup>[]</sup>	REC =18"		
	Sommada on none page							

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST B-747** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** hnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 3 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA  $\mathsf{ML}$ w=32.6% 3+3+3 N =6 REC =18" -30 32.0 58.3 FAT CLAY, fine to medium, moist, dark СН greenish gray, contains mica. w=34.2% 4+4+6 N = 10REC =18" -35 w=32.6% 5+7+8 N =15 REC =18" w=27.5% 4+5+7 N =12 REC =18" w=39.4% 6+5+6 N =11 REC =18" 53.5 36.8 w=48.6% ELASTIC SILT, moist, dark greenish MH 3+6+6 LL=78 N =12 gray. PL=47 REC =18" -55

### Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

continued on next page

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-747 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 3 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** 58.0 32.3 FAT CLAY, fine to medium, moist, dark CH w=35% greenish gray, contains mica. **REC =18"** LL=53 PL=16 60.0 30.3 -60 CLAYEY SAND, greenish gray, moderate HCl reaction, moderate SC cementation, 15% med. - coarse shell fragments. Strong cemented sand w=27.6% at bottom 3" of 6+7+50/3" LL=43 N =57/9" sample PL=20 REC =16" 25.3 65.0 Harder drilling SILTY SAND, strong HCl reaction, SM strong cementation, 25% med. - coarse shell fragments. w=30.3% 18+14+20 LL=NP N =34 PL=NP REC =18" 70.0 20.3 POORLY GRADED SAND WITH SILT, SP-SM weak HCl reaction, 15% med. - coarse shell fragments. w=28.1% 7+9+13 LL=NP N =22 PL=NP REC =18" 15.3 75.0 BOTTOM OF BORING @ 75.0 FT.

### Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

SC	hnabel
Schnab	el Engineering

TEST BORING LOG

**Project:** Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Boring Number: B-74
Contract Number: 06120048

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: T. Connelly

Drilling Method: 3-7/8" O.D. Drag Bit

Drilling Method: 3-7/8" O.D. Drag Bit

Drilling Equipment: Diedrich D-50 (ATC)

Schnabel Representative: R. Vinzant

Dates Started: 7/17/06 Finished: 7/17/06

**Location:** Northing: 216039.74 ft Easting: 960288.74 ft

Lasting. 300200.74 it

**Ground Surface Elevation:** 82.4 (feet)

<b>Groundwater Observations</b>										
Date Time Depth Casing Caved										
Encountered	7/17		8.5'							

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	s	AMPLING	TESTS	REMARKS
(FT)		22,100.	(FT)		DEPTH	DATA		
0.5	FL, R AND TOPSOIL.	ML	81.9			1+2+2		
-	SANDY SILT, fine to medium, moist, light brown, contains organic matter.	IVIL				N =4 REC =16"		
-	Mottled grayish orange, No organic.					4+5+9 N =14 REC =18"		
4.5	SILTY SAND, fine to medium grained,	SM	77.9					
	moist, mottled grayish orange, few root fragments.				5 -	6+8+12 N =20 REC =18"		
7.0	DOODLY ODADED CAND WITH OLAY	00.00	75.4		L -			
	POORLY GRADED SAND WITH CLAY, medium to coarse grained, wet, yellowish brown, with clay.	SP-SC		$\bar{\Delta}$		4+8+7 N =15 REC =18"		
9.5	CLAYEY SAND, medium to coarse	SC	72.9					
-	grained, wet, orange.	30			<del>-10-</del>			
-						3+3+4 N =7 REC =18"		
13.0			69.4		L			
-	SANDY SILT, fine to medium, moist, dark gray, contains mica.	ML				REC =24"		
-					15			
4					Ļ			
17.0			65.4					
17.0	SANDY LEAN CLAY, fine to medium, moist, dark gray, contains mica.	CL	05.4					
-					L - M	1+1+3		
						N =4 REC =18"		
22.0			60.4					
	SANDY SILT, fine to medium, moist, dark greenish gray, contains mica.	ML	30.7					
+					├ -  <u> </u>	3+3+5 N =8		
-	continued on next page				-25-L	REC =18"		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST B-748** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA  $\mathsf{ML}$ 3+4+5 N =9 REC =18" Greenish gray, contains no sand. 5+7+8 N =15 REC =18" -35 With fine - med. sand. 4+5+7 N =12 REC =18" Moist, dark greenish gray, weak HCI 12+24+5/3" reaction, moderate cementation, 3% N =29/9" med. - coarse shell fragments. REC =16" 7+6+8 5% med. - coarse shell fragments, no cemented sand. N =14 3% med. - coarse shell fragments. 4+4+6 N =10 REC =18"

### Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

continued on next page

**TEST** BORING LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048 Sheet: 3 of 4

Schnab	el Engineering LOG	1	Sheet: 3 of 4						
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	DEDI	SAMPLIN DEPTH DA		TESTS	REMARKS
_		ML			DEF		18+13+11		
_					<u>60</u>	M	N =24 REC =18"		Drilling penetration rate
-					-				slower
-					-				
	Greenish gray, moderate HCl reaction,						50/4"		
	Greenish gray, moderate HCl reaction, moderate cementation, 15% med coarse shell fragments.				—65 <i>—</i>		N =50/4" REC =4"		
-					-				
-					-				
-	Dark greenish gray, no cemented sand.				-		5+6+13		
	Dam greenen grey, no como co cana					$\parallel \chi \parallel$	N =19 REC =18"		
-									
-					-				
-					-	П	7+7+9		
					- 75	$\parallel \chi \parallel$	N =16 REC =18"		
_									
-					-				
-	Crossish grow week LICI reaction 20/				-		7+8+9		
	Greenish gray, weak HCl reaction, 3% med coarse shell fragments.				- 80 <i>-</i>	$\parallel \chi \parallel$	N =17 REC =18"		
_					- 50				
-									
-	Dade was saide was				-		0.5.0		
	Dark greenish gray.				 85		3+5+6 N =11 REC =18"		
					- 65-				
-					-				
-					-				
-	Light greenish gray, strong HCl reaction, strong cementation, 40% med coarse shell fragments.				90 <i></i>		13+26+17 N =43 REC =18"		
-	continued on next page								

Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
 \* = See Appendix I for additional lab testing data.

**TEST B-748** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA  $\mathsf{ML}$ Dark greenish gray, weak HCl reaction, 15% med. - coarse shell fragments. 31+21+17 N = 38REC =18" Weak HCl reaction, 3% med. - coarse 7+12+16 shell fagments. N =28 REC =18" 100.0 -100--17.6BOTTOM OF BORING @ 100.0 FT.

### Comments:

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

<sup>2. \* =</sup> See Appendix I for additional lab testing data.

chnabel Schnabel Engineering

Boring Foreman: D. Reese

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

**Sheet:** 1 of 3

**Boring Contractor:** CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

**Drilling Method:** 3-7/8" OD Tri-cone Roller Bit (Mud Rotary)

Drilling Equipment: CME-75 (Truck) Schnabel Representative: M. Arles

Dates Started: 5/23/06 Finished: 5/23/06

**Location:** Northing: 215775.08 ft Easting: 960332.24 ft

Ground Surface Elevation: 102.5 (feet)

	Groundwater Observations									
	Date	Time	Depth	Casing	Caved					
F.,	5/00		00 [	4.01						

Encountered	5/23	-	23.5'	4.0'	

DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL		AMPLING	TESTS	REMARKS
					DEPTH	DATA		0-4' hollow
0.2	ROOTMAT AND TOPSOIL.	SC	102.3			1+1+2 N =3		stem auger
2.0	CLAYEY SAND, fine to medium grained, moist, brown, contains root fragments.	SP-SC	100.5		- <u> </u>	REC =14"		
- -	POORLY GRADED SAND WITH CLAY, fine to coarse grained, moist, brown.	01-00				3+2+2 N =4 REC =16"		4-55' 3-7/8" mud rotary
-	orangeish brown.				5 -	WOH+3+3 N =6 REC =14"		
7.0 - - -	POORLY GRADED SAND, fine to coarse grained, moist, yellow, with gravel.	SP	95.5			3+4+5 N =9 REC =14"		
- - -	orangeish yellow.				10- 	4+6+8 N =14 REC =18"		
13.0 -	POORLY GRADED SAND WITH SILT and gravel, fine to coarse grained, moist, yellowish orange.	SP-SM	89.5		  15-	5+8+10 N =18 REC =18"		
-	brownish, orange.					6+12+12 N =24 REC =12"		
- -	wet, orange.			Ā		4+5+6 N =11 REC =18"		
	continued on next page				20			

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-749 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 3 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SP-SM 4+5+11 orangeish brown. N =16 REC =14" 32.0 70.5 SANDY SILT, fine to medium, moist, ML dark gray. 1+2+2 N =4 REC =18" -35 37.0 65.5 LEAN CLAY, moist, dark gray, with CL sand. 1+3+3 N =6 REC =18" REC =24" fine to medium sandy 47.0 55.5 SANDY SILT, fine to medium, moist, MLTEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08 dark gray. 3+4+5 N =9 REC =18" 52.0 50.5 LEAN CLAY, moist, dark gray, with shell CL fragments, sand. 3+4+5 N =9 REC =18" 2-15/16" mud rotary 57.0 45.5 SILTY SAND, fine to medium grained, SM moist, dark gray. continued on next page

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST B-749** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 3 of 3 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SM 5+5+6 N =11 REC =18" contains cemented sand. 15+50 N =50 REC =12" -65 67.0 35.5 SANDY SILT, fine to medium, moist, ML dark gray, trace fine to medium shell fragments, weak HCl reaction, 0-5% shell frag. 3+3+4 N =7 REC =18" 4+4+4 N =8 REC =18" 27.5 75.0 BOTTOM OF BORING @ 75.0 FT.

### Comments:

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

<sup>2. \* =</sup> See Appendix I for additional lab testing data.

Schnabel Engineering

TEST BORING LOG **Project:** Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Boring Number: B-750

Contract Number: 06120048 Sheet: 1 of 3

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: T. Chew

Drilling Method: 3-7/8" OD Tri-cone Roller Bit
Drilling Equipment: Diedrich D-50 (ATC)
Schnabel Representative: B. Bradfield
Dates Started: 7/10/06 Finished: 7/10/06

**Location:** Northing: 215849.16 ft Easting: 959930.06 ft

Easting. 959950.00 it

**Ground Surface Elevation:** 72.4 (feet)

	Ground	water Obs	ervations	i	
	Date	Time	Depth	Casing	Caved
Encountered	7/10		43.5'		

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	S	AMPLING	TESTS	REMARKS
(FT)	OTTATA DEGGTAL TIGHT	OLAGO.	(FT)	•••	DEPTH	DATA	12010	KEMIAKKO
	SILTY SAND, fine to coarse grained, moist, yellowish brown.	SM				1+1+2 N =3		Augered with 4-1/4" HSA to ft.
	Dark orangeish brown.					3+3+3 N =6 REC =18"		
4.5	SANDY LEAN CLAY, fine to medium, moist, orangeish brown and light gray.	CL	67.9			2+3+4 N =7 REC =13"		
7.0	FAT CLAY with sand, moist, gray, contains mica.	СН	65.4			3+3+14 N =17 REC =18"		9'- Started mu rotary with 3-7/8" tri-cone
10.0	ELASTIC SILT with sand, moist, gray, contains mica.	MH	62.4		10   	1+2+3 N =5 REC =15"		roller bit
- - -	Gray and dark gray, some pockets (<1/2") of sandy clay.				 15	4+3+4 N =7 REC =18"		
17.0	FAT CLAY with silt and sand, moist, gray and dark gray, contains mica, some pockets (<1/2") of sandy clay.	СН	- 55.4		   	4+4+7 N =11		
22.0	LEAN CLAY with silt and sand, moist, gray and dark gray, contains mica.	CL	50.4		 			
	continued on next page				25_	7+9+10 N =19 REC =18"		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-750 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 3 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA CL REC =20" -30 3+4+4 sandy N =8 REC =18" -35 37.0 35.4 SANDY SILT, fine, moist, greenish gray, MLcontains mica. 4+5+7 N =12 REC =18" 30.4 42.0 CLAYEY SAND, fine to coarse grained, SC wet, gray and brownish white, 10-20% fine to medium shell fragments,  $\overline{\nabla}$ contains mica, strong HCI reaction, 6+8+15 weak cementation. N =23 REC =18" 46-52'- Harder drilling REC =11" Light gray and brownish white, 50-60% fine to coarse shell fragments, strong HCI reaction, moderate cementation. -50 52.0 20.4 POORLY GRADED SAND WITH CLAY, SP-SC fine to medium grained, wet, gray and brownish white, 20-30% fine to coarse shell fragments, strong HCI reaction, 5+6+7 N =13 HCl reaction localized to shell fragments. REC =18" continued on next page

### Comments:

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**B-750** Project: **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 3 of 3 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SP-SC 7+8+9 N =17 REC =18" 62.0 10.4 SC CLAYEY SAND, fine to medium grained, wet, greenish gray, 0-10% fine to medium shell fragments, contains mica, weak HCl reaction, HCl reaction 4+6+9 localized to shell fragments. N =15 REC =18" 3+5+7 N =12 REC =18"  $\boxtimes$ 50/5" 73.9 -1.6 BOTTOM OF BORING @ 73.9 FT. N =50/5" REC =0"

Calvert Cliffs Nuclear Power Plant

### Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

**TEST** 

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

<sup>2. \* =</sup> See Appendix I for additional lab testing data.

chnabel Schnabel Engineering

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 3

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: D. Reese Drilling Method: 3-7/8" OD Tri-cone Roller Bit (Mud Rotary)

Drilling Equipment: CME-75 (Truck) Schnabel Representative: M. Arles

Dates Started: 5/22/06 Finished: 5/22/06

**Location:** Northing: 215588.86 ft Easting: 960146.2 ft

Ground Surface Elevation: 92.2 (feet)

	Groundwater Observations												
	Date	Time	Depth	Casing	Caved								
Encountered	5/22		13.5'	4.0'									
)													

0.00	Guilace Lievation. 92.2 (leet)									
DEPTH (FT)	STRATA DESCRIPTION	CLASS	ELEV. (FT)	WL	DEPT		AMPLING DATA	TEST	s	REMARKS
0.4	ROOTMAT AND TOPSOIL		91.8			М	1+1+2			0-4' hollow
-	SILTY SAND, fine to medium grained, moist, brown, contains root fragments.	SM				M	N =3 REC =9"			stem auger
2.5	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, brown.	SP-SM	89.7		 	M	3+4+3 N =7 REC =18"			4-75' mud rotary
5.0	POORLY GRADED SAND, fine to coarse grained, moist, brown, trace gravel.	SP	87.2		5 	$\bigvee$	1+2+3 N =5 REC =12"			,
-	yellowish orange, with gravel.				 	$\bigvee$	5+6+6 N =12 REC =18"			
10.0	POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, yellowish orange.	SP-SM	82.2		10 	$\bigvee$	5+7+8 N =15 REC =16"			
13.0	POORLY GRADED SAND with gravel, fine to coarse grained, moist, brownish orange.	SP	79.2	Ţ	 15—	X	7+10+10 N =20 REC =18"			
17.0	SILTY SAND, fine to coarse grained, wet, orange, trace gravel.	SM	75.2			X	3+3+2 N =5 REC =13"			
- - -										
	fine to medium grained, no gravel.				  25	M	2+1+1 N =2 REC =14"			
	continued on next page									

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**B-751 Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 3 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SM 26.5 65.7 SANDY SILT, fine to medium, moist, MLreddish orange. 1+2+3 29.0 63.2 SANDY LEAN CLAY, fine to medium, CL N =5 moist, gray. **REC =16"** -30 REC =24" -35 3+3+4 N =7 REC =18" REC =24" 47.0 45.2 CLAYEY SAND, fine to medium SC grained, moist, greenish gray. 6+6+7 N =13 REC =18" 3+3+4 N =7 REC =18" 57.0 35.2 SANDY SILT, fine to medium, moist, MLgreenish gray. continued on next page

Calvert Cliffs Nuclear Power Plant

### Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

**TEST** 

Project:

2. \* = See Appendix I for additional lab testing data.

**TEST B-751** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 3 of 3 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA  $\mathsf{ML}$ 3+4+3 N =7 REC =18" 62.0 30.2 SILTY SAND, fine to medium grained, SM moist, greenish gray, trace fine to coarse shell fragments, strong HCl reaction, 0-10% shell frag. 5+6+7 N =13 REC =18" with fine to coarse shell fragments, 15-20% shell frag.. 11+16+22 N =38 REC =18"  $\boxtimes$ 50/5" 73.9 18.3 BOTTOM OF BORING @ 73.9 FT. N =50/5" REC =5"

### Comments:

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

<sup>2. \* =</sup> See Appendix I for additional lab testing data.



TEST BORING LOG **Project:** Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

Boring Number: B-752
Contract Number: 06120048

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: T. Connelly

Drilling Method: 3-7/8" OD Tri-cone Roller Bit
 Drilling Equipment: Diedrich D-50 (ATC)
 Schnabel Representative: R. Vinzant
 Dates Started: 7/5/06 Finished: 7/6/06

**Location:** Northing: 215489.21 ft Easting: 960257.57 ft

**Ground Surface Elevation:** 95.8 (feet)

	Groundy	water Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	7/5		23.5'		
Start of day	7/6		23.0'		
Water Reading	7/27		58.0'		

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	S	AMPLING	TESTS	REMARKS
(FT)			(FT)		DEPTH	DATA		
0.5	FL, R AND TOPSOIL.  SILTY SAND, fine to medium grained, moist, orangeish brown, contains root fragments.  POORLY GRADED SAND WITH SILT, medium to coarse grained, moist, orangeish brown.  Light yellowish orange, contains root	SM SP-SM	95.3			wor+1+2 N =3 REC =14" 2+2+2 N =4 REC =18"	w=5.9% *	
10.0 —	fragments.  No root fragments.		85.8			N =6 REC =18" 2+2+4 N =6 REC =18"		
	WELL GRADED SAND WITH SILT, fine to medium grained, moist, yellowish orange, trace organic matter.	SW-SM	03.0			2+2+5 N = 7 REC = 18" 3+5+13 N = 18 REC = 18"	w=6.7% *	
- - - 22.0 -			73.8			2+5+6 N =11 REC =18"	w=12.7%	
	SILTY SAND, fine to medium grained, wet, mottled grayish orange, contains mica.  Remarks 23.5 ft:Change from hollow stem auger continued on next page	SM	13.0	Ā		3+3+2 N =5 REC =18"		Change from hollow stem auger to muc rotary drilling

- 1. Ground water observation well OW-752B installed in boring upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-752A installed at nearby location.

TEST Project: Calvert Cliffs Nuclear Power Plant B-752 **Boring Number:** hnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SM to mud rotary drilling w=29.0% 2+1+2 Moist, gray. N = 3**REC =18"** -30 31.0 64.8 CH Sandy FAT CLAY, fine to medium grained, moist, dark greenish gray, contains mica. w=29.1% 3+4+5 LL=52 N = 9PL=23 REC =18" -35

59.8

50.8

43.8

39.8

CH

SM

OH

w=33.1%

LL=63

PL=31

w=37.1%

LL=71

PL=26

w = 40.3%

LL=68

PL=24

w=27.7%

LL=40

PL=29

3+4+5

3+5+6

N =11

5+6+8

N =14

∐ REC =18"

10+8+9

REC =18"

N =17

-55

REC =18"

REC =18"

N =9

МН

Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

36.0

45.0

52.0

56.0

mica.

ELASTIC SILT, moist, dark greenish

FAT CLAY, moist, dark greenish gray

SILTY SAND, fine to medium grained,

ORGANIC CLAY, moist, dark greenish

continued on next page

moist, dark greenish gray, contains

gray, with sand, fine - med. sand.

Trace sand.

- 1. Ground water observation well OW-752B installed in boring upon completion.
- 2. \* = See Appendix I for additional lab testing data.

gray, contains mica.

3. Ground water observation well OW-752A installed at nearby location.

TEST Project: Calvert Cliffs Nuclear Power Plant B-752 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** w=45.3%  $\mathsf{OH}$ REC =18" LL=65 PL=17 35.8 60.0 -60 ELASTIC SILT, moist, gray МН w=37.0% 4+5+5 LL=64 N = 10PL=43 REC =18" 30.8 65.0 Sandy SILT, fine to medium grained, moist, dark greenish gray, weak HCI ML reaction, 3% medium - coarse shell fragments. w=34.6% 5+6+7 N = 13REC =18" Rig chatter Remarks 25+15+25 73 ft:Rig chatter N = 40Strong HCI reaction, 15% medium -REC =18" coarse shell.  $\boxtimes$ 50/5" Contains cemented sand, strong HCI N = 50/5" reaction, 25% medium - coarse shell fragments. REC =5" 0.08 15.8 -80 SP-SM POORLY GRADED SAND WITH SILT, weak HCl reaction, 5% medium - coarse shell fragments. w=28.0% 8+9+10 N =19 **REC =18"** -85 Weak HCl reaction, 3% medium -7+9+13 coarse shell fragments. N =22 REC =18" -90 continued on next page

### Comments:

- 1. Ground water observation well OW-752B installed in boring upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-752A installed at nearby location.

**TEST** Project: Calvert Cliffs Nuclear Power Plant **B-752 Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SP-SM Weak HCI reaction, 3% medium -5+7+9 coarse shell fragments. N =16 ∐ REC =18" 8.0 95.0 CLAYEY SAND, greenish gray, strong HCl reaction, 25% medium - coarse SC shell fragments. w=31.6% 17+20+16 N =36 REC =18" -100-100.0 -4.2 BOTTOM OF BORING @ 100.0 FT.

### Comments:

- 1. Ground water observation well OW-752B installed in boring upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-752A installed at nearby location.

chnabel Schnabel Engineering

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 2

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: T. Connelly

Drilling Method: 3-7/8" OD Tri-cone Roller Bit

Drilling Equipment: CME-550 (ATV) Schnabel Representative: K. Bell

Dates Started: 7/6/06 Finished: 7/6/06

**Location:** Northing: 217831.2 ft Easting: 960648.86 ft

**Ground Surface Elevation:** 48.8 (feet)

	Groundy	vater Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	7/6		13.5'		

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	s	AMPLING	TESTS	REMARKS
(FT)		OLAGO.	(FT)	***	DEPTH	DATA	1.2010	- CENTAINING
0.6	ROOTMAT AND TOPSOIL.		48.2			0.0.40		
	CLAYEY SAND, fine to coarse grained, moist, yellowish brown, trace root fragments.	SC				2+6+10 N =16 REC =15"		
-	yellowish brown and orangeish brown, Iron staining.					4+4+6 N =10 REC =16"		
-	yellowish brown and gray.				5 -	2+4+5 N =9 REC =15"		
7.0 +	Sandy LEAN CLAY, moist, orangeish brown and gray, Iron staining.	CL	41.8			4+4+6 N =10 REC =18"		
10.0		00	38.8		-10-			
-	CLAYEY SAND, fine to coarse grained, moist, orangeish brown and gray.	SC				4+5+6 N =11 REC =10"		Start of mud rotary drilling
13.0	POORLY GRADED SAND WITH SILT, fine to medium grained, wet, yellowish brown and orangeish brown.	SP-SM	35.8	Ā	  15-	9+11+9 N =20 REC =9"		
-					_			
17.0	FAT CLAY, moist, gray, trace sand, trace fine to medium shell fragments, 2-5%, HCl reaction weak.	СН	31.8		 			
-	2 0 %, 11011 3 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1					2+4+4 N =8 REC =18"		
22.0			26.8					
-22.0	SANDY ELASTIC SILT, moist, gray and blueish gray.	MH	20.0					
-						3+3+4 N =7 REC =18"		
_	continued on next page				<u> </u>			

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 2 Schnabel Engineering LOG

Schnab	bel Engineering LUG		1			Sheet	: 2 of 2	T
DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	DEPTH	SAMPLING I DATA	TESTS	REMARKS
_		МН						
27.0	SILTY SAND, fine to medium grained moist, gray, trace fine to medium she fragments, 2-5%, strong cementation HCl reaction strong.	d, SM	21.8		- 30-	50/1" N =50/1" REC =1"		Harder drilling
- - - -	wet, blueish gray, contains fine to coarse shell fragments, 30-40%.				  35-	5+5+7 N =12 REC =18"		Rig chatter
40.0	BOTTOM OF BORING @ 40.0 FT.		8.8		  \ 40	5+9+9 N =18 REC =18"		

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.



**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

B-754 **Boring Number:** Contract Number: 06120048 Sheet: 1 of 2

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings

**Drilling Method:** 3-7/8" O.D. Drag Bit (Mud Rotary)

Drilling Equipment: CME-750 (ATV) Schnabel Representative: K. Megginson Dates Started: 5/16/06 Finished: 5/16/06

**Location:** Northing: 217369.78 ft Easting: 960290.37 ft

Ground Surface Elevation: 67.0 (feet)

		Sileet.	1 01 2									
	Groundwater Observations											
	Date	Time	Depth	Casing	Caved							
Encountered	5/16		2.5'									
Water Reading	7/26		29.4'									

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	SA	AMPLING	TESTS	REMARKS	
(FT)	OTIGIA DEGOME HOR	OLAGO.	(FT)	***	DEPTH	DATA	12313	KEWIAKK	
0.5	Forest litter, rootmat and topsoil.	211	66.5		M	3+5+4		*NWJ rods	
-	SILTY SAND, fine to coarse grained, moist, brown, contains root fragments.	SM		_		N =9 REC =13"		used.	
-	wet, brown and dark brown.			Ā	I II X II	2+1+3 N =4 REC =12"			
_	fine to medium grained, brown.					4+7+9 N =16 REC =12"			
						6+6+4 N =10 REC =12"			
9.5	LEAN CLAY, moist, gray, with fine to medium sand, trace mica.	CL	57.5			WOH+2+3 N =5			
12.0	FAT CLAY, moist, gray, trace fine to medium sand and mica.	СН	55.0			REC =18"			
_					X	WOH+2+3 N =5 REC =18"			
- - -					X	3+4+6 N =10 REC =18"			
22.0	ELASTIC SILT, moist, light greenish gray and gray, trace fine to medium sand.	MH	45.0		   				
	continued on next page				X	5+8+10 N =18 REC =18"			

- 1. Ground water observation well OW-754 installed in boring upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-754 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 2 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA МН 6+8+10 gray, with fine to medium sand, trace N =18 organic matter (±1%). **REC =18"** 35.0 32.0 SILTY SAND, fine to medium grained, wet, dark gray, little fine to coarse shell SM fragments (±15%), strong HCl reaction. 25+43+26 N =69 REC =16" -35 \*Very slight rig chatter as rotary advanced from light brown, mostly fine to coarse shell 9+23+31 38 to 41 ft. fragments (±80%). N =54 REC =15" brown, some fine to coarse shell fragments (±40%) below 39.5 ft. 26.0 41.0 LEAN CLAY, moist, greenish gray and CL gray, with fine to medium sand, trace fine to coarse shell fragments (±1%), weak HCl reaction. 3+5+7 N =12 REC =18" greenish gray, trace fine to medium 4+5+4 N =9 sand and mica. REC =18" 50.0 17.0 -50 BOTTOM OF BORING @ 50.0 FT.

### Comments:

<sup>1.</sup> Ground water observation well OW-754 installed in boring upon completion.

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Schnabel Engineer	ina

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 2

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: T. Chew

Drilling Method: 2-15/16" OD Tri-cone Roller Bit Drilling Equipment: Diedrich D-50 (ATC) Schnabel Representative: B. Bradfield Dates Started: 8/2/06 Finished: 8/2/06

**Location:** Northing: 215923.66 ft Easting: 961637.86 ft

**Ground Surface Elevation:** 95.0 (feet)

Groundwater Observations									
	Date	Time	Depth	Casing	Caved				
Encountered	8/2		NE						

OEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	SAMPLING DEPTH DATA	TESTS	REMARKS
-	POORLY GRADED SAND, fine to coarse grained, moist, light brown, trace silt.	SP			2+1+1 N =2 REC =6"		
-					4+2+3 N =5 REC =10"		
7.0			00.0		2+3+3 N =6 REC =12"		
7.0 +	POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, orangeish brown.	SP-SM	88.0		5+5+5 N =10 REC =11"		
- - -	No cemented sand.				-10- - 3+5+5 N =10 REC =16"		
13.0 -	POORLY GRADED SAND, fine to coarse grained, moist, light brown and orangeish brown, trace silt.	SP	82.0		4+9+9 N =18 REC =13"		
17.0	SILTY SAND, fine to medium grained, moist, light brown and gray, alternating colors form layers <1/8" thick.	SM	78.0		2+3+5 N =8 REC =12"		
22.0 -	SANDY SILT, fine to medium, moist, light brown and gray, alternating colors form layers 1/16-1/8" thick.	ML	73.0		  		
-	continued on next page				2+2+1 N =3 REC =18"		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-755 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 2 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA  $\mathsf{ML}$ 3+1+3 N =4 29.5 65.5 SILTY SAND, fine to medium grained, SM REC =18" moist, dark gray. 32.0 63.0 SANDY FAT CLAY, moist, dark gray, СН contains mica. 4+4+11 N =15 REC =18" -35 58.0 37.0 SANDY LEAN CLAY, moist, dark gray, CL contains mica. 2+3+6 N =9 REC =18" 40.0 55.0 BOTTOM OF BORING @ 40.0 FT.

### Comments:

<sup>1.</sup> Boring backfilled with cement/bentonite grout through tremie pipe upon completion.

<sup>2. \* =</sup> See Appendix I for additional lab testing data.

SC	hnabel
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Boring Foreman: T. Connelly

TEST **BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

Sheet: 1 of 2

Boring Contractor: CONNELLY AND ASSOCIATES, INC

FREDERICK, MARYLAND

Drilling Method: 3-7/8" OD Tri-cone Roller Bit (Mud Rotary)

Drilling Equipment: CME-75 (Truck) Schnabel Representative: R. Vinzant

Dates Started: 5/25/06 Finished: 5/25/06

**Location:** Northing: 215504.6 ft Easting: 961215.1 ft

Ground Surface Elevation: 106.9 (feet)

Groundwater Observations								
	Date	Time	Depth	Casing	Caved			
Encountered	5/25		7.5'					

DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	DEPT		MPLING DATA	TEST	s	REMARKS
0.5	Forest litter, rootmat and topsoil.		106.4				1+1+2			
-	SANDY LEAN CLAY, fine to medium, moist, dark brown, with root fragments, and organic matter.	CL	100.4		 	$\mathbb{A}$	N =3 REC =18"			
-	orangeish brown.					XII	3+2+3 N =5 REC =18"			Charac from
4.5	POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, light brown.	SP-SM	102.4		- 5 -	XII	6+5+5 N =10 REC =13"			Change from hollow stem auger to mud rotary drilling
-	wet, light orangeish brown.			Ā		XII	4+5+5 N =10 REC =15"			
- - -					—10— 	XII	6+5+5 N =10 REC =13"			
- -	fine to medium grained, moist, reddish brown.					XII	7+9+8 N =17 REC =16"			
-	fine to coarse grained, wet, light grayish orange.				  - 20-	XII	8+9+11 N =20 REC =13"			
- -	fine to medium grained, dark orangeish brown.  continued on next page				  25-	XII	3+5+6 N =11 REC =15"			

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-756 installed at nearby location.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-756 **Boring Number:** hnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 2 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SP-SM 13+17+18 fine to coarse grained, deddish brown. N =35 **REC =16"** dark reddish orange (3" layer of white 5+6+12 clay). N =18 REC =17" -35 70.9 36.0 CLAYEY SAND, fine to medium SC grained, wet, mottled grayish orange. 1+2+1 N = 3REC =18" greenish gray, contains mica. 1+2+1 N = 3REC =18" 46.0 60.9 LEAN CLAY, moist, oliveish gray, with CL fine to medium sand, contains mica. TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08 3+3+3 N =6 REC =18" 50.0 56.9 -50 BOTTOM OF BORING @ 50.0 FT.

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-756 installed at nearby location.

chnabel Schnabel Engineering

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

B-757 Contract Number: 06120048 Sheet: 1 of 2

**Boring Contractor:** CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: T. Connelly **Drilling Method:** 3-7/8" OD Tri-cone Roller Bit (Mud Rotary)

Drilling Equipment: CME-75 (Truck) Schnabel Representative: R. Vinzant

Dates Started: 5/25/06 Finished: 5/25/06

**Location:** Northing: 215135.13 ft Easting: 960760.6 ft

Ground Surface Elevation: 106.9 (feet)

Groundwater Observations									
Date Time Depth Casing Cav									
Encountered	5/25		11.0'						

0.5	STRATA DESCRIPTION  Forest litter, rootmat and topsoil.  SILTY SAND, fine to medium grained, moist, brown, contains root fragments, and organic matter.  POORLY GRADED SAND WITH SILT, fine to medium grained, moist, orangeish brown.  fine to medium grained.	SM SP-SM	ELEV. (FT) - 106.4 - 104.9	WL		1+1+1 N = 2 REC = 4+4+3 N = 7 REC = 3+4+5 N = 9 REC =	:14" ::18"	15	REMARKS
-	SILTY SAND, fine to medium grained, moist, brown, contains root fragments, and organic matter.  POORLY GRADED SAND WITH SILT, fine to medium grained, moist, orangeish brown.  fine to medium grained.					1+1+1 N = 2 REC = 4+4+3 N = 7 REC = 3+4+5 N = 9 REC =	=14" =18"		
-	moist, brown, contains root fragments, and organic matter.  POORLY GRADED SAND WITH SILT, fine to medium grained, moist, orangeish brown.  fine to medium grained.					A+4+3 N = 7 REC = 3+4+5 N = 9 REC =	=18" =18"		
	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, orangeish brown.  fine to medium grained.  light orangeish brown.	SP-SM				N =7 REC = 3+4+5 N =9 REC =	:18"		
	light orangeish brown.				5 -	N =9 REC =	=18"		
						7+8+8			
-	wet, orangeish brown.				F 7	N =16 REC =			
-	-			Σ	-10-	7+11+ N =24 REC =		ho au	nanged from llow stem ger to mud tary drilling
						5+8+8 N =16 REC =			
-	light orangeish brown.					6+7+10 N =17 REC =			
						4+6+7 N =13 REC =			

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

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**TEST** BORING LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** Contract Number: 06120048

Schnab	el Engineering LOG						Sheet	2 of 2	71200-10
DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL			AMPLING	TESTS	REMARKS
(FT)			(F1)		DEPTI	н	DATA		
		SP-SM	00.0						
26.0	POORLY GRADED SAND WITH CLAY fine to medium grained, wet, orangeish	, SP-SC	80.9						
4	fine to medium grained, wet, orangeish brown.								
	Siowii.								
						ᆔ	31313		
1					- 1	I X II	3+3+2 N =5		
4					<u> </u>	Ш	REC =18"		
1									
+									
_					L ]				
	mottled grayish orange.					ᆔ	2+1+1		
1	mottled grayish orange.				- 1	XII	2+1+1 N =2		
-					_35_	Ш	REC =18"		
1									
+					F 1				
_					L l				
						ᆔ	2+2+2		
1					- 1	I X II	N =4		
40.0 🕂	BOTTOM OF BORING @ 40.0 FT.		66.9		-40-l	Ш	REC =18"		
	BOTTOM OF BORING @ 40.0 FT.								

Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
 \* = See Appendix I for additional lab testing data.

SC	hnabel
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**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 2

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: T. Connelly

Drilling Method: 3-7/8" OD Tri-cone Roller Bit

**Drilling Equipment: CME-75** 

Schnabel Representative: R. Vinzant

Dates Started: 5/24/06 Finished: 5/24/06

**Location:** Northing: 215133.29 ft Easting: 960332.67 ft

**Ground Surface Elevation:** 82.6 (feet)

	Groundy	vater Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	5/24		Dry		

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	s	AMPLING	TESTS	REMARKS
(FT)			(FT)	<b>-</b>	DEPTH	DATA		
-	POORLY GRADED SAND WITH SILT, medium to coarse grained, organic matter, trace gravel, moist, light orangeish brown.	SP-SM				2+2+2 N =4 REC =16"		
-	Reddish brown.					2+1+1 N =2 REC =17"		
-	Orangeish brown, trace organic matter.				5 -	3+2+2 N =4 REC =18"		
- - -	Light yellowish brown, trace gravel, and mica.					13+7+5 N =12		
- - -	Light orangeish brown, fine - med. sand.					3+3+3 N =6 REC =18"		
- - -					-15	3+3+3 N =6 REC =18"		Start of mud rotary drilling
17.0	CLAYEY SAND, fine to medium grained, wet, light orange.	SC	65.6					
					20	2+1+1 N =2 REC =18"		
22.5	SANDY LEAN CLAY, fine to medium, moist, greenish gray, with mica.	CL	60.1					
_	continued on next page					1+3+3 N =6 REC =18"		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST B-758** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 2 Schnabel Engineering LOG DEPTH **SAMPLING** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA CL 1+3+3 N =6 REC =18" 3+4+4 N =8 REC =18" -35 4+5+6 N =11 REC =18" 40.0 42.6 BOTTOM OF BORING @ 40.0 FT.

# Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
   \* = See Appendix I for additional lab testing data.



**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings Drilling Method: 3-7/8" OD Drag Bit Drilling Equipment: CME-750 (ATV) Schnabel Representative: B. Bradfield Dates Started: 6/20/06 Finished: 6/21/06

**Location:** Northing: 214526.25 ft Easting: 960025.32 ft

**Ground Surface Elevation:** 98.4 (feet)

		Officet.	1 01 7		
	Groundy	water Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	6/20		10.5'		
Water Reading	7/26		61.3'		

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	s	AMPLING	TESTS	REMARKS
(FT)	OTTATA DEGOTAL TION	OLAGO.	(FT)	***	DEPTH	DATA	12010	KEMAKKO
0.2	Forest litter, rootmat, and topsoil.	ML	98.2			3+3+3		
2.0	SILT with sand, moist, yellowish brown and brown, contains root fragments		96.4			N =6 REC =7"		1.5'-Begin mud-rotary with
_	CLAYEY SAND, fine to medium grained, moist, orangeish brown, contains root fragments	SC				4+6+9 N =15 REC =14"		3-7/8" drag bit
4.5	POORLY GRADED SAND WITH SILT, fine to coarse grained, moist, orangeish brown and brown	SP-SM	93.9		5 -	2+3+3 N =6 REC =14"		
7.0	POORLY GRADED SAND, fine to coarse grained, trace gravel, trace silt, moist, orangeish brown.	SP	91.4			4+7+8 N =15 REC =10"		
-	wet, yellowish brown			Ā	-10-	4+5+8 N =13 REC =10"		
13.0	POORLY GRADED SAND WITH SILT, fine to coarse grained, wet, yellowish brown	SP-SM	85.4			4+6+9 N =15 REC =6"		
17.0			81.4					
-	SILTY SAND, fine to coarse grained, trace gravel, wet, orangeish brown and reddish brown.	SM	01.7			8+7+5 N =12 REC =6"		
22.0	CLAYEY SAND, fine to medium	SC	76.4					
-	grained, wet, orangeish brown and light gray	30			-	2+2+2		
_	continued on next page				_25-	N =4 REC =15"		

- 1. Ground water observation well OW-759B installed in boring upon completion.
- \* = See Appendix I for additional lab testing data.
   Ground water observation well OW-759A installed at nearby location.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-759 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SC 27.0 71.4 SANDY ELASTIC SILT, fine to medium, МН wet, orangeish brown and mottled gray 1+1+2 N = 3REC =15" 32.0 66.4 FAT CLAY with sand, moist, gray, СН contains mica 2+3+2 N =5 REC =18" -35 37.0 61.4 LEAN CLAY with sand, moist, gray, CL contains mica 2+4+4 N =8 REC =18" 42.0 56.4 FAT CLAY with sand, moist, gray, CH contains mica 2+4+5 N =9 44.5 53.9 POORLY GRADED SAND WITH CLAY, SP-SC REC =18" fine to medium grained, wet, dark gray, contains mica. 47.0 51.4 LEAN CLAY with sand, moist, dark CL gray, contains mica 4+6+8 N =14 -50 52.0 46.4 SC CLAYEY SAND, fine to medium grained, moist, dark gray, contains mica 4+6+8 N =14 REC =18" REC =0" 57-62'-Harder drilling

### Comments:

FEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Ground water observation well OW-759B installed in boring upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-759A installed at nearby location.

continued on next page

B-759 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **DEPTH SAMPLING** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH **DATA** SC fine to coarse grained, wet, gray and 12+14+21 brownish white, 30-40% fine to coarse N =35 59.5 38.9 REC =18" shell fragments, strong HCl reaction CL SANDY LEAN CLAY, fine to coarse, wet, gray, 10-20% fine to medium shell fragments, moderate HCI reaction, moderate cementation moist, 0-10% fine to medium shell 1+3+4 fragments, weak HCI reaction N = 7REC =18" 32.9 65.5 SANDY FAT CLAY, fine to medium, CH moist, gray, 0-10% fine to medium shell REC =24" fragments, contains mica, weak HCI reaction 68'-Start of day 6/21/06 68.5 29.9 SANDY SILT, fine to coarse, moist, gray, 20-30% fine to coarse shell ML 1+3+50/5" N =53/11" 70'-Intermittent fragments, moderate HCl reaction, REC =8" moderate to moderate cementation, cemented sand hard drilling up to 1" in diameter 72.0 26.4 SILTY SAND, fine to medium grained, SM wet, gray and brownish white, 30-40% fine to medium shell fragments, strong HCI reaction 4+6+10 N = 16REC =18" 77.0 21.4 POORLY GRADED SAND, fine to medium grained, wet, gray and brownish white, trace silt, 10-20% fine to medium shell fragments, strong HCI 10+7+5 reaction, HCl reaction localized to shell N =12 fragments REC =15" 82.0 16.4 POORLY GRADED SAND WITH SILT, SP-SM fine to medium grained, wet, gray and brownish white, 20-30% fine to coarse shell fragments, strong HCl reaction, 6+7+8 HCl reaction localized to shell fragments N =15 **REC =18"** -85 87.0 11.4 CLAYEY SAND, fine to medium SC grained, wet, gray, 0-10% fine to medium shell fragments, moderate HCI reaction, HCl reaction localized to shell 3+4+8 fragments N = 12REC =18" -90 continued on next page

Calvert Cliffs Nuclear Power Plant

### Comments:

FEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Ground water observation well OW-759B installed in boring upon completion.
- \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-759A installed at nearby location.

TEST

Project:

**TEST B-759** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SC 4+5+8 N =13 REC =18" brownish white, 50-60% fine to coarse shell fragments, strong HCI reaction REC =1" 7+11+13 N =24 30-40% fine to medium shell fragments, REC =12" trace cemented sand, strong HCI 100.0 -100--1.7 reaction BOTTOM OF BORING @ 100.0 FT.

### Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Ground water observation well OW-759B installed in boring upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-759A installed at nearby location.



**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

B-765 **Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: J. Blemings

Drilling Method: 3-7/8" OD Tri-cone Roller Bit **Drilling Equipment:** Diedrich D-50 (ATC) Schnabel Representative: R. Vinzant Dates Started: 7/11/06 Finished: 7/12/06

**Location:** Northing: 216424.51 ft Easting: 959701.22 ft

Ground Surface Elevation: 97.4 (feet)

	Groundy	vater Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	7/11		19.5'		
Start of day	7/12		20.0'		
Water Reading	7/27		19.4'		

DEPTH   (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL		AMPLING	TESTS	REMARKS
	FL, R AND TOPSOIL.		+` ´		DEPTH	DATA		
0.5	POORLY GRADED SAND WITH SILT, medium to coarse grained, trace organic matter, moist, dark yellowish brown.	SP-SM	96.9			1+1+1 N =2 REC =18"		
_	Orangeish brown, contains root fragments.					2+2+4 N =6 REC =18"		
-	No root fragments.				<u> </u>	2+4+4 N =8 REC =18"		
-						3+3+8 N =11 REC =18"		
-	Light yellowish brown.				10 	3+4+6 N =10 REC =18"		
- - -	Orangeish brown.				 15-	5+5+5 N =10 REC =18"		
- - - - -	Wet, 4" section of light gray material .			Ā		2+2+5 N =7 REC =18"		
-	2" layer of dark reddish brown .					5+6+7 N =13 REC =18"		
_	continued on next page				25  <u>L</u>			

- 1. Ground water observation well OW-765A installed in boring upon completion.
- \* = See Appendix C for additional lab testing data.
   Ground water observation well OW-765B installed at nearby location.

TEST Project: Calvert Cliffs Nuclear Power Plant B-765 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SP-SM 27.0 70.4 SANDY LEAN CLAY, fine to medium, CL moist, gray, contains mica. 3+3+3 N =6 **REC =18"** 3+3+4 N =7 REC =18" -35 37.0 60.4 SILTY SAND, fine to medium grained, SM moist, gray, contains mica. 6+8+13 N =21 REC =18" 55.4 42.0 SANDY LEAN CLAY, fine to medium, CL moist, gray, contains mica. 5+9+10 N =19 REC =18" 47.0 50.4 SANDY SILT, fine to medium, moist, MLdark greenish gray, contains mica. 4+7+9 N =16 REC =18" 52.0 45.4 LEAN CLAY, moist, dark greenish gray, CL with sand, contains mica, fine - med. sand. 3+4+6 N =10 REC =18" 57.0 40.4 SILT, moist, dark greenish gray, with MLsand, contains mica, fine - med. sand. continued on next page

### Comments:

FEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Ground water observation well OW-765A installed in boring upon completion.
- 2. \* = See Appendix C for additional lab testing data.
- 3. Ground water observation well OW-765B installed at nearby location.

B-765 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA ML5+5+6 N = 11REC =18" 7+8+13 N =21 REC =18" Harder drilling Contains cemented sand, strong HCI reaction, weak cementation, 15% med. -9+50/5" N =50/5" REC =11" coarse shell fragments. REC =8" Strong HCI reaction, moderate cementation, 15% med. - coarse shell fragments. 73.0 24.4 SILTY SAND, fine to medium grained, SM moist, greenish gray, strong HCl reaction, moderate cementation, 25% 14+12+50/5" N =62/11" med. - coarse shell fragments. REC =17" Drilling penetration rate faster Dark greenish gray, moderate HCI 6+7+11 reaction, weak cementation, 15% N =18 layered med. - coarse shell fragments. REC =18" Wet, weak HCI reaction, 5% med. -6+8+12 coarse shell fragments, no cementation. N =20 **REC =18"** -85 3% med. - coarse shell fragments. 4+6+8 N =14 REC =18" -90 continued on next page

Calvert Cliffs Nuclear Power Plant

### Comments:

FEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Ground water observation well OW-765A installed in boring upon completion.
- \* = See Appendix C for additional lab testing data.
- 3. Ground water observation well OW-765B installed at nearby location.

TEST

Project:

**TEST B-765** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SM Moist. 4+6+6 N =12 REC =18" Wet, light gray, strong HCl reaction, strong cementation, 50% med. - coarse shell fragments. REC =6" -100-REC =20" 102.0 -4.6 BOTTOM OF BORING @ 102.0 FT.

### Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Ground water observation well OW-765A installed in boring upon completion.
- \* = See Appendix C for additional lab testing data.
   Ground water observation well OW-765B installed at nearby location.

chnabel Schnabel Engineering

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

B-766 **Boring Number:** Contract Number: 06120048 Sheet: 1 of 2

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Evans

**Drilling Method:** 3-7/8" OD Tri-cone Roller Bit (Mud Rotary)

Drilling Equipment: Failing-1500 (Truck) Schnabel Representative: R. Vinzant Dates Started: 5/23/06 Finished: 5/23/06

**Location:** Northing: 216932.89 ft Easting: 959791.5 ft

Ground Surface Elevation: 108.9 (feet)

	Groundy	water Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	5/23		0.0'		
Water Reading	7/26		27.0'		

POORLY GRADED SAND WITH SILT, trace root fragments, fine to medium grained, wet, dark brown.  reddish brown.  orangeish brown.  moist.	SP-SM	(FT)	$\nabla$	5 - \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	DATA  5+8+4 N = 12 REC = 18"  2+1+2 N = 3 REC = 18"  2+3+3 N = 6 REC = 16"  3+3+4 N = 7 REC = 15"		
orangeish brown. moist.				5 -	N = 3 REC = 18" 2+3+3 N = 6 REC = 16" 3+3+4 N = 7		
moist.				5 -	N =6 REC =16" 3+3+4 N =7		
					N =7		
wet, trace gravel, fine to coarse grained.							
				-10-	4+8+9 N =17 REC =18"		
					12+16+17 N =33 REC =18"		
					12+13+19 N =32 REC =18"		
					10+15+20 N =35 REC =18"		
	reddish brown.	reddish brown.	reddish brown.	reddish brown.	reddish brown.	reddish brown.	reddish brown.    N = 32

- 1. Ground water observation well OW-766 installed in boring upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST B-766** Project: Calvert Cliffs Nuclear Power Plant **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 2 of 2 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH DATA SP-SM light orangeish brown mottled of white. 5+4+5 N =9 REC =18" 32.0 76.9 CLAYEY SAND, fine to medium SC grained, wet, orangeish brown, contains white clay. 2+2+2 N =4 REC =18" -35 greenish gray, contains mica. 2+1+2 N = 3REC =18" 2+2+3 N =5 REC =18" 2+3+4 N =7 REC =18" 50.0 58.9 -50 BOTTOM OF BORING @ 50.0 FT.

### Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Ground water observation well OW-766 installed in boring upon completion.
- 2. \* = See Appendix I for additional lab testing data.

chnabel Schnabel Engineering

**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 4

CONNELLY AND ASSOCIATES, INC. **Boring Contractor:** 

FREDERICK, MARYLAND

Boring Foreman: D. Reese **Drilling Method:** 3-7/8" OD Tri-cone Roller Bit (Mud Rotary)

Drilling Equipment: CME-75 (Truck)

Dates Started: 6/19/06 Finished: 6/20/06

**Location:** Northing: 217116.03 ft Easting: 962242.98 ft

Schnabel Representative: M Arles

Ground Surface Elevation: 48.4 (feet)

Groundwater Observations											
	Date	Time	Depth	Casing	Caved						
Encountered	6/20		23.5'	0.0'							

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	s	AMPLING	TESTS	REMARKS
(FT)	5.13.17.5266101 11610		(FT)		DEPTH	DATA		
0.3	FL, R AND TOPSOIL.	FILL	48.1			1+3+3		0-40' Hollow stem auger
20	Sandy lean clay FILL, contains root fragments, fine to coarse, moist, brown.	1166	40.4			N =6 REC =12"		stern auger
2.0	SILTY SAND, fine to medium grained, moist, brown.	SM	46.4			5+6+6 N =12 REC =18"		
7.0			44.4		5 -	5+6+7 N =13 REC =18"		
7.0 +	LEAN CLAY, moist, brown and green.	CL	41.4			3+4+5 N =9 REC =12"		
- - -	trace sand.				-10-	2+2+3 N =5 REC =14"		
13.0	ELASTIC SILT, moist, green and brown.	MH	35.4		 15-	1+3+3 N =6 REC =16"		
- - -					  			
- - -	with ironite layers.				-20	1+3+4 N =7 REC =18"		
23.0	SILTY SAND, fine to medium grained, wet, brown.	SM	25.4	Σ	-  -  -	WOH+1+1 N =2		
	continued on next page				-25-K	REC =12"		

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-768A installed at nearby location.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-768 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SM moist, green, with fine to coarse shell fragments, strong HCl reaction, 30-40% 3+4+4 N =8 shell frag. **REC =18"** contains cemented sand, 40-50% shell 3+5+5 N = 10REC =18" -35 fine grained, trace fine to medium shell 3+3+4 fragments, moderate HCI reaction, N =7 40-100' mud 0-10% shell frag. REC =18" rotary, 3-7/8" roller bit REC =20" fine to medium grained, weak HCI reaction.

8+21+19

31+11+18 N =29

REC =14"

53' rig chatter

N =40 REC =18"

### Comments:

FEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.

with fine to coarse shell fragments, strong HCl reaction, 60-70% shell frag.

wet, green and white, contains

cemented sand, 60-80% shell frag, 1/4"

continued on next page

layers of cemented sand and shells.

3. Ground water observation well OW-768A installed at nearby location.

TEST Project: Calvert Cliffs Nuclear Power Plant B-768 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 3 of 4 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH DATA** SM green, moderate HCl reaction, 10-20% 5+17+23 shell frag. N = 40REC =18" 5+7+12 N =19 REC =18" 67.0 -18.6 SP-SM POORLY GRADED SAND WITH SILT, fine to medium grained, moist, green, trace fine to medium shell fragments, moderate HCl reaction, 0-10% shell 5+8+10 frag. N =18 REC =18" 72.0 -23.6 SILTY SAND, fine to medium grained, SM moist, green. REC =13" -75 77.0 -28.6 SANDY SILT, fine to medium, moist, ML green, trace fine to medium shell fragments, moderate HCl reaction, 0-10% shell frag. 5+5+5 N = 10REC =18" 82.0 -33.6 SILTY SAND, fine to medium grained, SM moist, green, with fine to coarse shell fragments, strong HCI reaction, 40-60% shell frag. 4+13+9 N =22 **REC =18"** -85 5+12+12 N =24 REC =18" -90 continued on next page

### Comments:

FEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-768A installed at nearby location.

**TEST** Project: Calvert Cliffs Nuclear Power Plant **B-768 Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Sheet: 4 of 4 Schnabel Engineering LOG **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SM 92.0 -43.6 SANDY SILT, fine to medium, moist, ML oliveish green, with fine to medium shell fragments, moderate HCl reaction, 10-15% shell frag. 4+6+7 N =13 ∐ REC =18" 97.0 -48.6 ELASTIC SILT, moist, oliveish green, MH with sand, trace fine to medium shell fragments, moderate HCI reaction, 0-5% shell frag. 4+7+8 N =15 REC =18" 100.0 -100--51.6 BOTTOM OF BORING @ 100.0 FT.

### Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Boring backfilled with cement/bentonite grout through tremie pipe upon completion.
- 2. \* = See Appendix I for additional lab testing data.
- 3. Ground water observation well OW-768A installed at nearby location.



**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**B-769 Boring Number:** Contract Number: 06120048 Sheet: 1 of 2

Boring Contractor: UNI-TECH DRILLING

MALAGA, NEW JERSEY

Boring Foreman: J. Blemings

**Drilling Method:** 3-7/8" O.D. Drag Bit (Mud Rotary)

Drilling Equipment: CME-750 (ATV) Schnabel Representative: K. Megginson Dates Started: 5/11/06 Finished: 5/11/06

**Location:** Northing: 216589.75 ft Easting: 962559.47 ft

Ground Surface Elevation: 54.2 (feet)

	Sileet. 1 of 2												
	Groundy	vater Obs	ervations										
	Date	Time	Depth	Casing	Caved								
Encountered	5/11		24.5'										
Water Reading	7/25		24.3'										

DEPTH   (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL		SAMPLING	TESTS	REMARKS
(1.1)	Farantiittan gantuurt and taganii		(1.1)		DEPTH	-		*NWJ rods
0.7	Forest litter, rootmat and topsoil.	014	53.5		\ <u>\</u>	1+1/12" N =1/12"		used.
]	SILTY SAND, fine to medium grained, moist, brown and dark brown, contains root fragments.	SM			- 7 <u>V</u>	REC =7"		
	fine to coarse grained, light brown.					3+5+5 N =10 REC =15"		
4.5	CLAVEY SAND, fine to coorse grained	SC	49.7					
-	CLAYEY SAND, fine to coarse grained, moist, brown, (coarse sand is	30			5 —	3+4+6		
-	subangular to subrounded).				<u> </u>  2	N =10 REC =12"		
	orangeish brown and brown.		45.7			5+4+5 N =9		
8.5	LEAN CLAY, moist, light orangeish brown and grayish brown, trace fine to medium sand.	CL	45.7			REC =16"		
-	fine to medium sandy, light orangeish brown and light grayish brown, trace mica, contains clayey sand lenses, (bedding thickness 1/8 inch).					6+6+8 N =14 REC =16"		
- - -	grayish brown and light orangeish brown.				15	3+2+4 N =6 REC =18"		
-								
_	orangeish brown and grayish brown, trace fine to medium sand, (soil structure exhibits vertical laminations - laminations no greater than 1/16 inch thick).				20	WOH+3+3 N =6 REC =18"		
-	orangeish brown and light brown, trace					WOH+2+2		
7	fine to medium sand.			$\bar{\sum}$	$\lceil \rceil \rangle$	N =4 REC =18"		
-	continued on next page				├-25-  <sup> </sup>	1 IVEC - 10		

- 1. Ground water observation wel OW-769 installed in boring upon completion.
- 2. \* = See Appendix I for additional lab testing data.

**TEST** Project: Calvert Cliffs Nuclear Power Plant B-769 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 2 **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA wet, light brown and dark orangeish CL brown, with fine to medium sand. 27.0 27.2 CLAYEY SAND, fine to medium SC grained, wet, brown and orangeish brown, (high percentage of fines). 4+1+4 N =5 **REC =18"** light gray and gray below 29.7 ft. 32.0 22.2 SILTY SAND, fine to medium grained, SM wet, gray, trace fine to coarse shell fragments (±5%), weak HCl reaction. 4+4+4 N =8 REC =18" -35 37.0 17.2 CLAYEY SAND, fine to medium SC grained, wet, gray, few fine to coarse shell fragments (±10%), strong HCI reaction, contains fine to medium 17+9+6 strongly cement sand layer from 38.5 to N =15 39 ft. REC =16" dark gray, weak HCI reaction. 3+3+5 N =8 REC =18" 3+4+3 N =7 REC =18" 50.0 4.2 -50 BOTTOM OF BORING @ 50.0 FT.

### Comments:

FEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

- 1. Ground water observation wel OW-769 installed in boring upon completion.
- 2. \* = See Appendix I for additional lab testing data.



**TEST BORING** LOG

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**Boring Number:** 

Contract Number: 06120048 Sheet: 1 of 2

Boring Contractor: CONNELLY AND ASSOCIATES, INC.

FREDERICK, MARYLAND

Boring Foreman: T. Connelly

Drilling Method: 3-7/8" OD Tri-cone Roller Bit **Drilling Equipment:** Diedrich D-50 (ATC) Schnabel Representative: R. Vinzant Dates Started: 6/22/06 Finished: 6/22/06

**Location:** Northing: 215466.6 ft Easting: 962826.95 ft

Ground Surface Elevation: 121.6 (feet)

	Groundy	vater Obs	ervations								
	Date	Time	Depth	Casing	Caved						
Encountered	6/22		11.0'								
Water Reading	7/25		DRY								

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL	SAMPLING	TESTS	REMARKS
(FT)			(FT)		DEPTH DATA		
0.5	FL, R AND TOPSOIL.	SP-SM	121.1		2+1+2 N =3		
1	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, yellowish brown.	SF-SIVI			REC =18"		
	Moist, yellowish orange, trace root fragments.				6+8+6 N =14 REC =18"		
4.5	SANDY ELASTIC SILT, fine to medium,	MH	117.1				
-	moist, yellowish orange, trace root fragments.	IVIII			3+4+5 N =9 REC =18"		
7.0	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, reddish brown.	SP-SM	114.6		7+10+12 N =22 REC =18"		
-	Wet.			Ā	5+7+10 N =17 REC =18"		Change from hollow stem auger to mud
-	Yellowish orange, Med coarse sand.				5+5+8 N =13 REC =18"		rotary drilling
- - - - -	Moist, reddish brown.				9+10+9 N =19 REC =18"		
_	Orangeish brown.				9+13+12 N =25 REC =18"		
1	continued on next page				23		

- 1. Ground water observation well OW-770 installed in boring upon completion.
- 2. \* = See Appendix I for additional lab testing data.

B-770 **Boring Number:** chnabel **BORING** Calvert County, Maryland Contract Number: 06120048 Schnabel Engineering LOG Sheet: 2 of 2 ELEV. **SAMPLING DEPTH** STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) **DEPTH** DATA SP-SM 10+11+13 Wet, light yellowish brown. N =24 REC =15" 9+12+14 N =26 REC =18" -35 37.0 84.6 POORLY GRADED SAND WITH CLAY, SP-SC fine to medium grained, moist, mottled grayish orange. 3+3+1 N =4 REC =14" Gray, contains organic matter. 2+1+1 44.0 77.6 CL N =2 LEAN CLAY, moist, mottled orangeish REC =6" gray, with sand, Fine - med. sand. 46.0 75.6 FAT CLAY, moist, mottled orangeish CH gray, with sand, Fine - med. sand. 2+8+8 N =16 49.5 72.1 REC =12" POORLY GRADED SAND WITH SILT, SP-SM 50.0 71.6 -50 fine to medium grained, moist, reddish brown. BOTTOM OF BORING @ 50.0 FT.

Calvert Cliffs Nuclear Power Plant

### Comments:

TEST BORING LOG 06120048 PLOG SPT 700.GPJ SCHNABEL.GDT 3/6/08

1. Ground water observation well OW-770 installed in boring upon completion.

**TEST** 

Project:

2. \* = See Appendix I for additional lab testing data.

**Schnabel Project No**. 06120048 **Appendix C:** Borings and Test Pits

# **TEST PIT LOGS**

Schnabel	TEST	Project:		Cliffs Nuclear Power Pla	Test Pit Number:			TP-			
Schnabel Engineering	PIT LOG		Calvert	County, Maryland		Contract Number: 0612004 Sheet: 1 of 1					
oring Contractor:			Groundy	vater Obs	ervations	j					
orning Contractor.					Date	Time	Depth	Casing			
oring Foreman: Paul Scha	affer										

**TP-B307** 

Caved

Dates Started: 7/29/06 Finished: 7/29/06 **Location:** Northing: 216957.53 ft Easting: 960690.62 ft

Schnabel Representative: K Megginson

Excavation Equipment: John Deere 410D (Rubber Tired)

EPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL		S	AMPLING	TESTS	REMARKS
(FT)			(F1)		DEP1	ГН	DATA		
0.3	Rootmat and topsoil	ML	119.1						
-	SILT (ML), trace fine to medium sand, contains root fragments, moist, brown. Fine to medium sandy below 1.5 ft.	WL			- -				
3.0	SILTY SAND (SM), fine to medium,	SM	116.4		-	1			
4.0	contains poorly graded sand with silt lenses, moist, brown and light brown.	SP-SM	115.4		-			2 20/	Test Pit
-	POORLY GRADED SAND WITH SILT				<del>-</del> 5 -		Bulk Sample	w=2.3%	consistently caved-in at
-	(SP-SM), fine to coarse, contains clayey sand pockets, moist, light brown and								about 5.0 ft.
6.7	yellowish brown.		112.7						
	BOTTOM OF BORING @ 6.7 FT.								

- 1. Backfilled upon completion 2. \* See Appendix I for additional laboratory testing data.



Project: Calvert Cliffs Nuclear Power Plant

Calvert County, Maryland

**TP-B314** Test Pit Number:

Contract Number: 06120048 Sheet: 1 of 1

**Boring Contractor:** 

Boring Foreman: Paul Schaffer

Excavation Equipment: John Deere 410D (Rubber Tired)

Schnabel Representative: K Megginson Dates Started: 8/2/06 Finished: 8/2/06

**Location:** Northing: 217320.35 ft Easting: 960658.25 ft

Ground Surface Elevation: 52.8 (feet)

	Groundy	vater Obs	ervations		
	Date	Time	Depth	Casing	Caved
Encountered	8/2		4.0'		
Encountered	8/2		6.5'		

DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL		AMPLING	TESTS	REMARKS
(Г1)	Forest litter restmet and tonesil		(1-1)		DEPTH	DATA		
0.8	Forest litter, rootmat and topsoil		52.0					
-	SILTY SAND (SM), fine to medium, trace fine gravel, contains root	SM						
1	fragments, moist, brown							
4	Light brown below 1.5 ft.				_			
4.0			48.8	$\nabla$	L J_			
4.0	FAT CLAY (CH), trace fine to medium sand, moist, light gray, orange-brown	CH	40.0	_		Bulk Sample	w=37.0% LL=71	Perched grou water from 4 t
-	and yellow-brown.				<b>-</b> 5 - <b>-</b> ■		PL=24	4.5 ft.
4				$\nabla$				Water
				<u> </u>				infiltration fror back sidewall
								6.5 ft.
8.0	ELASTIC SILT (MH), trace fine sand	МН	44.8		- 1			
9.0	and mica, moist, gray.	_	43.8					
	BOTTOM OF BORING @ 9.0 FT.							

- 1. Backfilled upon completion
- 2. \* See Appendix I for additional laboratory testing data.

1	hnabel	TEST	Project:	Са	lvert Clif	fs Nucle	ar Pow	er Pla	nt		Test P	it Numbeı	r: TI	P-B315			
	bel Engineering	PIT LOG		Ca	Ivert Co	unty, Ma	ryland					Contract Number: 06120048 Sheet: 1 of 1					
									Gr	oundwa		ervations					
Boring C	Contractor:								D	Date	Time	Depth	Casing	Caved			
Boring F	oreman: Paul Sch	affer															
Excavati	on Equipment: Jol	hn Deere 41	0D (Rubbei	r Tire	ed)												
Schnabe	el Representative:	K Megginso	n														
Dates \$	Started: 8/2/06 F	Finished: 8	/2/06														
Location	: Northing: 217182 Easting: 96056																
Ground	Surface Elevation:	65.8 (feet)															
DEPTH (FT)	STRATA	A DESCRIPT	TION		CLASS	ELEV. (FT)	WL	DEP		AMPLII	NG ATA	TEST	S F	REMARKS			
	Forest litter, root	mat and top	soil					DEF	Ϊ	,	AIA .						
1.0 -	SILTY SAND (SI	M) fine to m	edium		SM	64.8		-	1								
2.0 -	contains root frag	gments, moi	st, light		SC	63.8		ļ.,									
3.0 -	CLAYEY SAND contains silty sar orange-brown.				SM	62.8		_									
5.0 —	SILTY SAND (SI moist, stratified by yellow-brown.		edium,		SP-SM	60.8		- 5 -									
_	POORLY GRAD (SP-SM), fine to sand lenses, mo brown.	coarse, con	tains silty							Bulk S	Sample	w=5.4	%				

57.3

TEST PIT LOG NEW TEST PITS 06120048.GPJ SCHNABEL.GDT 3/10/08

8.5

- Comments:
  1. Backfilled upon completion
  2. \* See Appendix I for additional laboratory testing data.

BOTTOM OF BORING @ 8.5 FT.



Project: Calvert Cliffs Nuclear Power Plant

Calvert County, Maryland

**TP-B334** Test Pit Number:

Contract Number: 06120048 Sheet: 1 of 1

**Boring Contractor:** 

Excavation Equipment: John Deere 410D (Rubber Tired)

Schnabel Representative: K Megginson Dates Started: 8/2/06 Finished: 8/2/06

**Location:** Northing: 216515.64 ft Easting: 960560.94 ft

Boring Foreman: Paul Schaffer

**Ground Surface Elevation:** 87.0 (feet)

	Groundwater Observations												
	Date	Time	Depth	Casing	Caved								
Encountered	8/2	12:00	8.0'										

DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	DEPT	AMPLING DATA	TESTS	REMARKS
0.7	Forest litter, rootmat and topsoil SILTY SAND (SM), fine to medium,	SM	86.3			DATA		
- - -	contains root fragments, moist, brown light brown below 2.5 ft.				  - 5 -	Bulk Sample	w=7.4%	
_					 	Bulk Sample	w=14.5%	Water
7.5 9.3 10.0	LEAN CLAY (CL), trace fine to medium sand and mica, moist, dark brown.  wet below 8.0 ft.  POORLY GRADED SAND WITH SILT (SP-SM), fine to medium, wet, light gray and orangish-brown  BOTTOM OF BORING @ 10.0 FT.	SP-SM	- 79.5 - 77.7 - 77.0	Ţ	  10			infiltration as bucket advanced below 8 ft.

- 1. Backfilled upon completion
- 2. \* See Appendix I for additional laboratory testing data.

Schnabel	TEST	<b>,</b>		Cliffs Nuclear Power F	Plant	Test Pit Number: TP-B33								
Schnabel Engineering	PIT LOG	Cal	vert	County, Maryland		Contract Number: 06120048 Sheet: 1 of 1								
Boring Contractor:					Ground	water Obs	ter Observations							
Borning Contractor.					Date	Time	Depth	Casing	Caved					
Boring Foreman: Paul Scha	affer													
Excavation Equipment: Joh	nn Deere 41	0D (Rubber Tire	d)											
Schnabel Representative: I	K Megginsor	า												
Dates Started: 7/29/06	Finished:	7/29/06												
<b>Location:</b> Northing: 216730 Easting: 960700														

DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	DEP.		AMPL	ING DATA	TEST	s	REMARKS
0.4	Forest litter, rootmat and topsoil.	214	99.2			Π	_				
2.0	SILTY SAND (SM), fine to medium, contains clayey sand pockets and root fragments, moist, brown.	SM	97.6		- ·						
- -	SANDY LEAN CLAY (CL), fine to medium, contains root fragments, moist, brown.	CL					Bulk	Sample	w=19.0 LL=3 PL=2	)	
5.0 —	SILTY SAND (SM), fine to medium, moist, brown.	SM	94.6		- 5 -		Bulk	Sample	w=8.9 *	%	
8.0	BOTTOM OF BORING @ 8.0 FT.		91.6		- ·						

- Comments:

  1. Backfilled upon completion
  2. \* See Appendix I for additional laboratory testing data.

	hnabel pel Engineering	TEST PIT LOG			iffs Nucle		er Plar	nt		Contra	it Number oct Number 1 of 1			<b>P-B407</b>
Boring C	ontractor:		•					Gro	oundv	vater Obs	ervations	;		
Borning C	ontractor.							D	ate	Time	Depth	Cas	ing	Caved
Boring F	oreman: Paul Sch	naffer												
Excavati	on Equipment: Jo	ohn Deere 41	0D (Rubber Tir	red)										
Schnabe	I Representative:	K Megginsor	1											
Dates S	Started: 8/2/06	Finished: 8/	/2/06											
Location	: Northing: 21639 Easting: 96146													
Ground S	Surface Elevation	: 81.3 (feet)												
DEPTH (FT)	STRAT	A DESCRIPT	ION	CLASS	S. ELEV. (FT)	WL	DEP		AMPL	ING DATA	TEST	s	R	EMARKS
0.4	SILTY SAND (S contains root fra			SW-SN	80.9									
-	WELL GRADED (SW-SM), fine to	o coarse, trac	e fine and				-							
_	coarse gravel, r						L -	1						
	silty sand lense		5.7 ft.											
1	Light brown bei	OW 0.0 II.							<b>.</b>	0 1	w=7.1	%		
-							<del>-</del> 5 -		Bulk	Sample	* *	,,		
4							-	+						
7.0					74.3		L _							
	BOTTOM OF B	ORING @ 7.0	) FT.											

TEST PIT LOG NEW TEST PITS 06120048.GPJ SCHNABEL.GDT 3/10/08

- Comments:
  1. Backfilled upon completion
  2. \* See Appendix I for additional laboratory testing data.

1	hnabel	TEST	Project: (	Calvert C	liffs Nucle	ar Pow	er Plar	nt		Test P	it Numbe	r: TI	P-B414
	pel Engineering	PIT LOG		Calvert C	County, Ma	ryland					ct Number	er: 061200	
			1					Gr	oundw		ervations	<b>,</b>	
Boring C	ontractor:							D	ate	Time	Depth	Casing	Caved
Boring F	oreman: Paul Scl	haffer											
Excavation	on Equipment: Jo	ohn Deere 41	0D (Rubber T	ired)									
Schnabe	I Representative:	K Megginsor	n										
Dates S	Started: 7/28/06	Finished:	7/28/06										
Location	: Northing: 21663	31.18 ft		-									
	Easting: 9615	30.95 π											
Ground S	Surface Elevation	: 120.8 (feet)											
DEPTH (FT)	STRAT	A DESCRIPT	ΓΙΟΝ	CLAS	s. ELEV.	WL	DEP		AMPL	ING DATA	TEST	S F	REMARKS
0.3	Rootmat and to	psoil		SM	120.5			Ī					
0.7	SILTY SAND (S			SP-SI	/  120.1		-	-					
4	contains root fra						ļ -	-					
	brown.						L.						
	POORLY GRAI (SP-SM), fine to												
1	sand lenses and brown and light												
-	brown and light	orangish bro	vvii.				<del>-</del> 5 -	1					
4								╁	Bulk	Sample	w=6.0	%	
7.0					113.8				Duik	Sample	*		
	BOTTOM OF B	ORING @ 6.	5 FT.										

TEST PIT LOG NEW TEST PITS 06120048.GPJ SCHNABEL.GDT 3/10/08

- Comments:
  1. Backfilled upon completion
  2. \* See Appendix I for additional laboratory testing data.

Schnabel TEST PIT			, , , , , ,		<b>Project:</b> Calvert Cliffs Nuclear Power Plant Calvert County, Maryland						it Numbeı	r: TF	P-B415
	el Engineering	LOG		alvert	Cou	nty, Ma	aryland				oct Number 1 of 1	er: 061200	048
Boring Co	ontractor:		•						Ground	vater Obs	ervations	i	
Borning Co	Jilliactor.								Date	Time	Depth	Casing	Caved
Boring Fo	oreman: Paul Sch	naffer											
Excavatio	on Equipment: Jo	hn Deere 41	0D (Rubber T	ired)									
Schnabel	Representative:	K Megginsor	า										
Dates S	tarted: 7/28/06	Finished:	7/28/06										
Location:	Northing: 21649												
	Easting: 96129	98.37 π											
Ground S	urface Elevation	: 118.9 (feet)											
DEPTH						ELEV			SAMPL	ING			

DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	S. DEPTH	AMPLING DATA	TESTS	REMARKS
0.4	Rootmat and topsoil.  Clayey sand FILL, fine to medium, contains root fragments, moist, brown.  Contains steel spun cable at 1.0 ft.  POORLY GRADED SAND, fine to medium, trace silt, contains silty sand lenses and layers, moist, stratfied light brown and orangish-brown.	FILL	118.5		  5	Bulk Sample	w=10.2% *	
6.5	BOTTOM OF BORING @ 6.5 FT.		112.4					

- Comments:
  1. Backfilled upon completion
  2. \* See Appendix I for additional laboratory testing data.

Schnabel
Schnabel Engineering

Project: Calvert Cliffs Nuclear Power Plant Calvert County, Maryland

**TP-B423** Test Pit Number:

Contract Number: 06120048 Sheet: 1 of 1

Boring Contractor:	Groundy	vater Obs	ervations		
Borning Contractor.	Date	Time	Depth	Casing	Caved
Boring Foreman: Paul Schaffer					
Excavation Equipment: John Deere 410D (Rubber Tired)					
Schnabel Representative: K Megginson					
Dates Started: 8/2/06 Finished: 8/2/06					
<b>Location:</b> Northing: 216414.95 ft Easting: 960849.03 ft					

Ground Surface Elevation: 105.9 (feet)

DEPTH (FT)	STRATA DESCRIPTION	CLASS	ELEV.	WL		AMPLING	TESTS	S REMARKS
0.3 1.0 - - 5.0 - 8.0 -	Rootmat and topsoil  Silty sand FILL, fine to medium, contains root fragments, moist, brown  Clayey sand FILL, fine to medium, moist, brown. Contains cement block, diamond-plated steel and asphalt fragments below 1.5 ft.  fine to coarse, contains root fragments. Contains rebar, bed frame and metal fragments below 2.5 ft.  fine to coarse sand, trace coarse gravel, contains root fragments, brown, grayish-brown and orangish-brown, contains sandy silt pockets below 5 ft.  sandy lean clay FILL, fine to coarse, trace coarse gravel, moist, brown. Contains cement fragments at 6 ft.  BOTTOM OF BORING @ 8.0 FT.	FILL FILL FILL	ELEV. (FT) - 105.6 - 104.9 - 100.9	WL	S DEPTH	Bulk Sample	w=16% LL=24 PL=16	Top of cinder block wall and man made debris at 1.5 ft Underground cinder block wall at least 10 ft wide (in an east-west direction) and ft. deep.

- 1. Backfilled upon completion 2. \* See Appendix I for additional laboratory testing data.

Schnabel	TEST	,	Cliffs Nuclear Power Pla	ınt	Test P	it Numbeı	r: Ti	P-B434
Schnabel Engineering	PIT LOG	Calvert	t County, Maryland			act Number 1 of 1	er: 061200	048
Boring Contractor:				Groundy	vater Obs	ervations	;	
Dorning Contractor.		Date	Time	Depth	Casing	Caved		
Boring Foreman: Paul Schaf	ffer							
Excavation Equipment: John	n Deere 41	0D (Rubber Tired)						
Schnabel Representative: K								
Dates Started: 7/29/06 F	inished:	7/29/06						

**Location:** Northing: 215825.9 ft Easting: 961244.18 ft

DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	DEP1	AMPLING DATA	TEST	s	REMARKS
0.5	Forest litter, rootmat and topsoil		104.7						
-	LEAN CLAY, trace fine to medium sand, contains root fragments, moist, brown.	CL			- 	Bulk Sample	w=21°		
-					 	Jam Jampio	LL=2: PL=1: *	5 8	
_					— 5 — _				
7.0 -	CILTY CAND fine to maditive mariet	CM	98.2						
8.0 -	SILTY SAND, fine to medium, moist, brown.	SM SP-SM	97.2						
8.5	POORLY GRADED SAND WITH SILT, fine to coarse, trace fine gravel, contains weakly cemented sand pockets, moist, light brown.	3F-3W	96.7						
	BOTTOM OF BORING @ 8.5 FT.								

- Comments:
  1. Backfilled upon completion
  2. \* See Appendix I for additional laboratory testing data.

Schnabel
Schnabel Engineering

Project: Calvert Cliffs Nuclear Power Plant

Calvert County, Maryland

**TP-B435** Test Pit Number:

Contract Number: 06120048 Sheet: 1 of 1

**Groundwater Observations Boring Contractor:** Time Depth Casing Caved Boring Foreman: Paul Schaffer

Excavation Equipment: John Deere 410D (Rubber Tired) Schnabel Representative: K Megginson

Dates Started: 7/29/06 Finished: 7/29/06

**Location:** Northing: 216020.06 ft Easting: 961404.74 ft

DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	DEPT		AMPLING DATA	TESTS	REMARKS
	Forest litter, rootmat and topsoil.		407.0			ΪÌ	271171		
0.7	CLAYEY SAND, fine to medium, contains root fragments, moist, brown.	SC	107.0						
2.5	SILTY SAND, fine to medium, contains root fragments, moist, orangish brown.	SM	105.2						
4.0	SILTY SAND, fine to coarse, moist, light brown and brown.	SM	103.7		 - 5 -			w=6.0%	
6.0	POORLY GRADED SAND WITH SILT, fine to coarse, trace silt, contains silty	SP-SM	101.7				Bulk Sample	*	
-	sand and poorly-graded sand with silt lenses, moist, brown and light brown trace cobbles (+/-1%) below 8 ft.						Bulk Sample	w=4.6% *	
9.0	CLAYEY SAND, fine to coarse, trace fine gravel, contains clayey sand pockets, moist, brown.	SC	98.7		-10-		Bulk Sample	w=6.7% LL=34 PL=17	

- 1. Backfilled upon completion 2. \* See Appendix I for additional laboratory testing data.

Schnabel
Schnabel Engineering
Boring Contractor

Project: Calvert Cliffs Nuclear Power Plant

Calvert County, Maryland

Test Pit Number:

Contract Number: 06120048 Sheet: 1 of 1

Boring Contractor:	Ground	water Obs	ervations	i	
Borning Contractor.	Date	Time	Depth	Casing	Caved
Boring Foreman: Paul Schaffer					
Excavation Equipment: John Deere 410D (Rubber Tired)					
Schnabel Representative: K Megginson					
Dates Started: 7/28/06 Finished: 7/28/06					
Lagations Northions 244004 40 ft					
Location: Northing: 214964.18 ft Easting: 962637.77 ft					
Ground Surface Elevation: 88.2 (feet)					

Ground Surface Elevation: 88.2 (feet)

DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL			AMPLING	TESTS	REMARKS
(1.1)	Forest litter, rootmat and topsoil		(1.1)		DEP	TH	DATA		
0.9 -	CLAYEY SAND, fine to coarse, contains root fragments, moist, brown	SC	87.3		- ·				
4.0 -	POORLY GRADED SAND WITH SILT, fine to coarse, trace fine to coarse gravel (+/- 5%) and cobbles (+/- 1%), contains root fragments, moist, brown and light brown.	SP-SM	84.2		_		Bulk Sample	w=4.8% *	
- 8.5	Contians weakly cemented sand pockets at 6 ft.  BOTTOM OF BORING @ 8.5 FT.		79.7		 				

- 1. Backfilled upon completion 2. \* See Appendix I for additional laboratory testing data.

Schnabel
Schnabel Engineering
Boring Contractor:

Project: Calvert Cliffs Nuclear Power Plant

Calvert County, Maryland

**TP-B716** Test Pit Number:

Contract Number: 06120048 Sheet: 1 of 1

Boring Contractor:	Groundwater Observations									
Borning Continuotor.		Date	Time	Depth	Casing	Caved				
Boring Foreman: Paul Schaffer										
Excavation Equipment: John Deere 410D (Rubber Tired)										
Schnabel Representative: K Megginson										
Dates Started: 7/28/06 Finished: 7/28/06										
Location: Northing: 214983.83 ft Easting: 961289.79 ft										

DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	S DEPTH	AMPL	ING ATA	TEST	s	REMARKS
	Forest litter, rootmat and topsoil.					_				
0.8 _	SILTY SAND, fine to medium, contains root fragments, moist, brown, contains weakly bonded silty sand pockets.	SM	96.3		 					
5.5 -	POORLY GRADED SAND WITH SILT, fine to coarse, trace fine gravel, moist, stratified light brown and brown.	SP-SM	91.6		 - 5 - 	Bulk	Sample	w=3.8 <sup>1</sup>	%	
- 0.0	Light grayish brown and yellowish brown below 6.5 ft.		90.1							
8.0 - 8.8	SILTY SAND, fine to coarse, contains chert fragments, moist, yellowish brown.	SM	89.1							
	BOTTOM OF BORING @ 8.8 FT.									

- 1. Backfilled upon completion 2. \* See Appendix I for additional laboratory testing data.

Schnabel	TEST	Project: Calvert	Cliffs Nuclear Power	Plant	Test P	it Numbeı	r: TP	P-B717					
Schnabel Engineering	PIT LOG	Calvert	County, Maryland			act Number 1 of 1	er: 061200	48					
Boring Contractor:			Groundwater Observations										
Soring Contractor.				Date	Time	Depth	Casing	Caved					
Boring Foreman: Paul Sch	affer												
Excavation Equipment: Jo	hn Deere 41	0D (Rubber Tired)											
Schnabel Representative:	K Megginsor	n											
Dates Started: 7/28/06	Finished:	7/28/06											
Location: Northing: 21429 Easting: 96234													

DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	DEP		AMPLING DATA	TESTS	3	REMARKS
1.0	Forest litter, rootmat and topsoil.  SANDY SILT, fine to medium, contains root fragments, moist, brown.	ML	89.5			-				
_ (	SILTY SAND, fine to coarse, contains clayey sand pockets, moist, light brown.	SM	85.5		5 5 -	-				
8.0	POORLY GRADED SAND WITH SILT, fine to coarse, trace fine to coarse gravel (+/- 5%), moist, orangish brown, contains iron oxide cemented sand bockets at 7.5 ft.  BOTTOM OF BORING @ 8.0 FT.	SP-SM	83.5				Bulk Sample	w=3.49		

- Comments:

  1. Backfilled upon completion
  2. \* See Appendix I for additional laboratory testing data.

Schnabel	TEST	Project:		Cliffs Nuclear Power Pla	ınt	Test P	Test Pit Number: <b>TF</b>				
Schnabel Engineering	PIT LOG		Calvert	County, Maryland		Contra Sheet:	er: 061200	)48			
oring Contractor:					Groundy	water Obs	ervations				
orning Continuotor.					Date	Time	Depth	Casing			
oring Foreman: Paul Scha	ıffer										

TP-B719

Caved

Excavation Equipment: John Deere 410D (Rubber Tired) Schnabel Representative: K Megginson Dates Started: 7/28/06 Finished: 7/28/06 **Location:** Northing: 213966.93 ft Easting: 261493.94 ft

DEPTH	STRATA DESCRIPTION	CLASS.	ELEV.	WL		S	AMPLING	TESTS	REMARKS
(FT)	01101111122001111 11011	02,100.	(FT)		DEPT	Н	DATA	12010	
0.3	Forest litter, rootmat and topsoil	CL	72.0					w=23.9%	
-	LEAN CLAY, with fine to medium sand, contains root fragments, moist, brown and light brown	OL			- 		Bulk Sample	W=23.976 LL=35 PL=22	
3.2	SILT, with fine to medium sand,	ML	69.1		-	1			
_	contians root fragments, moist, grayish brown.	IVIL	07.5		-				
4.8 _	SILTY SAND, fine to coarse, trace fine	SM	67.5		<del>-</del> 5 -				
-	gravel, contains clayey sand pockets and poorly graded sand with silt lenses, moist, light brown and light grayish				-				
+	brown						Bulk Sample	w=26.7%	
8.0	Wet, light gray and yellowish brown below 7 ft.		64.3		-		Built Gumple	*	
	BOTTOM OF BORING @ 8.0 FT.								
			1			Ιl			

- Backfilled upon completion
   \* See Appendix I for additional laboratory testing data.

Schnabel
Schnabel Engineering

**TEST** PIT LOG

Project: Calvert Cliffs Nuclear Power Plant

Calvert County, Maryland

**TP-B727** Test Pit Number:

Contract Number: 06120048 Sheet: 1 of 1

Boring Contractor:		Ground	water Obs	ervations	i	
Dorning Contractor.		Date	Time	r Observations ime Depth Cas	Casing	Caved
Boring Foreman: Paul Schaffer						
Excavation Equipment: John Deere 410D (Rub	ober Tired)					
Schnabel Representative: K Megginson						
Dates Started: 7/28/06 Finished: 7/28/06						
Landing Northing 045000 44 ft						
Location: Northing: 215299.14 ft Easting: 961883.13 ft						
0						

DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL	DEPT		AMPL	ING DATA	TEST	s	REMARKS
	Forest litter, rootmat and topsoil		400.0								
0.7	CLAYEY SAND, fine to coarse, contains root fragments, moist, brown, orangish brown, and light grayish brown	SC	103.6		 						
5.0 -	SILT, with fine to medium sand, moist, brown.  SILTY SAND, fine to medium, contains	ML SM	99.3		_ 5 _ _ 5 _		Bulk	Sample	w=10.3	3%	
7.0	clayey sand pockets, moist, brown. BOTTOM OF BORING @ 7.0 FT.		97.3								
						Ιl					

- Backfilled upon completion
   \* See Appendix I for additional laboratory testing data.

Schnabel	Project:		Cliffs Nuclear Power Pla	nt	Test P	Test Pit Number: TP-				
Schnabel Engineering	PIT LOG		Calvert	County, Maryland			Contract Number: 061200 Sheet: 1 of 1			
foring Contractor:					Ground	water Obs	ervations	;		
orning Contractor.					Date	Time	Depth	Casing		
oring Foreman: Paul Scha	affer									

**TP-B744** 

Caved

Excavation Equipment: John Deere 410D (Rubber Tired) Schnabel Representative: K Megginson Dates Started: 7/29/06 Finished: 7/29/06 **Location:** Northing: 316377.3 ft Easting: 959963.38 ft

DEPTH (FT)	STRATA DESCRIPTION	CLASS.	ELEV. (FT)	WL		SAMPLING	TESTS	REMARKS
0.5	Forest litter, rootmat and topsoil.				DEPTH	DATA		
1.0	SILT, trace fine to medium sand, contains root fragments, moist, brown.	ML CL	112.8 112.3		<u>-</u>		100/	
-	SANDY LEAN CLAY (CL), fine to medium, contains root fragments, moist, brown.				 	Bulk Sample	w=18% LL=25 PL=17 *	
3.5	SILTY SAND (SM), fine to medium, moist, brown.	SM	109.8					
5.0	POORLY GRADED SAND WITH SILT (SP-SM), fine to coarse, trace fine	SP-SM	108.3		<u> </u>			
6.5	gravel, moist, light brown.  BOTTOM OF BORING @ 6.5 FT.		106.8					

- Backfilled upon completion
   \* See Appendix I for additional laboratory testing data.

	hnabel	TEST	· · · • <b>,</b> · · · ·			fs Nucle		er Pla	nt		Test P	it Numbei	r:	ΤP	-B758
	bel Engineering	PIT LOG	(	Calvert	Cou	unty, Ma	ryland					oct Number	er: 061	2004	18
									Gr	oundv	1	ervations	<b>.</b>		
Boring C	Contractor:								D	ate	Time	Depth	Casi	ng	Caved
Boring F	oreman: Paul Sch	affer													
Excavati	ion Equipment: Jol	hn Deere 41	0D (Rubber 1	ired)											
Schnabe	el Representative:	K Megginso	n												
Dates :	Started: 7/28/06	Finished:	7/28/06												
	i: Northing: 215133 Easting: 960333	2.67 ft													
Ground	Surface Elevation.	62.0 (leet)		1											
DEPTH (FT)	STRATA	A DESCRIPT	TION	CLA	SS.	ELEV. (FT)	WL	DEP		AMPL	ING DATA	TEST	s	RE	MARKS
0.6	Forest litter, root	mat and top	soil.			82.0									
2.0 -	CLAYEY SAND, contains root frag			SC	2	80.6		-							
2.0 -	POORLY GRAD fine to coarse, tra cobbles, contains	ace fine grav	el and	SP-S	SM	00.0				Bulk	Sample	w=6.0	%		
3.9 _	sand pockets, m iron oxide cemer pockets.	oist, brówn,	contains	SN	Л	78.7		- 5 -							
-	SILTY SAND, fin gravel, moist, ligh Contains silty sa brown and yellov	ht brown. nd layers, st	ratified light												Pit istently d-in below

73.6

w=11.8%

Bulk Sample

TEST PIT LOG NEW TEST PITS 06120048.GPJ SCHNABEL.GDT 3/10/08

9.0

- Comments:
  1. Backfilled upon completion
  2. \* See Appendix I for additional laboratory testing data.

BOTTOM OF BORING @ 9.0 FT.

Schnabel	TEST	Project:		Cliffs Nuclear Power I	Plant	Test P	it Numbei	r: TI	P-(	
Schnabel Engineering	PIT LOG		Calvert	County, Maryland		Contract Number: 06120048 Sheet: 1 of 1				
Boring Contractor:					Ground	water Obs	ervations	1		
John g Gontractor.					Date	Time	Depth	Casing		
	**									

Boring Foreman: Paul Schaffer Excavation Equipment: John Deere 410D (Rubber Tired) Schnabel Representative: K Megginson Dates Started: 8/2/06 Finished: 8/2/06 **Location:** Northing: 217020.05 ft Easting: 960105.24 ft

**TP-C309** 

Caved

Ground Surface Elevation: 108.5 (feet) **SAMPLING DEPTH** ELEV. WL STRATA DESCRIPTION CLASS. **REMARKS TESTS** (FT) (FT) DEPTH **DATA** Forest litter, rootmat and topsoil. 0.5 108.0 SP POORLY GRADED SAND, fine to coarse, trace fine gravel, contains root fragments, moist, brown and w = 4.3%**Bulk Sample** orange-brown. Test Pit consistently - 5 caves-in between 5 and 6.0 102.5 6 ft. POORLY GRADED SAND WITH SILT, SP-SM fine to medium, trace silt, contains silty w=8.7% sand pockets and lenses moist, light **Bulk Sample** grayish brown, blackish gray, and 100.5 8.0 orangish brown. BOTTOM OF BORING @ 8.0 FT. TEST PIT LOG NEW TEST PITS 06120048.GPJ SCHNABEL.GDT 3/10/08

- 1. Backfilled upon completion
- 2. \* See Appendix I for additional laboratory testing data.

Schnabel Engineering	TEST PIT LOG	Project:	Cliffs Nuclear Power Plant County, Maryland
Boring Contractor:			

**TP-C723** Test Pit Number: Contract Number: 06120048 Sheet: 1 of 1

Excavation Equipment: John Deere 410D (Rubber Tired) Schnabel Representative: K Megginson	Groundwater Observations								
Doming Contractor:		Date	Time		Casing	Caved			
Boring Foreman: Paul Schaffer						·			
Excavation Equipment: John Deere 410D (Rubber Tired)									
Schnabel Representative: K Megginson									
Dates Started: 7/29/06 Finished: 7/29/06									
Location: Northing: 215989.07 ft Easting: 959754.78 ft									

Ground Surface Elevation: 96.8 (feet) **SAMPLING DEPTH** ELEV. STRATA DESCRIPTION CLASS. WL **TESTS REMARKS** (FT) (FT) DEPTH **DATA** Forest litter, rootmat and topsoil. 0.5 96.3  $\mathsf{ML}$ SANDY SILT, fine to medium, contains root fragments, moist, brown. 2.0 94.8 CLAYEY SAND, fine to medium, SC w=12% contains root fragments, moist, brown. **Bulk Sample** LL=30 PL=15 4.0 92.8 SILTY SAND, fine to coarse, moist, SM 5.0 91.8 SP-SM

	_	POORLY GRADED SAND WITH SILT,	SP-SM			_		4 00/	
		fine to coarse, trace fine gravel, moist, brown and light brown.					Bulk Sample	w=4.6%	
	7.0 -	Contains poorly graded sand trace silt lenses below 6.0 ft.		89.8	-	- 1			
		BOTTOM OF BORING @ 7.0 FT.							
10/08									
)T 3/									
EL.G									
NAB									
SC									
.GPJ									
0048									
0612									
PITS									
FST									
TEST PIT LOG NEW TEST PITS 06120048.GPJ SCHNABEL.GDT 3/10/08									
N 90									
빌									
EST F									
	Comment	<u> </u>							

- 1. Backfilled upon completion
- 2. \* See Appendix I for additional laboratory testing data.

## APPENDIX D GROUND WATER OBSERVATION WELLS

- Well Construction Logs
- Field Permeability Test Data
- Well Sampling Records

# **Schnabel Project No.** 06120048 **Appendix D:** Ground Water Observation Wells

### WELL CONSTRUCTION LOGS

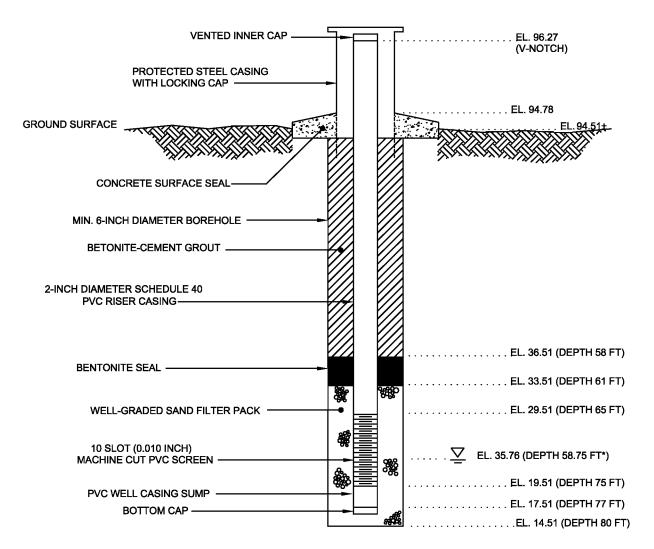
DATE COMPLETED: 07/07/2006

NORTHING: 217048.02

EASTING: 960814.47

**GROUND SURFACE ELEVATION: 94.51** 

GROUND WATER TABLE OBSERVATIONS		
DATE	DEPTH (FT) *	ELEVATION (FT)
7-27-06	58.74	35.76



NOTES: 1) SEE B-301 BORING LOG FOR STRATA DESCRIPTIONS

2) DEVELOPED BY PUMPING

3) CENTRALIZERS USED

4) \* = GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR
POWER PLANT CALVERT
COUNTY, MD

GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-301.DWG

WELL NO.: OW-313A

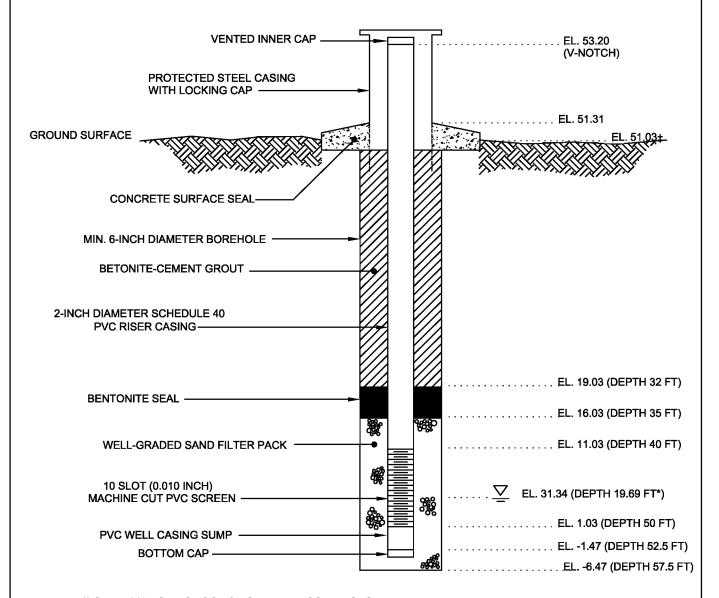
DATE COMPLETED: 05/24/2006

NORTHING: 217367.31

EASTING: 960705.30

**GROUND SURFACE ELEVATION: 51.03** 

GROUND WATER TABLE OBSERVATIONS		
DATE	DEPTH (FT) *	ELEVATION (FT)
7-27-06	19.69	31.34



NOTES: 1) SEE B-313 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* =GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR
POWER PLANT CALVERT
COUNTY, MD

GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-313A.DWG

WELL NO.: **OW-313B** 

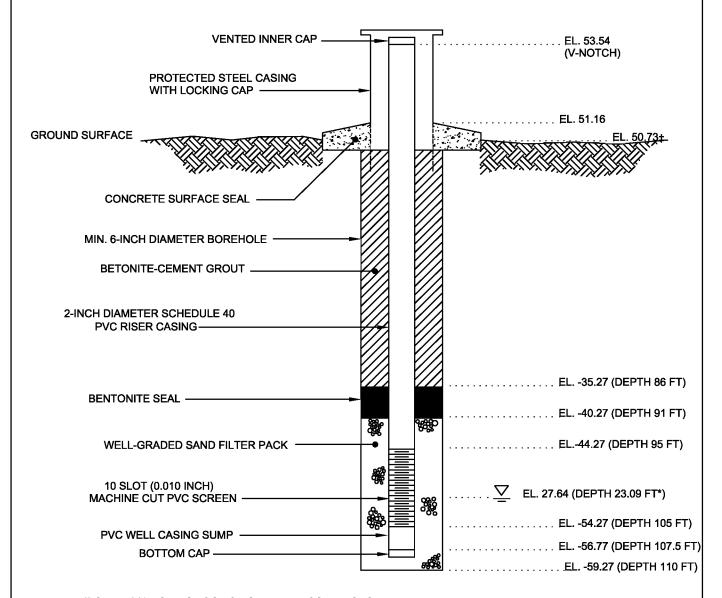
DATE COMPLETED: 05/23/2006

NORTHING: 217372.35

EASTING: 960713.67

**GROUND SURFACE ELEVATION: 50.73** 

GROUND WATER TABLE OBSERVATIONS		
DATE	DEPTH (FT) *	ELEVATION (FT)
7-27-06	23.09	27.64



NOTES: 1) SEE B-313 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* =GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR
POWER PLANT CALVERT
COUNTY, MD

GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-313B.DWG

WELL NO.: **OW-319A** 

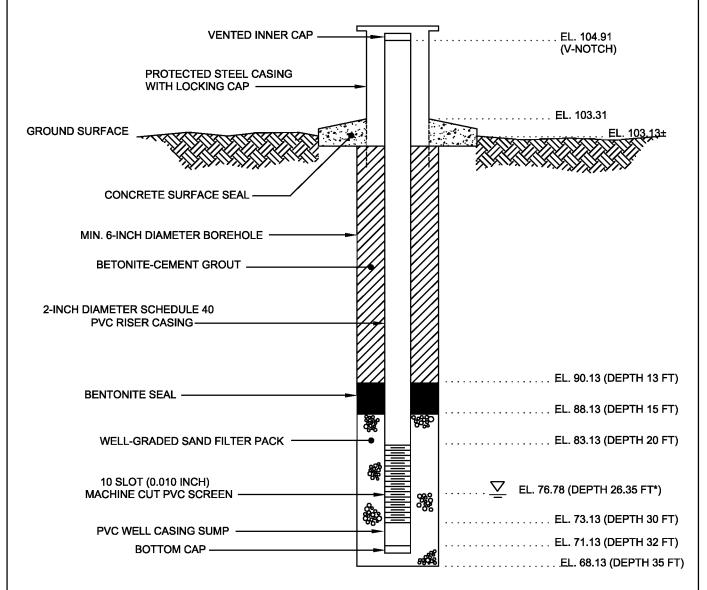
DATE COMPLETED: 05/18/2006

NORTHING: 216962.56

EASTING: 961116.12

**GROUND SURFACE ELEVATION: 103.13** 

GROUND WATER TABLE OBSERVATIONS		
DATE	DEPTH (FT) *	ELEVATION (FT)
7-21-06	26.35	76.78



NOTES: 1) SEE B-319 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* =GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR POWER PLANT CALVERT COUNTY, MD GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-319A.DWG

WELL NO.: **OW-319B** 

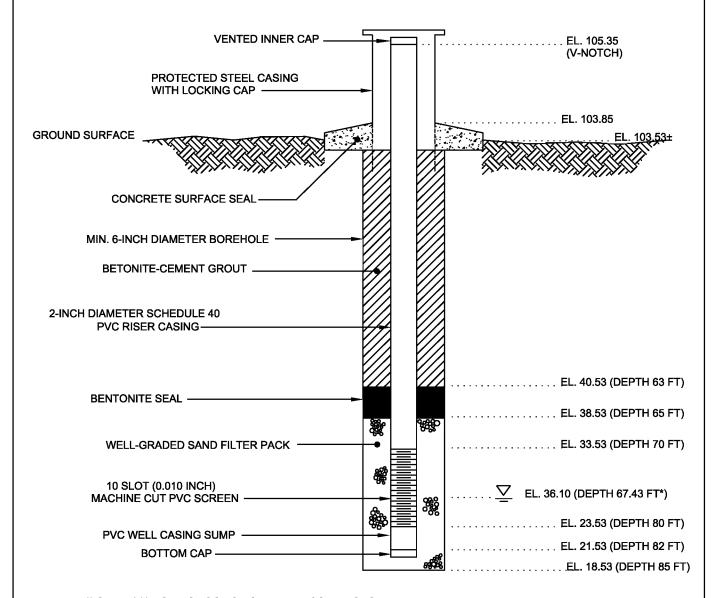
**DATE COMPLETED: 05/18/2006** 

NORTHING: 216957.32

EASTING: 961125.02

**GROUND SURFACE ELEVATION: 103.53** 

GROUND WATER TABLE OBSERVATIONS		
DATE	DEPTH (FT) *	ELEVATION (FT)
7-28-26	67,43	36.10



NOTES: 1) SEE B-319 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* =GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR POWER PLANT CALVERT COUNTY, MD GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-319B.DWG

WELL NO.: OW-323A

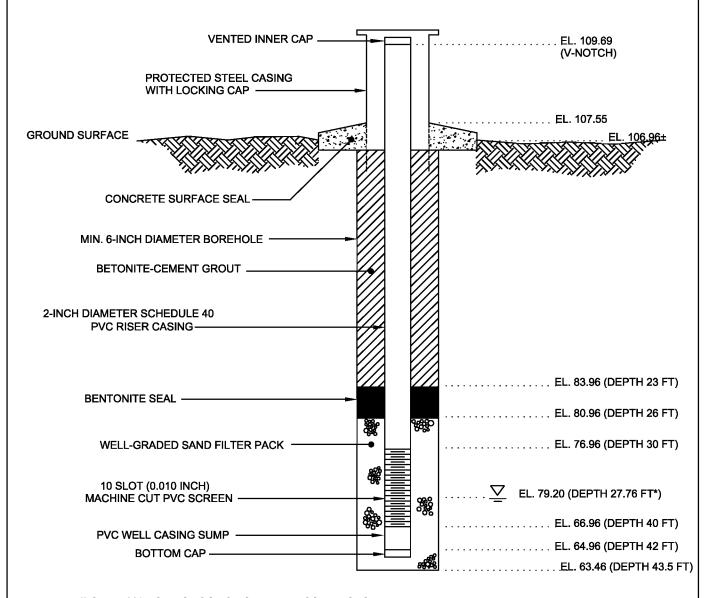
DATE COMPLETED: 07/17/2006

NORTHING: 217034.46

EASTING: 960057.07

**GROUND SURFACE ELEVATION: 106.96** 

GROUND WATER TABLE OBSERVATIONS		
DATE	DEPTH (FT) *	ELEVATION (FT)
7-26-06	27.76	79.20



NOTES: 1) SEE B-323 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* =GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR POWER PLANT CALVERT COUNTY, MD GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-323A.DWG

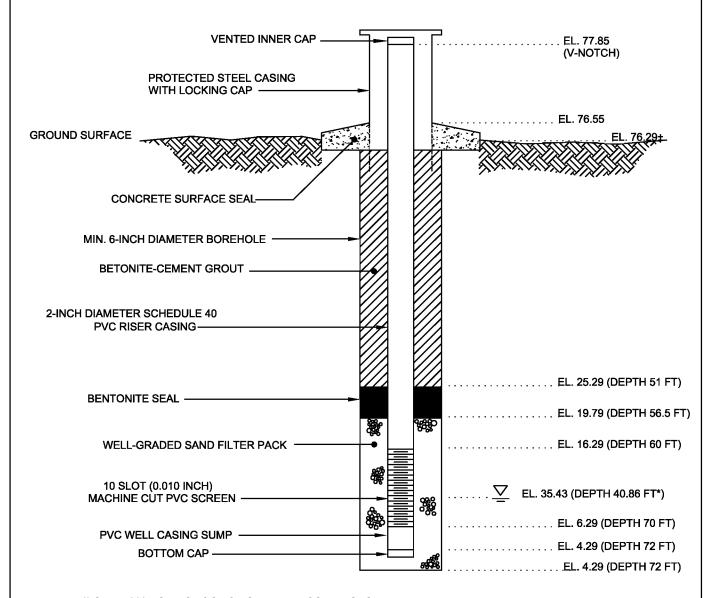
DATE COMPLETED: 06/29/2006

NORTHING: 216828.86

EASTING: 960493.21

**GROUND SURFACE ELEVATION: 76.29** 

GROUND WATER TABLE OBSERVATIONS		
DATE	DEPTH (FT) *	ELEVATION (FT)
7-27-06	40.86	35.43



NOTES: 1) SEE B-328 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* =GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR
POWER PLANT CALVERT
COUNTY, MD

GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-328.DWG

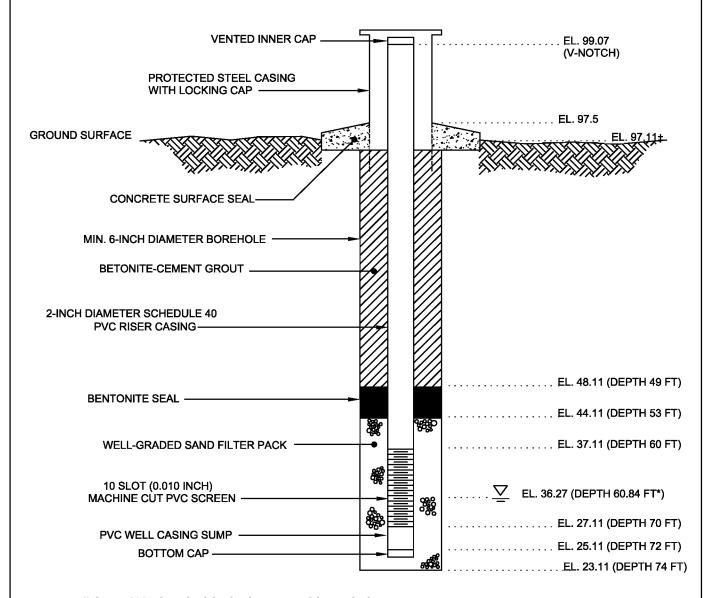
DATE COMPLETED: 06/30/2006

NORTHING: 216643.18

EASTING: 960746.61

**GROUND SURFACE ELEVATION: 97.11** 

GROUND WATER TABLE OBSERVATIONS		
DATE	DEPTH (FT) *	ELEVATION (FT)
7-31-06	60.84	36.27



NOTES: 1) SEE B-336 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* =GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR POWER PLANT CALVERT COUNTY, MD GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-336.DWG

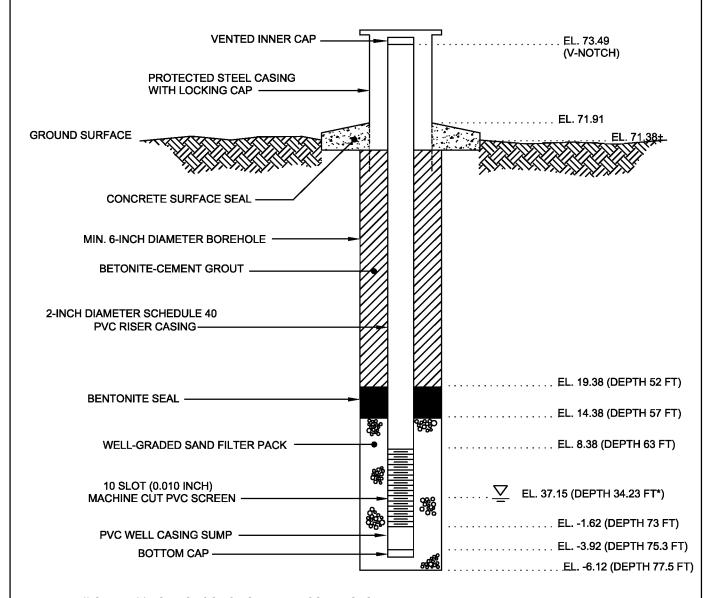
DATE COMPLETED: 06/30/2006

NORTHING: 216348.86

EASTING: 961530.99

**GROUND SURFACE ELEVATION: 71.38** 

GROUND WATER TABLE OBSERVATIONS		
DATE	DEPTH (FT) *	ELEVATION (FT)
7-28-06	34.23	37.15



NOTES: 1) SEE B-401 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* =GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR
POWER PLANT CALVERT
COUNTY, MD

GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-401.DWG

WELL NO.: **OW-413A** 

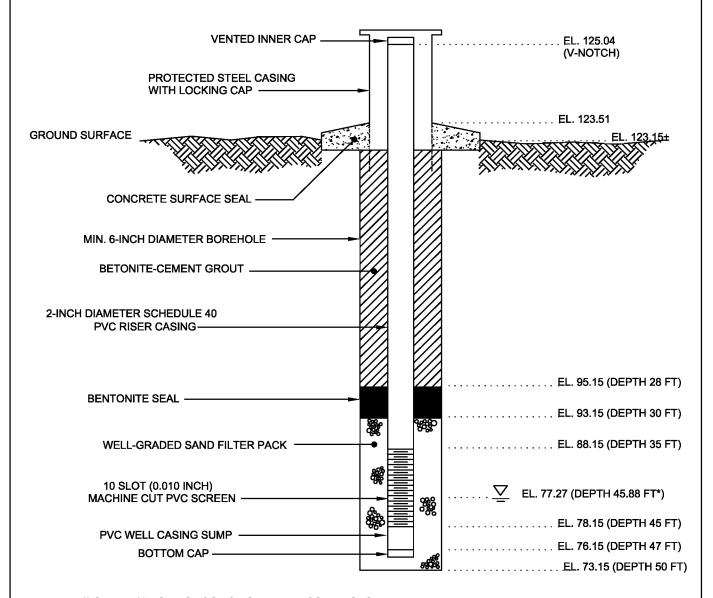
DATE COMPLETED: 05/16/2006

NORTHING: 216703.14

EASTING: 961418.81

**GROUND SURFACE ELEVATION: 123.15** 

GROUND WATER TABLE OBSERVATIONS		
DATE	DEPTH (FT) *	ELEVATION (FT)
7-31-06	45.88	77.27



NOTES: 1) SEE B-413 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* =GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR POWER PLANT CALVERT COUNTY, MD GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-413A.DWG

WELL NO.: **OW-413B** 

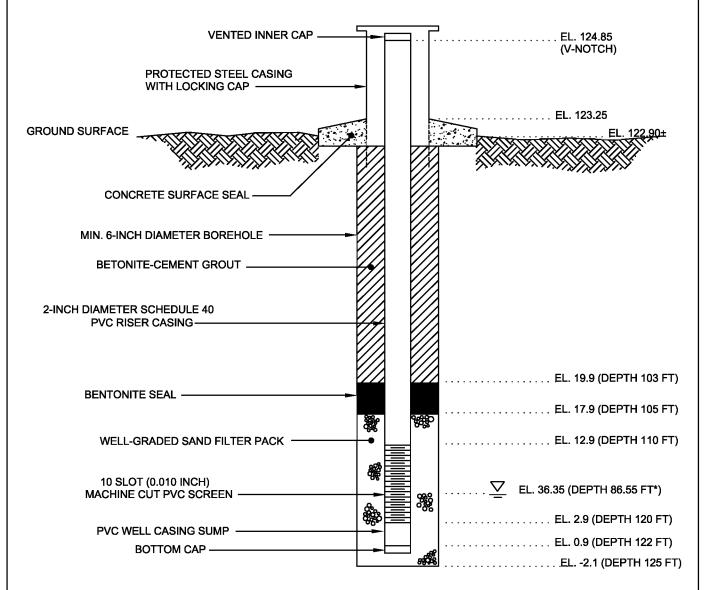
DATE COMPLETED: 05/16/2006

NORTHING: 216694.88

EASTING: 961413.25

**GROUND SURFACE ELEVATION: 122.90** 

GROUND WATER TABLE OBSERVATIONS		
DATE	DEPTH (FT) *	ELEVATION (FT)
7-31-06	86.55	36.35



NOTES: 1) SEE B-413 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* =GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR POWER PLANT CALVERT COUNTY, MD GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-413B.DWG

WELL NO.: **OW-418A** 

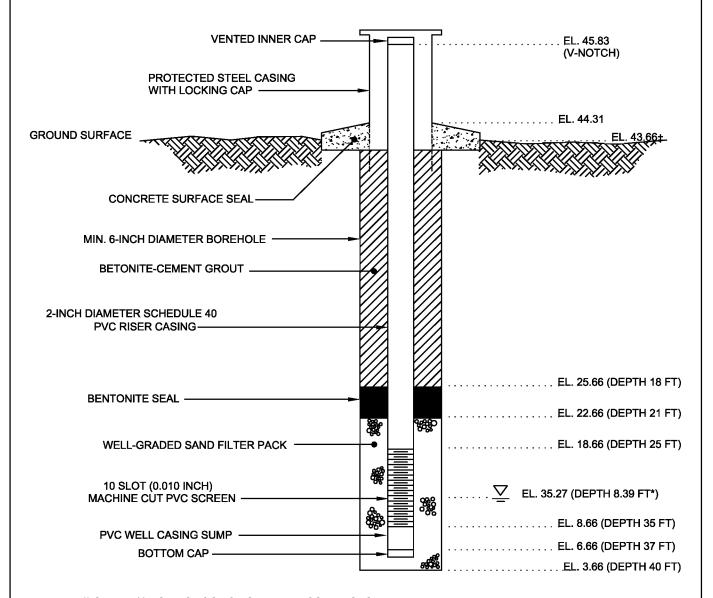
DATE COMPLETED: 07/06/2006

NORTHING: 216340.41

EASTING: 961966.46

**GROUND SURFACE ELEVATION: 43.66** 

GROUND WATER TABLE OBSERVATIONS		
DATE	DEPTH (FT) *	ELEVATION (FT)
7-28-06	8.39	35.27



NOTES: 1) SEE B-418 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* =GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR
POWER PLANT CALVERT
COUNTY, MD

GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-418A.DWG

WELL NO.: **OW-418B** 

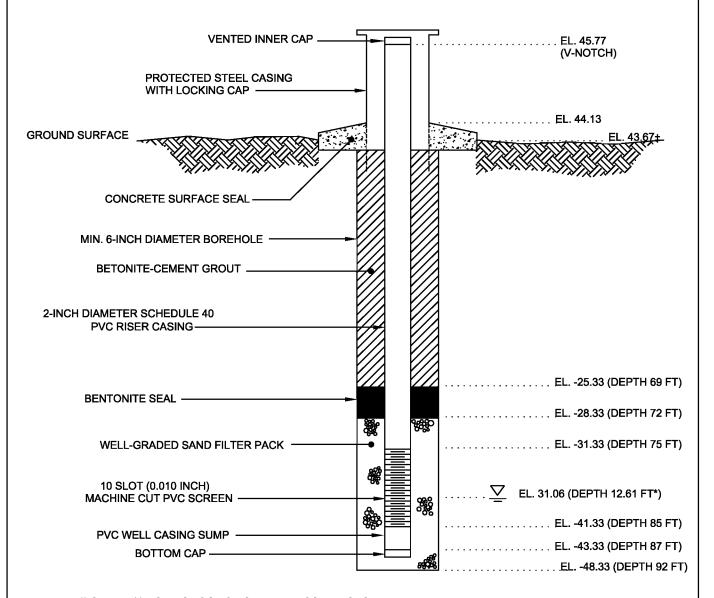
DATE COMPLETED: 07/06/2006

NORTHING: 216340.25

EASTING: 961976.71

**GROUND SURFACE ELEVATION: 43.67** 

GROUND WATER TABLE OBSERVATIONS		
DATE	DEPTH (FT) *	ELEVATION (FT)
7-31-06	12.61	31.06



NOTES: 1) SEE B-418 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* =GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR
POWER PLANT CALVERT
COUNTY, MD

GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-418B.DWG

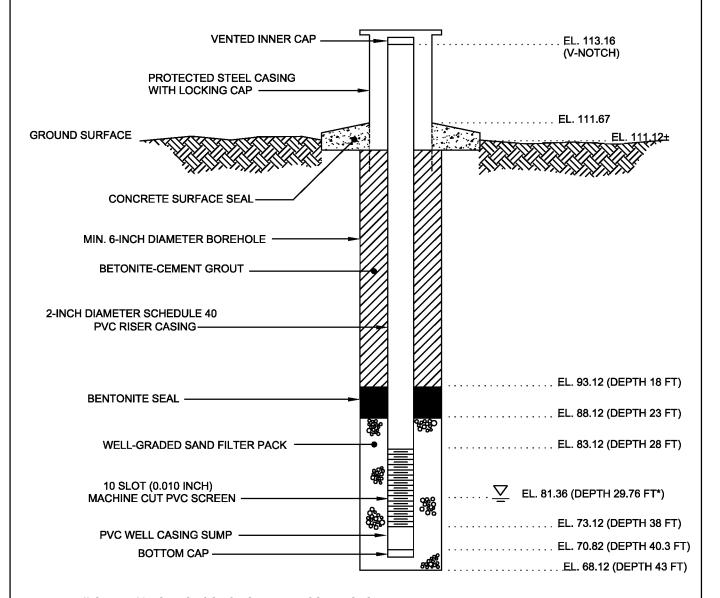
DATE COMPLETED: 07/06/2006

NORTHING: 216339.99

EASTING: 960882.24

**GROUND SURFACE ELEVATION: 111.12** 

GROUND WATER TABLE OBSERVATIONS		
DATE	DEPTH (FT) *	ELEVATION (FT)
7-24-06	29.76	81.36



NOTES: 1) SEE B-423 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* =GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR
POWER PLANT CALVERT
COUNTY, MD

GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-423.DWG

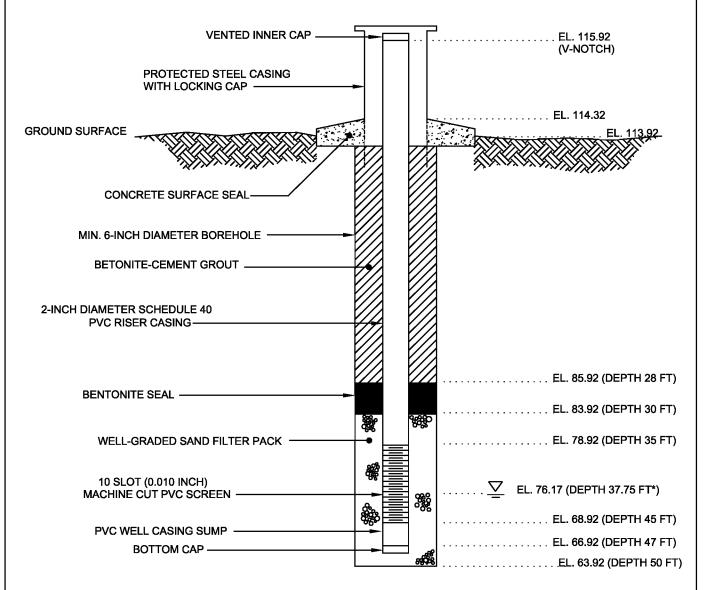
**DATE COMPLETED: 05/19/2006** 

NORTHING: 216105.21

EASTING: 961212.38

**GROUND SURFACE ELEVATION: 113.92** 

GROUND WATER TABLE OBSERVATIONS		
DATE	DEPTH (FT) *	ELEVATION (FT)
7-24-06	37.75	76.17



NOTES: 1) SEE B-428 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* =GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR
POWER PLANT CALVERT
COUNTY, MD

GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-428A.DWG

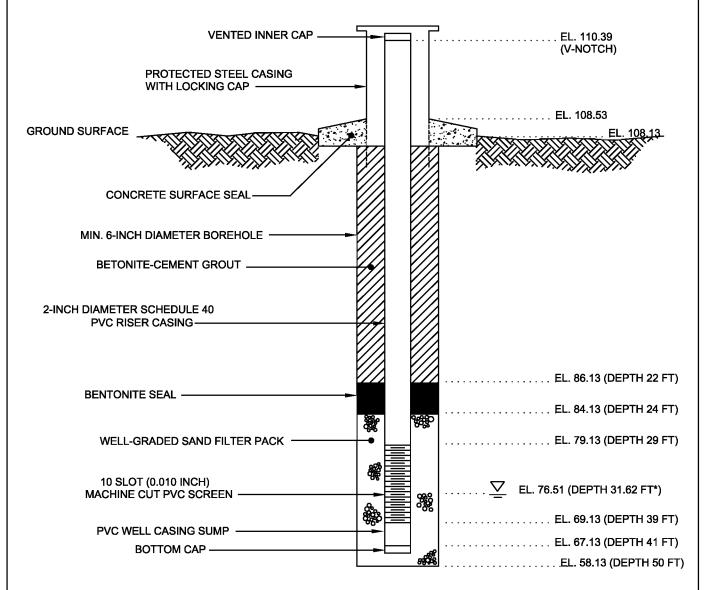
DATE COMPLETED: 05/22/2006

NORTHING: 215922.47

EASTING: 961446.87

**GROUND SURFACE ELEVATION: 108.13** 

GROUND WATER TABLE OBSERVATIONS		
DATE	DEPTH (FT) *	ELEVATION (FT)
7-25-06	31.62	76.51



NOTES: 1) SEE B-436 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* =GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR POWER PLANT CALVERT COUNTY, MD GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-436A.DWG

**WELL NO.: OW-703A** 

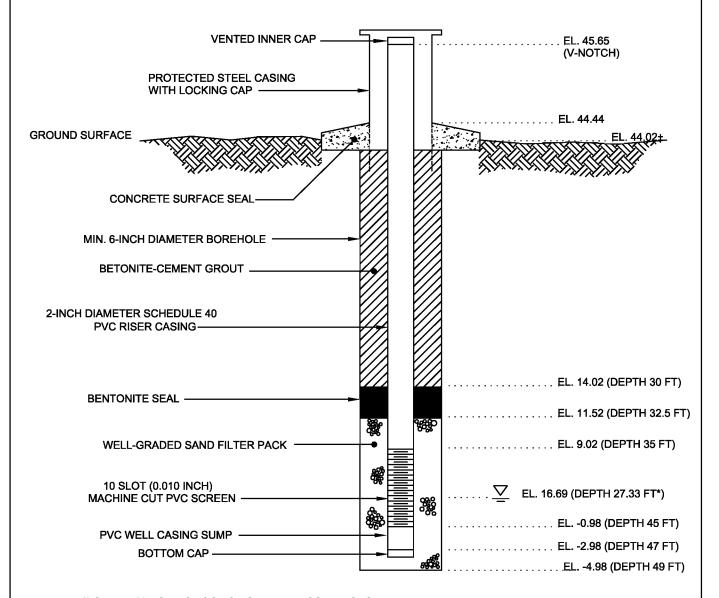
DATE COMPLETED: 07/12/2006

NORTHING: 218171.23

EASTING: 960967.72

**GROUND SURFACE ELEVATION: 44.02** 

GROUND WATER TABLE OBSERVATIONS		
DATE	DEPTH (FT) *	ELEVATION (FT)
7-26-06	27.33	16.69



NOTES: 1) SEE B-703 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* =GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR
POWER PLANT CALVERT
COUNTY, MD

GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-703A.DWG

WELL NO.: **OW-703B** 

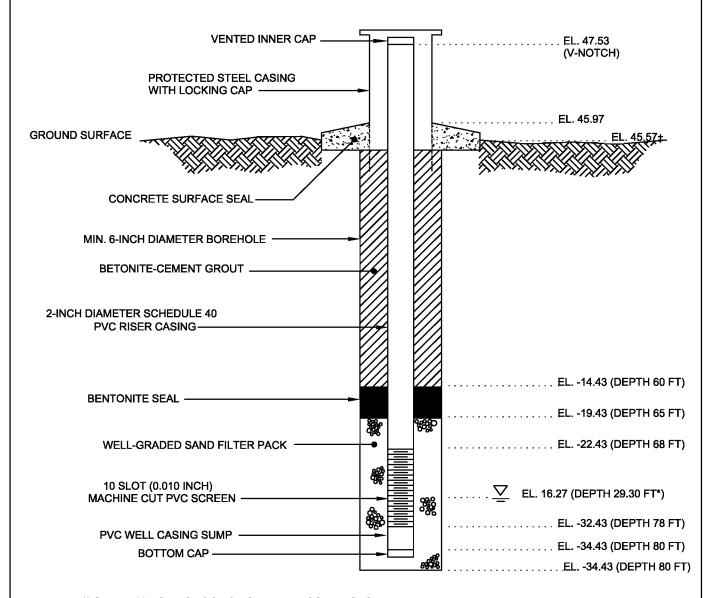
DATE COMPLETED: 07/12/2006

NORTHING: 218171.67

EASTING: 960958.91

**GROUND SURFACE ELEVATION: 45.57** 

GROUND WATER TABLE OBSERVATIONS		
DATE	DEPTH (FT) *	ELEVATION (FT)
7-26-06	29.30	16.27



NOTES: 1) SEE B-703 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* =GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR
POWER PLANT CALVERT
COUNTY, MD

GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-703B.DWG

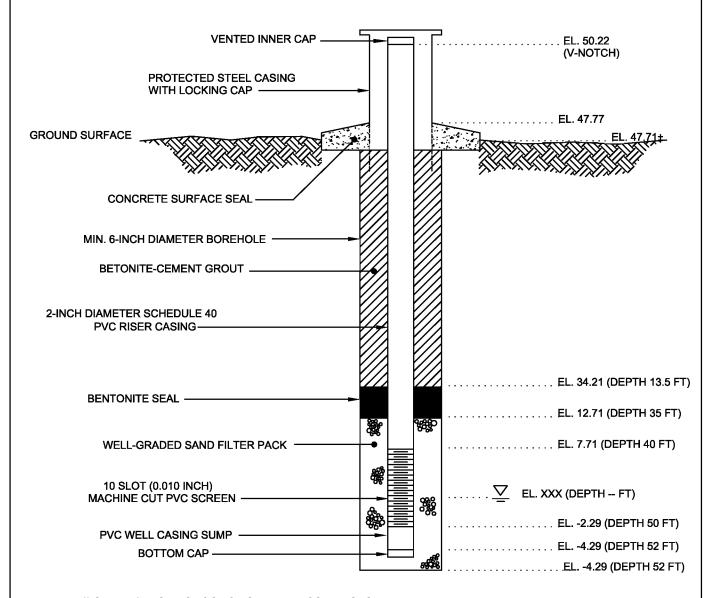
DATE COMPLETED: 06/28/2006

NORTHING: 217566.62

EASTING: 960917.18

**GROUND SURFACE ELEVATION: 47.71** 

GROUND WATER TABLE OBSERVATIONS		
DATE	DEPTH (FT)	ELEVATION (FT)



NOTES: 1) SEE B-705 BORING LOG FOR STRATA DESCRIPTIONS

2) DEVELOPED BY PUMPING

3) CENTRALIZERS USED



CALVERT CLIFFS NUCLEAR POWER PLANT CALVERT COUNTY, MD GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-705.DWG

**WELL NO.: OW-708A** 

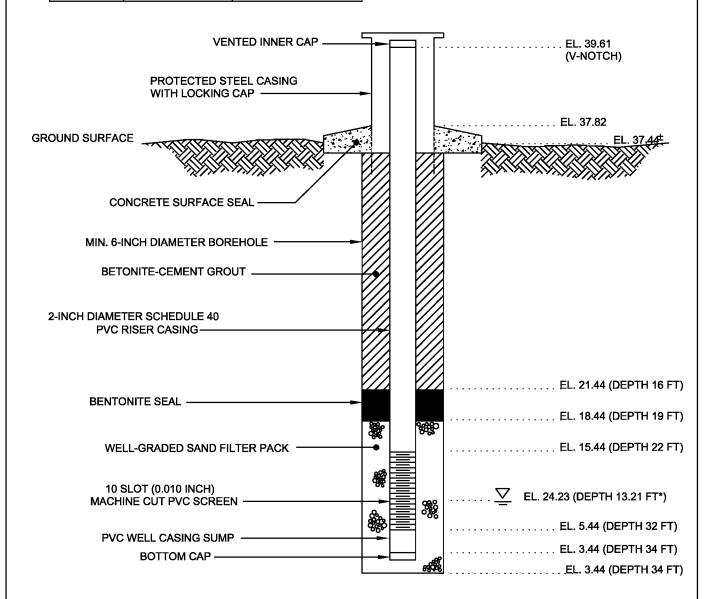
DATE COMPLETED: 06/21/2006

NORTHING: 217586.23

EASTING: 961803.52

**GROUND SURFACE ELEVATION: 37.44** 

GROUND WATER TABLE OBSERVATIONS		
DATE	DEPTH (FT) *	ELEVATION (FT)
7-24-06	13.21	24.23
	_	



NOTES: 1) SEE B-708 BORING LOG FOR STRATA DESCRIPTIONS

2) DEVELOPED BY PUMPING

3) CENTRALIZERS USED

4) \* = GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR
POWER PLANT CALVERT
COUNTY, MD

GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-708.DWG

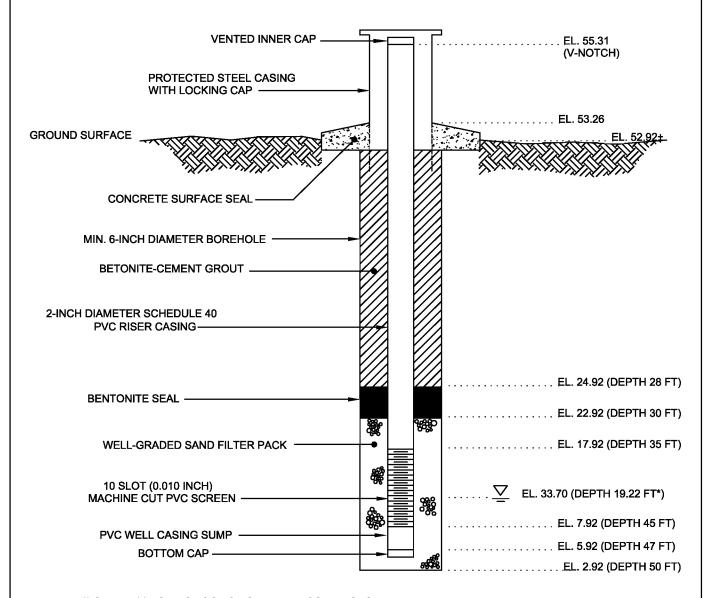
DATE COMPLETED: 05/22/2006

NORTHING: 216748.48

EASTING: 961741.61

**GROUND SURFACE ELEVATION: 52.92** 

GROUND WATER TABLE OBSERVATIONS		
DATE	DEPTH (FT) *	ELEVATION (FT)
7-24-06	19.22	33.70



NOTES: 1) SEE B-711 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* =GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR
POWER PLANT CALVERT
COUNTY, MD

GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-711.DWG

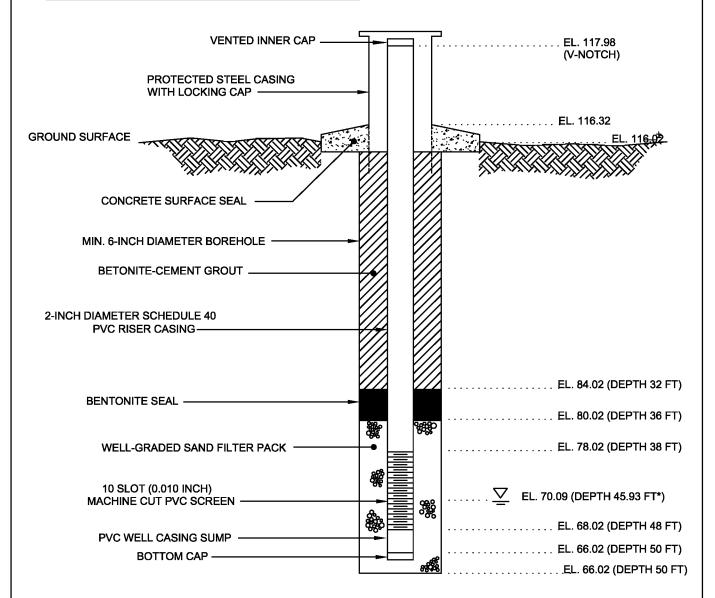
DATE COMPLETED: 06/27/2006

NORTHING: 215705.73

EASTING: 962034.37

**GROUND SURFACE ELEVATION: 116.02** 

GROUND WATER TABLE OBSERVATIONS			
DATE DEPTH (FT) * ELEVATION (FT)			
7-25-06	45.93	70.09	



NOTES: 1) SEE B-714 BORING LOG FOR STRATA DESCRIPTIONS

2) DEVELOPED BY PUMPING

3) CENTRALIZERS USED

4) \* =GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR POWER PLANT CALVERT COUNTY, MD GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-714.DWG

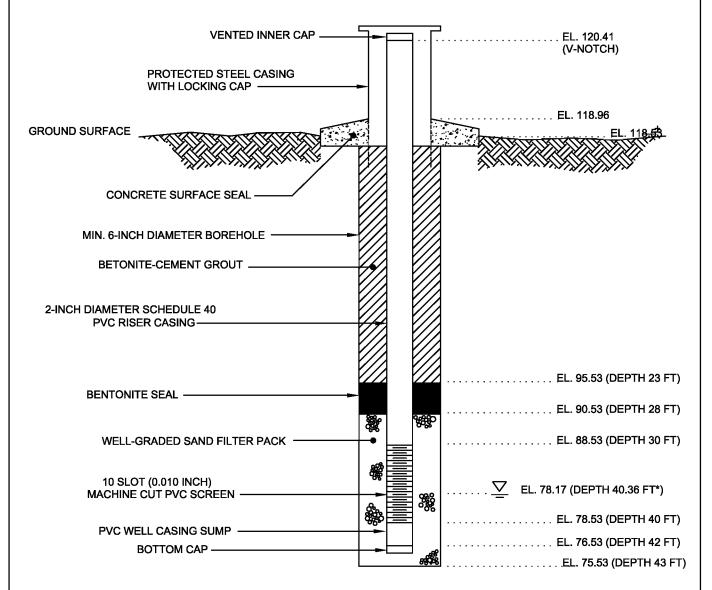
DATE COMPLETED: 06/21/2006

NORTHING: 214133.58

EASTING: 961924.87

**GROUND SURFACE ELEVATION: 118.53** 

GROUND WATER TABLE OBSERVATIONS		
DATE	DEPTH (FT) *	ELEVATION (FT)
7-25-06	40.36	78.17



NOTES: 1) SEE B-718 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* =GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR POWER PLANT CALVERT COUNTY, MD GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-718.DWG

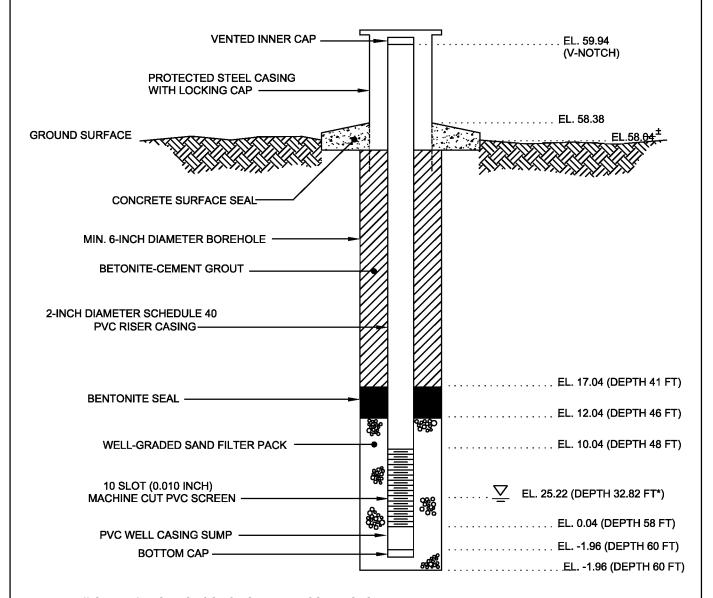
DATE COMPLETED: 06/272006

NORTHING: 214649.30

EASTING: 963212.73

**GROUND SURFACE ELEVATION: 58.04** 

GROUND WATER TABLE OBSERVATIONS		
DATE	DEPTH (FT) *	ELEVATION (FT)
7-25-06	32.82	25.22



NOTES: 1) SEE B-725 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* =GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR
POWER PLANT CALVERT
COUNTY, MD

GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-725.DWG

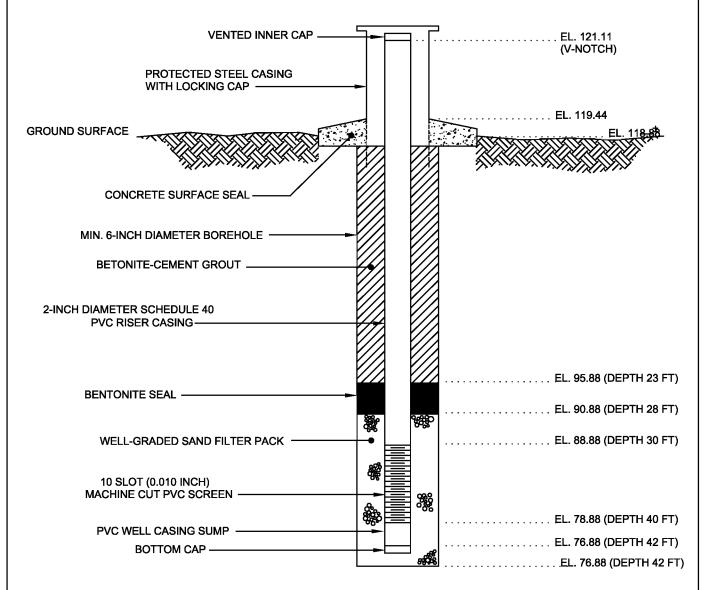
DATE COMPLETED: 06/23/2006

NORTHING: 214872.58

EASTING: 962445.93

**GROUND SURFACE ELEVATION: 118.88** 

GROUND WATER TABLE OBSERVATIONS			
DATE	DEPTH (FT) *	ELEVATION (FT)	
7-25-06	DRY		



NOTES: 1) SEE B-729 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* =GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR POWER PLANT CALVERT COUNTY, MD GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-729.DWG

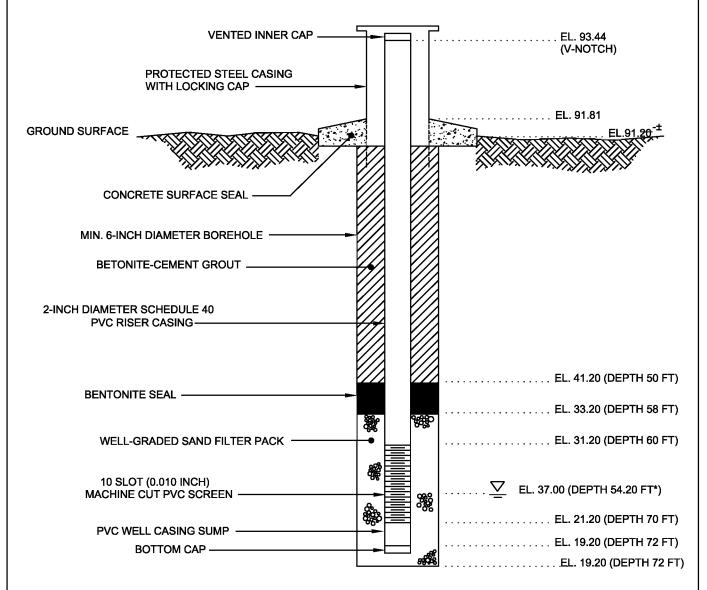
**DATE COMPLETED: 06/29/2006** 

NORTHING: 214805.48

EASTING: 961021.83

**GROUND SURFACE ELEVATION: 91.20** 

GROUND WATER TABLE OBSERVATIONS			
DATE	DEPTH (FT) *	ELEVATION (FT)	
7-27-06	54.20	37.00	



NOTES: 1) SEE B-735 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* =GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR POWER PLANT CALVERT COUNTY, MD GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-735.DWG

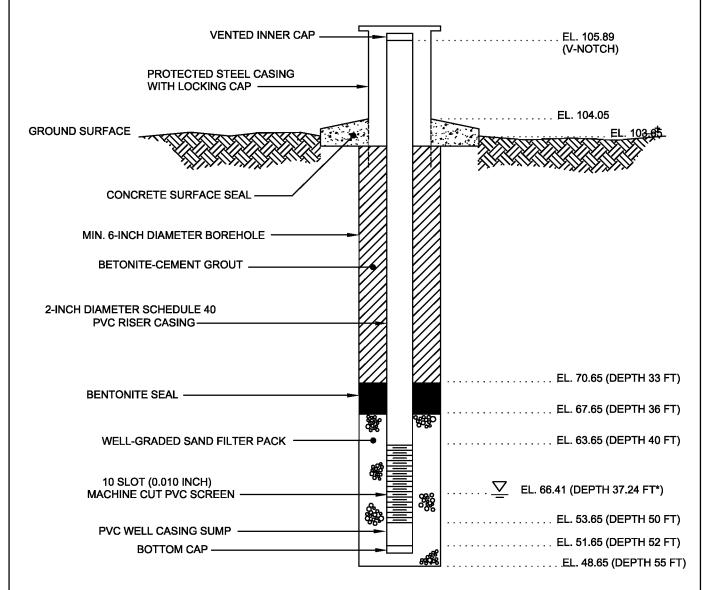
DATE COMPLETED: 07/11/2006

NORTHING: 213320.62

EASTING: 961234.01

**GROUND SURFACE ELEVATION: 103.65** 

GROUND WATER TABLE OBSERVATIONS				
DATE	DEPTH (FT) *	ELEVATION (FT)		
7-26-06	37.24	66.41		



NOTES: 1) SEE B-743 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* =GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR POWER PLANT CALVERT COUNTY, MD GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-743.DWG

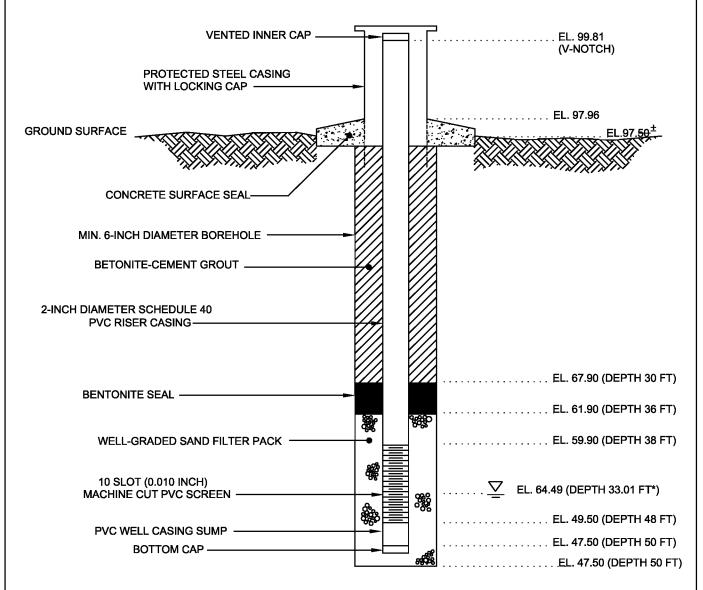
**DATE COMPLETED: 06/21/2006** 

NORTHING: 216405.37

EASTING: 960089.41

**GROUND SURFACE ELEVATION: 97.50** 

GROUND WATER TABLE OBSERVATIONS			
DATE	DEPTH (FT) *	ELEVATION (FT)	
7-27-06	33.01	64.49	



NOTES: 1) SEE B-744 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* =GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR POWER PLANT CALVERT COUNTY, MD GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-744.DWG

WELL NO.: **OW-752A** 

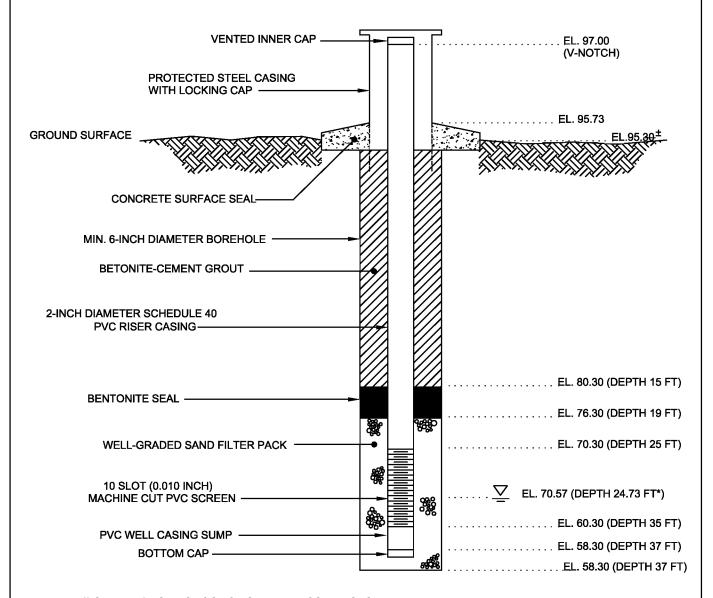
DATE COMPLETED: 07/07/2006

NORTHING: 215482.18

EASTING: 960250.12

**GROUND SURFACE ELEVATION: 95.30** 

GROUND WATER TABLE OBSERVATIONS			
DATE DEPTH (FT) * ELEVATION (FT)			
7-27-06	24.73	70.57	



NOTES: 1) SEE B-752 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* =GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR
POWER PLANT CALVERT
COUNTY, MD

GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-752A.DWG

WELL NO.: **OW-752B** 

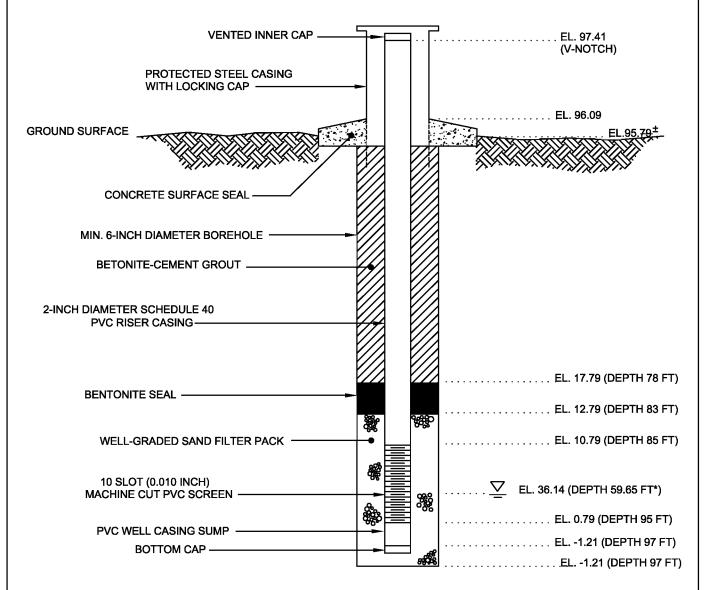
DATE COMPLETED: 07/07/2006

NORTHING: 215489.21

EASTING: 960257.57

**GROUND SURFACE ELEVATION: 95.79** 

GROUND WATER TABLE OBSERVATIONS			
DATE DEPTH (FT) * ELEVATION (FT)			
7-27-06	59.65	36.14	



NOTES: 1) SEE B-752 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* =GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR
POWER PLANT CALVERT
COUNTY, MD

GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-752B.DWG

WELL NO.: **OW-754** 

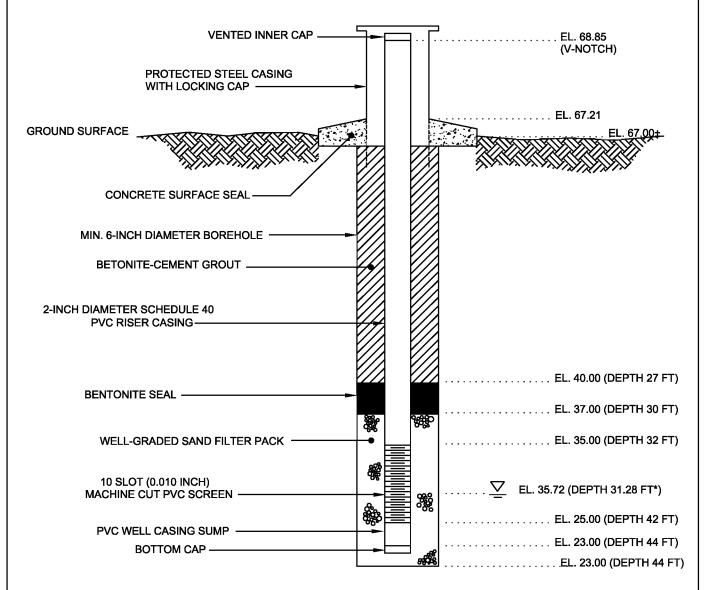
DATE COMPLETED: 07/06/2006

NORTHING: 217369.78

EASTING: 960290.37

**GROUND SURFACE ELEVATION: 67.00** 

GROUND WATER TABLE OBSERVATIONS			
DATE DEPTH (FT) * ELEVATION (FT)			
7-26-06	31.28	35.72	



NOTES: 1) SEE B-754 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* =GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR
POWER PLANT CALVERT
COUNTY, MD

GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-754.DWG

WELL NO.: **OW-756** 

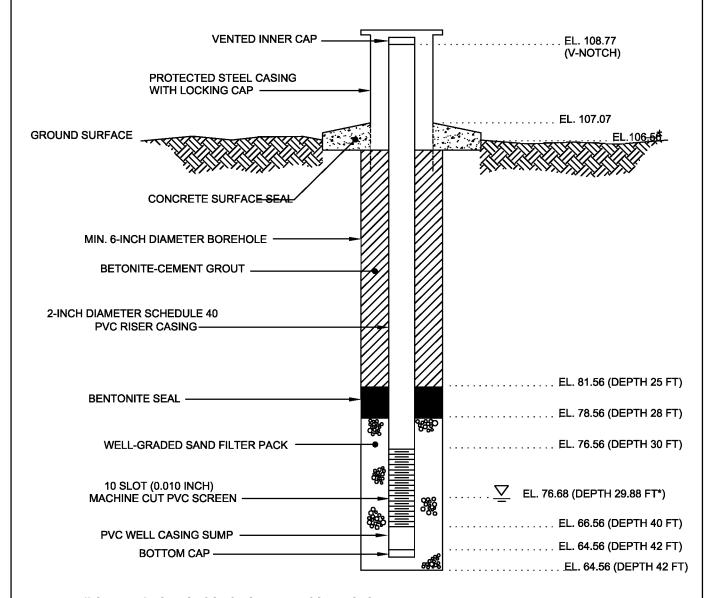
DATE COMPLETED: 06/21/2006

NORTHING: 215497.07

EASTING: 961212.39

**GROUND SURFACE ELEVATION: 106.56** 

GROUND WATER TABLE OBSERVATIONS			
DATE DEPTH (FT) * ELEVATION (FT)			
7-24-06	29,88	76.68	



NOTES: 1) SEE B-756 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* =GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR
POWER PLANT CALVERT
COUNTY, MD

GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-756.DWG

WELL NO.: **OW-759A** 

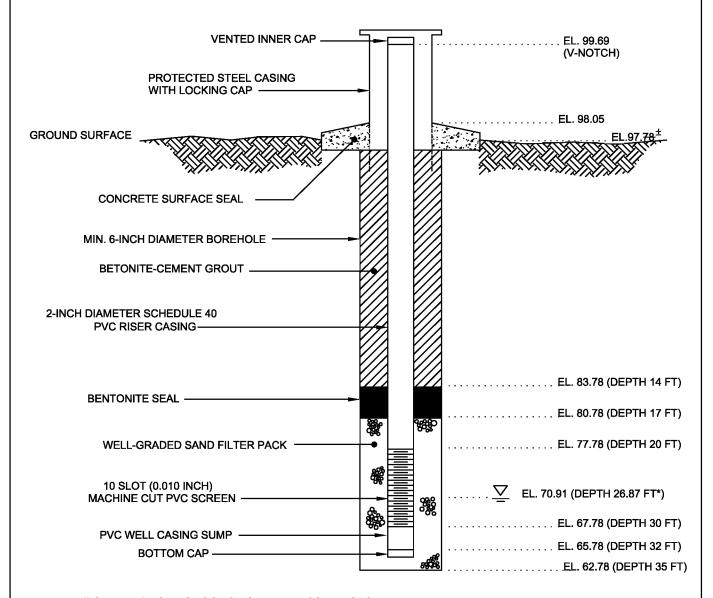
DATE COMPLETED: 06/22/2006

NORTHING: 214536.47

EASTING: 960055.02

**GROUND SURFACE ELEVATION: 97.78** 

GROUND WATER TABLE OBSERVATIONS			
DATE DEPTH (FT) * ELEVATION (FT)			
7-26-06	26.87	70.91	



NOTES: 1) SEE B-759 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* =GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR
POWER PLANT CALVERT
COUNTY, MD

GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-759A.DWG

WELL NO.: **OW-759B** 

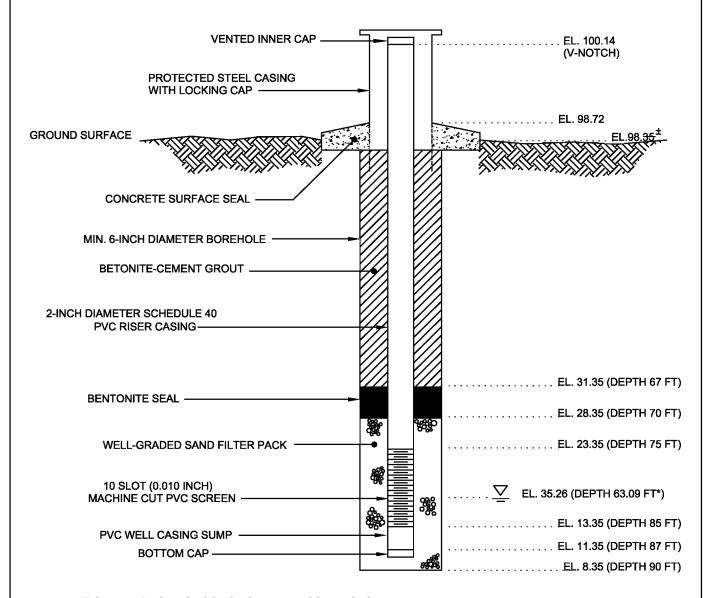
DATE COMPLETED: 06/22/2006

NORTHING: 214526.25

EASTING: 960056.32

**GROUND SURFACE ELEVATION: 98.35** 

GROUND WATER TABLE OBSERVATIONS			
DATE DEPTH (FT) * ELEVATION (FT)			
7-26-06	63.09	35.26	



NOTES: 1) SEE B-759 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* =GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR
POWER PLANT CALVERT
COUNTY, MD

GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-759B.DWG

WELL NO.: **OW-765A** 

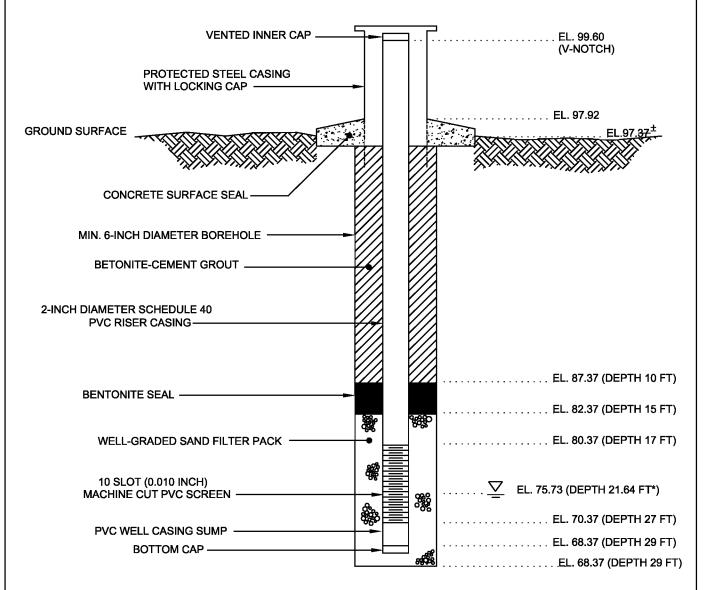
DATE COMPLETED: 07/13/2006

NORTHING: 216424.51

EASTING: 959701.22

**GROUND SURFACE ELEVATION: 97.37** 

GROUND WATER TABLE OBSERVATIONS			
DATE DEPTH (FT) * ELEVATION (FT)			
7-27-06	21.64	75.73	



NOTES: 1) SEE B-765 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* =GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR
POWER PLANT CALVERT
COUNTY, MD

GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-765A.DWG

WELL NO.: **OW-765B** 

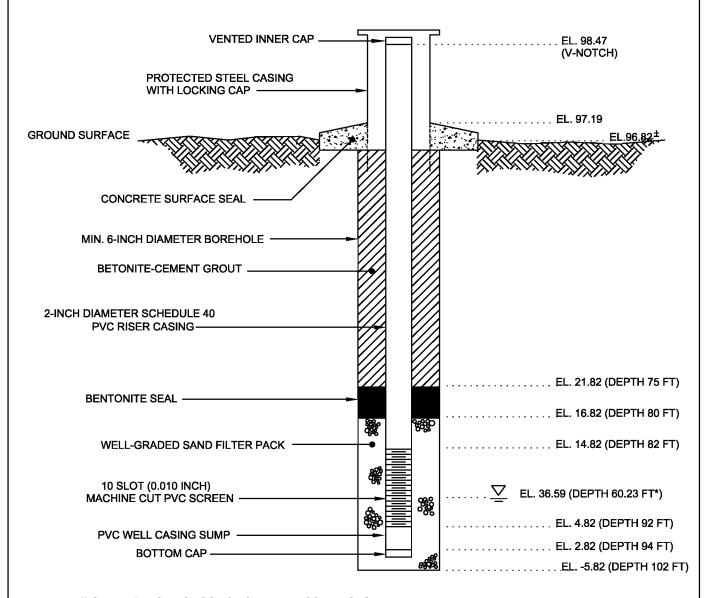
DATE COMPLETED: 07/13/2006

NORTHING: 216420.42

EASTING: 959693.64

**GROUND SURFACE ELEVATION: 96.82** 

GROUND WATER TABLE OBSERVATIONS			
DATE DEPTH (FT) * ELEVATION (FT)			
7-27-06	60.23	36.59	



NOTES: 1) SEE B-765 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* =GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR
POWER PLANT CALVERT
COUNTY, MD

GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-765B.DWG

WELL NO.: **OW-766** 

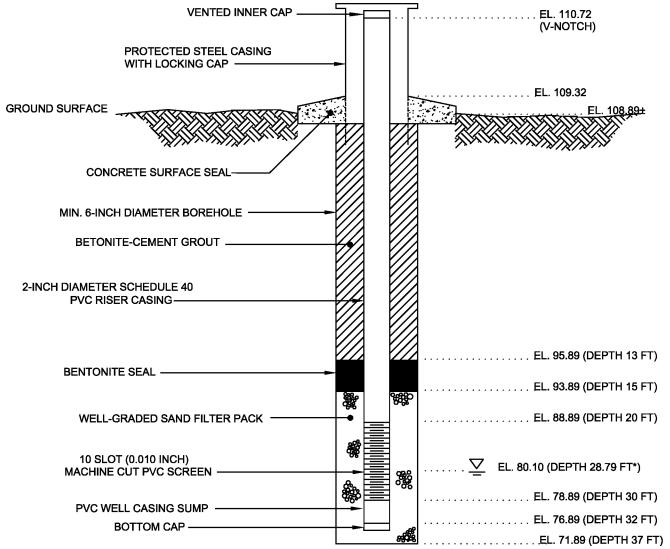
**DATE COMPLETED: 07/13/2006** 

NORTHING: 216932.89

EASTING: 959791.50

**GROUND SURFACE ELEVATION: 108.89** 

GROUND WATER TABLE OBSERVATIONS		
N (FT)		
)		
<u> </u>		



NOTES: 1) SEE B-766 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* = GROUND WATER DEPTH MEASURED FROM V-NOTCH
- 5) BENTONITE HOLE PLUG USED TO BACKFILL BORING B-766 FROM 50 FT TO 37 FT



CALVERT CLIFFS NUCLEAR POWER PLANT CALVERT COUNTY, MD

GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-766.DWG

WELL NO.: **OW-768A** 

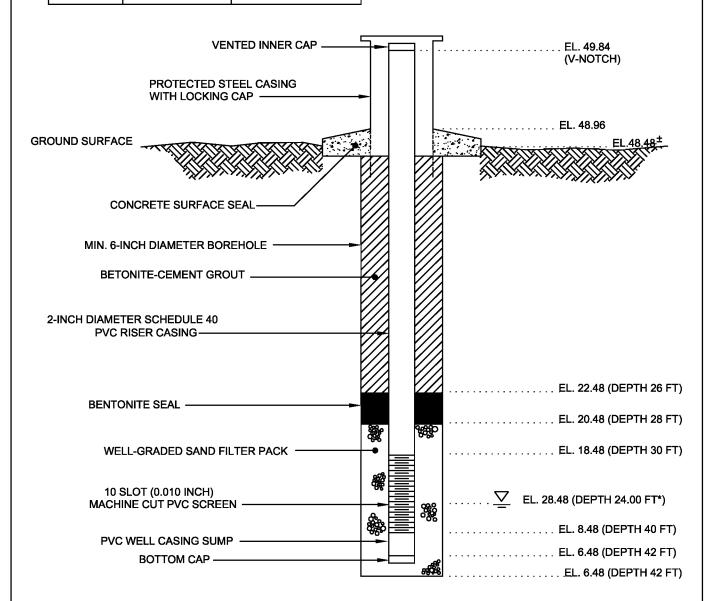
DATE COMPLETED: 06/20/2006

NORTHING: 217106.06

EASTING: 962238.98

**GROUND SURFACE ELEVATION: 48.48** 

GROUND WATER TABLE OBSERVATIONS			
DATE DEPTH (FT) * ELEVATION (FT)			
7-25-06	24.00	24.48	



NOTES: 1) SEE B-768 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* =GROUND WATER DEPTH MEASURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR POWER PLANT CALVERT COUNTY, MD GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-768.DWG

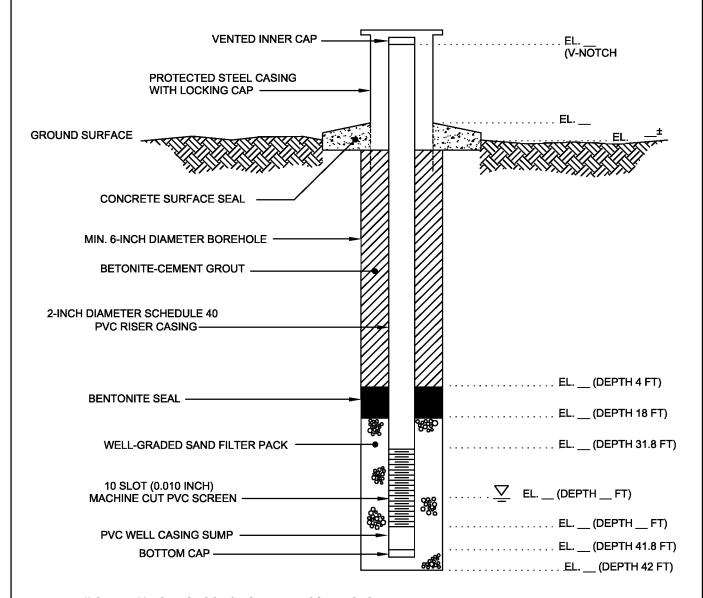
WELL NO.: **OW-769A** 

DATE COMPLETED: 06/23/2006

NORTHING: EASTING:

GROUND WATER TABLE OBSERVATIONS		
DATE DEPTH (FT) ELEVATION (FT)		ELEVATION (FT)

GROUND SURFACE ELEVATION:



NOTES: 1) SEE B-769 BORING LOG FOR STRATA DESCRIPTIONS

2) DEVELOPED BY PUMPING

3) CENTRALIZERS USED



CALVERT CLIFFS NUCLEAR POWER PLANT CALVERT COUNTY, MD GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-769.DWG

WELL NO.: **OW-770** 

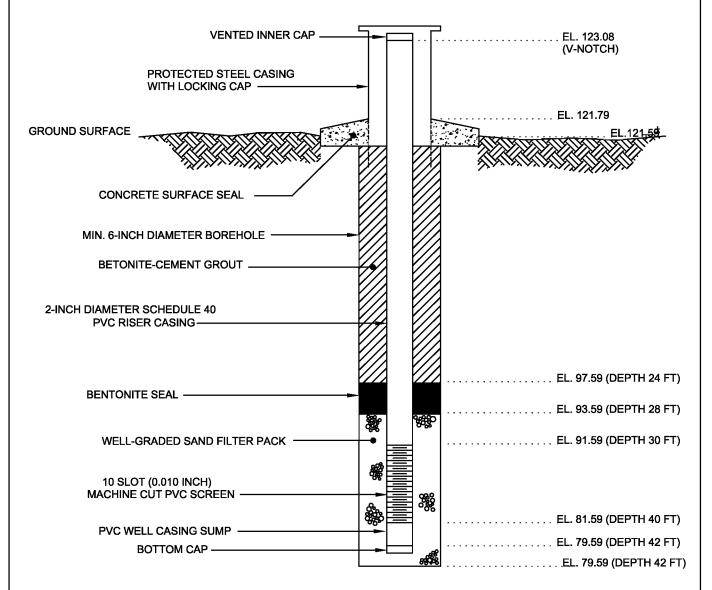
DATE COMPLETED: 06/22/2006

NORTHING: 215466.60

EASTING: 962826.95

**GROUND SURFACE ELEVATION: 121.59** 

GROUND WATER TABLE OBSERVATIONS			
DATE DEPTH (FT) * ELEVATION (FT)			
7-25-06	DRY		



NOTES: 1) SEE B-770 BORING LOG FOR STRATA DESCRIPTIONS

- 2) DEVELOPED BY PUMPING
- 3) CENTRALIZERS USED
- 4) \* =GROUND WATER DEPTH MESURED FROM V-NOTCH



CALVERT CLIFFS NUCLEAR POWER PLANT CALVERT COUNTY, MD GROUND WATER OBSERVATION WELL CONSTRUCTION LOG

PROJECT NO. 06120048 DWG NO. OW-770.DWG

### **Schnabel Project No.** 06120048 **Appendix D:** Ground Water Observation Wells

### FIELD PERMEABILITY TEST DATA



### PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP COLA Project	PROJECT NO.: 06120048
LOCATION: Lusby, MD	CLIENT: Bechtel Power Corporation
DATE:	
WEATHER/TEMP: 190 (married	
TEST INFORMATION	WELL INFORMATION
Type of Test: (Falling Bead / Rising	Head ) WELL ID: DW-301
Slug Type: Mechanical / Water )	Screen Inside Diameter: こパ
Approximate Volume of Slug: 637 0.629	Casing Inside Diameter: Z'
Manual Water Level Meter S/N: WLP -001	Total Well Depth (ft, TOC):
Transducer S/N: 104 259	Screen Interval Depth (ft, TOC): 65-75
Slug S/N: SLUG -00 Z	Riser Height (ft): Z
1 Pre-Test Water Level (ft, TOC)/ Time:  2 Water Level after Probe insertion (ft, TOC)/ Time:  3 Transducer Depth:  4 Calc. Pre-Test Head over Transducer:  5 Measured Pre-Test Head over Transducer:  6 Time Test Started:  7 Pre-Test Head over Transducer:  7 Time Test Started:  8 Percent Recovery at End of Test:  9 Datalogger File Name:  8 Datalogger File Name:  9 S. 75 / [5:3]  58.75 / [5:5]  58.76 / [5:5]  5	
•	
Comments:	

TOC = Bottom of the V-notch at top of casing

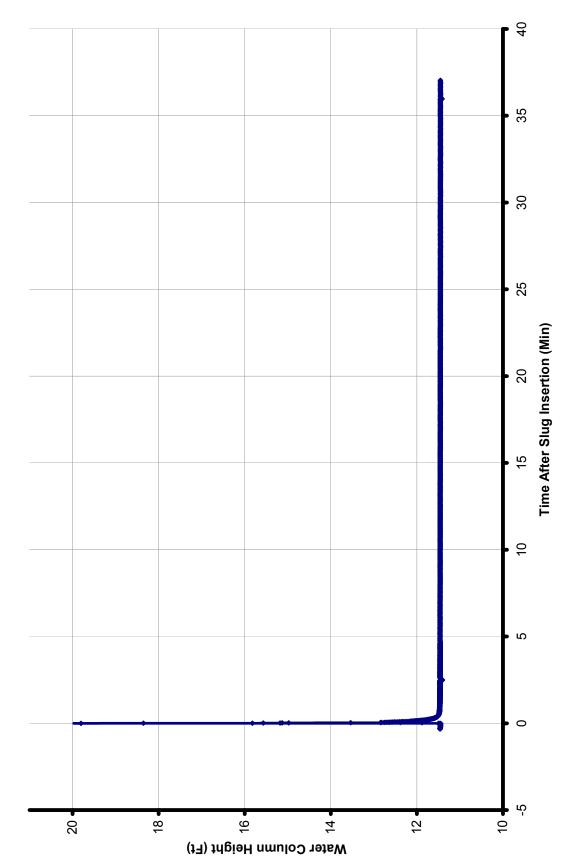
Performed By: Date:

Note: All water level measurements obtained from well measurement point at top of casing.

Reference: ASTM D4044

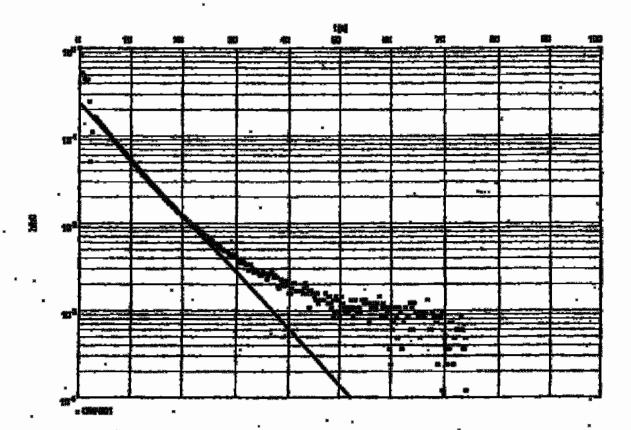
Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

**OW-301 Permeability Test** 





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### PERMEABILITY (SLUG) TEST FIELD FORM

PROJECT: Calvert Cliffs NPP COLA Project LOCATION: Lusby, MD DATE: July 27, 3006 WEATHER/ TEMP 90 ham		PROJECT NO.: 06120048 CLIENT: Bechtel Power	Corporation
TEST INFORMATION	ON	WELL INFOR	RMATION
Type of Test:	(Ealling Head / Rising Head )	WELL ID	: OW-313 A
Slug Type:   Me	echanical Water )	Screen Inside Diameter	
Approximate Volume of Slug:	032 BAL 0.625 GAL	Casing Inside Diameter	: 24
Manual Water Level Meter S/N:	WCP-001	Total Well Depth (ft, TOC)	
Transducer S/N:	109213	Screen Interval Depth (ft, TOC)	40-50
Slug S/N:	Sina - 003	Riser Height (ft)	<u> 2.0</u>
1 Pre-Test Water Level (ft, TOC)/Time: 2 Water Level after Probe Insertion (ft, TOC)/Time: 3 Transducer Depth: 4 Calc. Pre-Test Head over Transducer: 5 Measured Pre-Test Head over Transducer: 6 Time Test Started: 7 Time Test Ended: 8 Percent Recovery at End of Test: 9 Datalogger File Name:  Comments: TOC = Bottom of the V-notch at top of casing	9.69 ft/4:10 pm 19.70 ft/4:45 pm 20 ft 10.30 ft 10.53 ft 4:48 pm 5:10 pm 10.58 ft 120098-PTD-OW-3/3A-3	SLUB	

Date:

Date:

Note: All water level measurements obtained from well measurement point at top of casing,

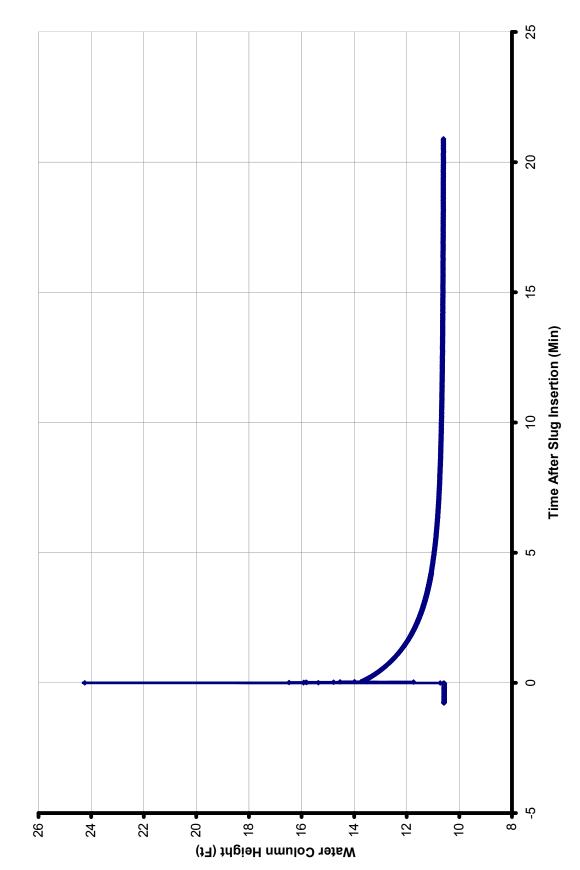
Performed By:

Approved By:

Reference: ASTM D4044

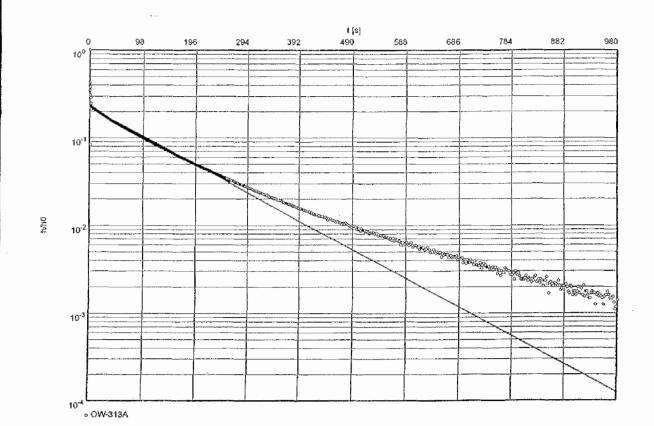
Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

**OW-313A Permeability Test** 





Schnabel Engineering North, LLC 656 Quince Orchard Road, Suite 700 Galthersburg, MC 20678	BOUWER-BICE's method			
(301) 417-2400			Evaluated by: patrick	
Slug Test No. 313A		Test conducted on: 7/27/20	03	
OW-313A				



Hydrautic conductivity [ft/s]: 7.50 x 10<sup>-6</sup>

INPUT PARAMETERS
Static Water Level = 10.60 ft
Depth to Bottom of Aquifer = 62.00 ft
Length of Screen = 10.00 ft
Radius of Casing = 0.08 ft
Radius of Influence = 0.25 ft
Evaluated by: Ramela Patrick

Reviewed by: Christopher Krampis



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## PERMEABILITY (SLUG) TEST FIELD FORM

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Section 1975

Cartest Carte May COLA Project PROJECT LOCKTONE DATE WEATHER

PROJECT NO.: CLENT N	Bernen t Cashy bast	Street Interval
MICH. Culvert Cittle MP COLA Project MICH. 1. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2.	The of Test: ( polling Hard / Rising Head ) Shay Type of Test: ( polling Hard / Rising Head ) Shay Type ( Medicality ) Water 1 Approximate Volume of Shay ( D. 20 )	COLO ANE MAR

A 100%

referred Chapter (p., 1704).

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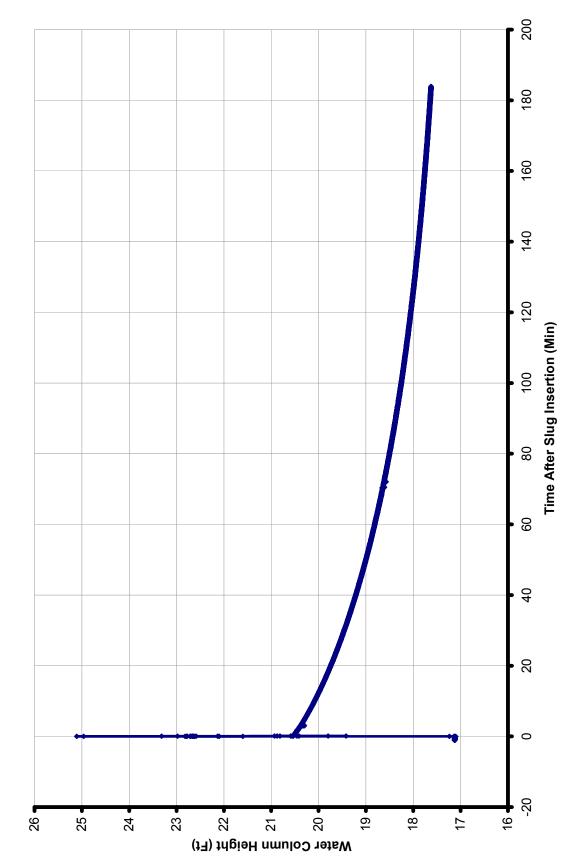
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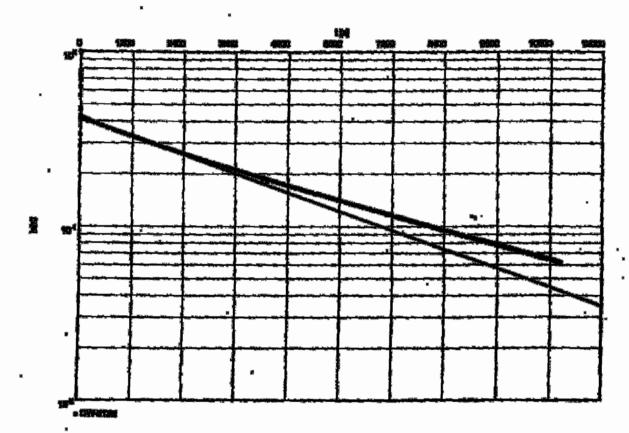
Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

**OW-313B Permeability Test** 





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## PERMEABILITY (SLUG) TEST FIELD FORM

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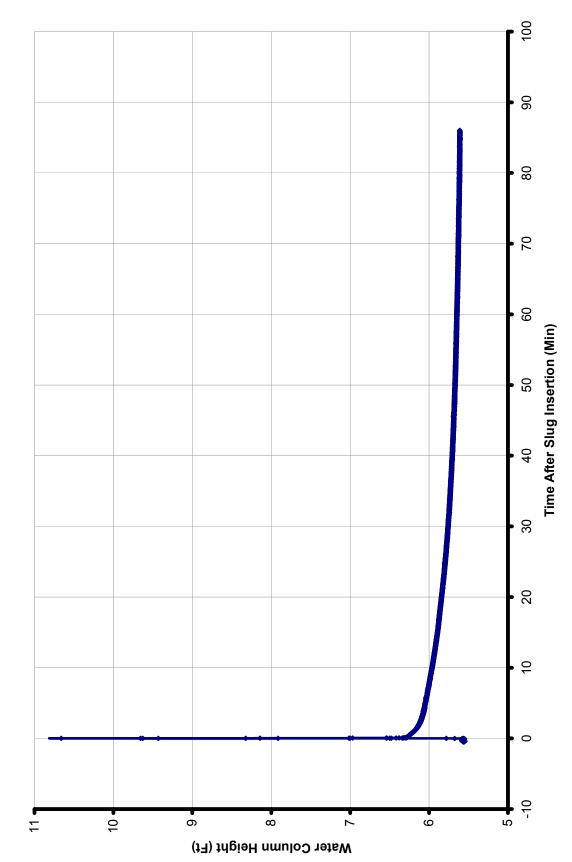
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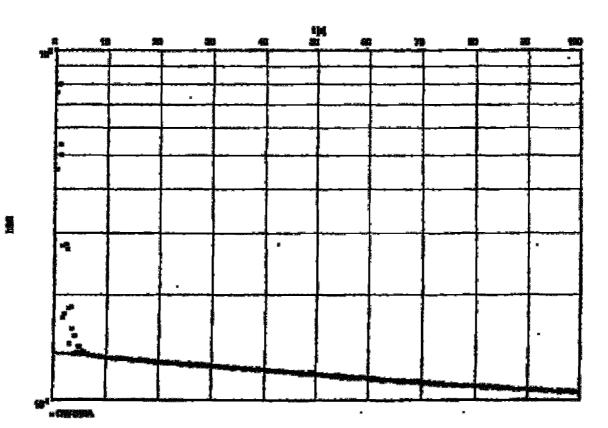
Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

**OW-319A Permeability Test** 





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## PERMEABILITY (SLUG) TEST FIELD FORM

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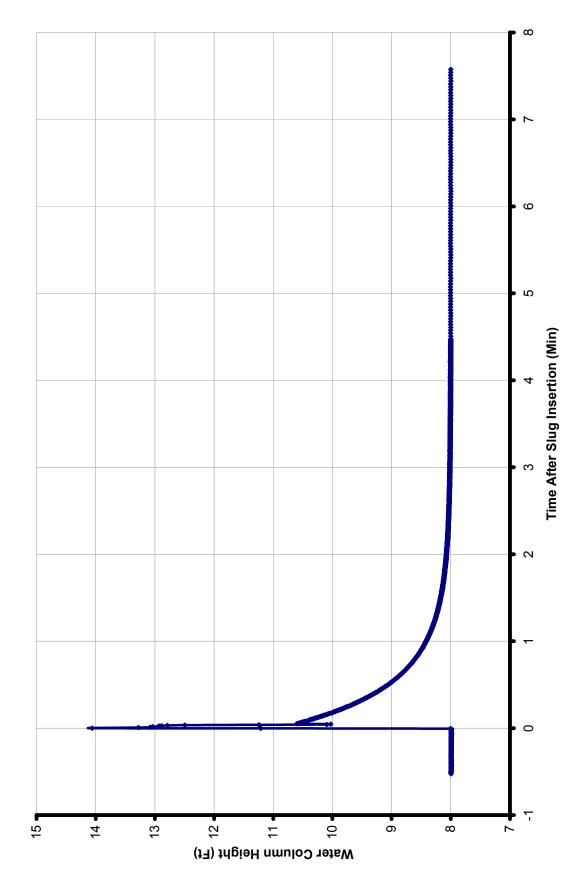
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Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

**OW-319B Permeability Test** 





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## PERMEABILITY (SLUG) TEST FIELD FORM

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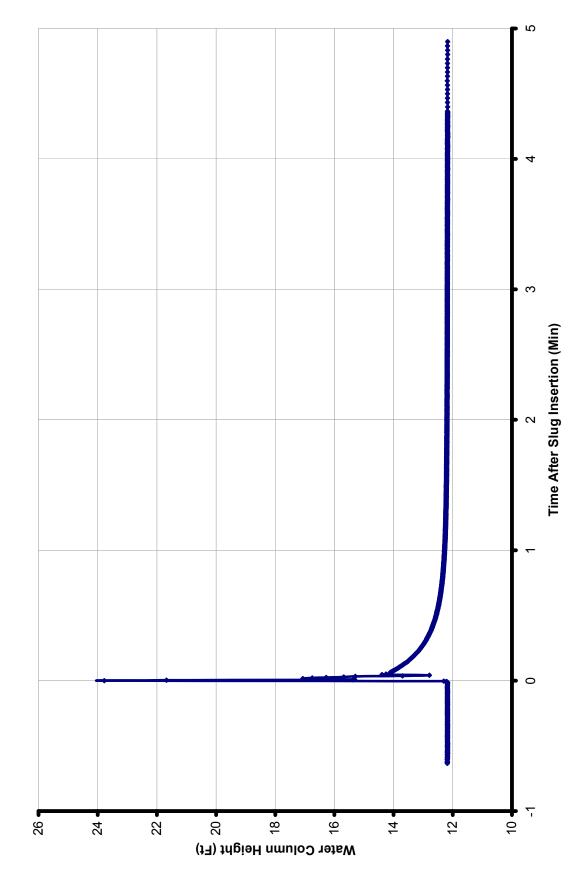
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**OW-323 Permeability Test** 





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## PERMEABILITY (SLUG) TEST FIELD FORM

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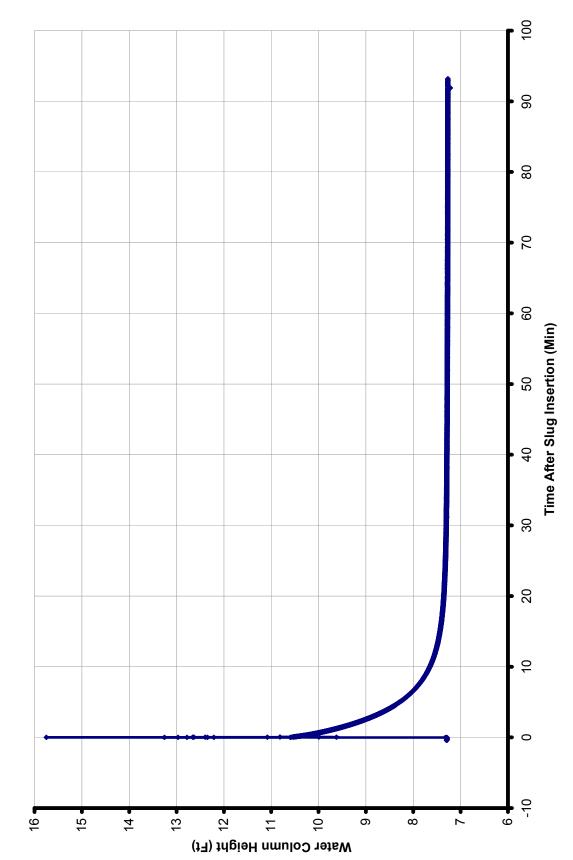
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Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

**OW-328 Permeability Test** 





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# PERMEABILITY (SLUG) TEST FIELD FORM

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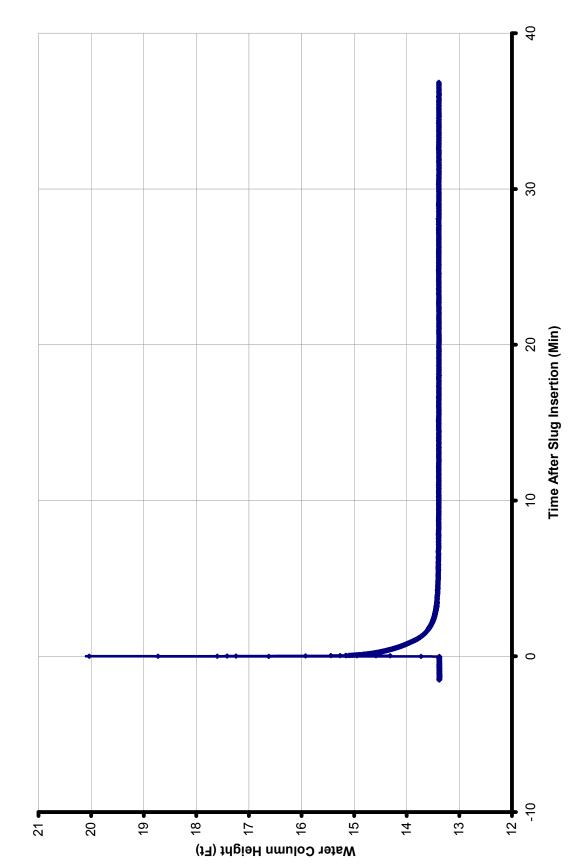
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Note: All water have measurements abteined from well manacement point at tap of confrg. Reference: AKTH DADA

Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

**OW-336 Permeability Test** 





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Langle for Benny = 1030 ft

Estimated by: Esquale Petrick

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## PERMEABILITY (SLUG) TEST FIELD FORM

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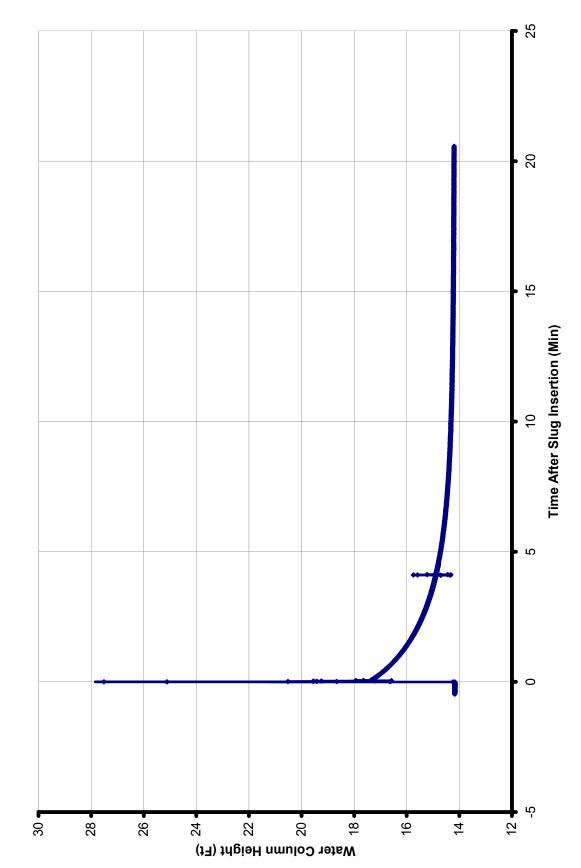
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Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

**OW-401 Permeability Test** 





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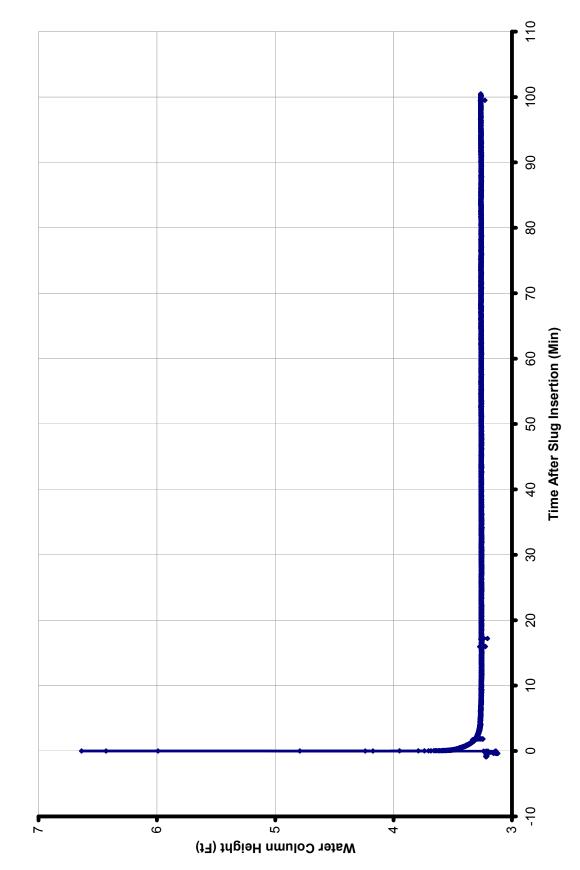
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Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

**OW-413A Permeability Test** 





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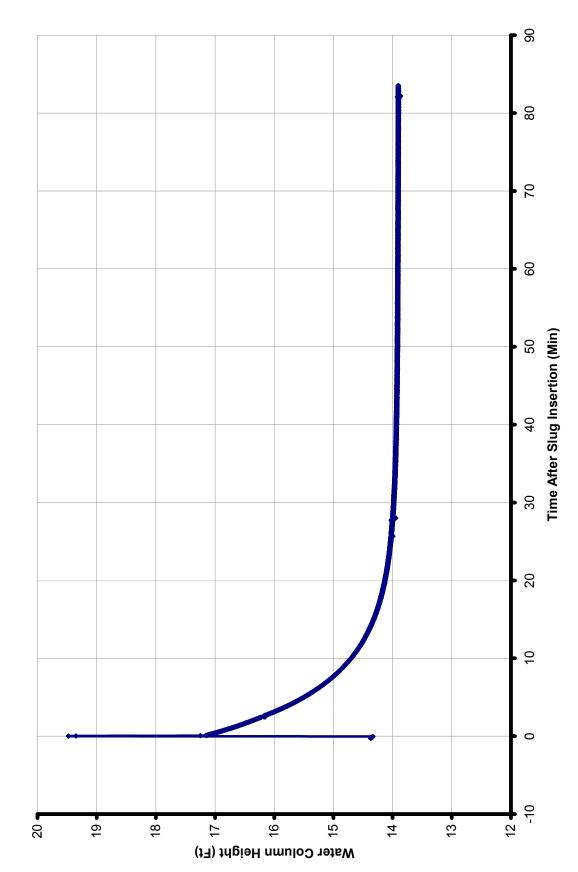
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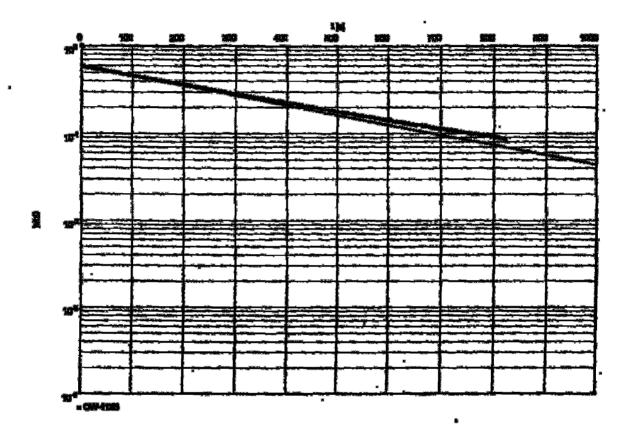
Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

**OW-413B Permeability Test** 





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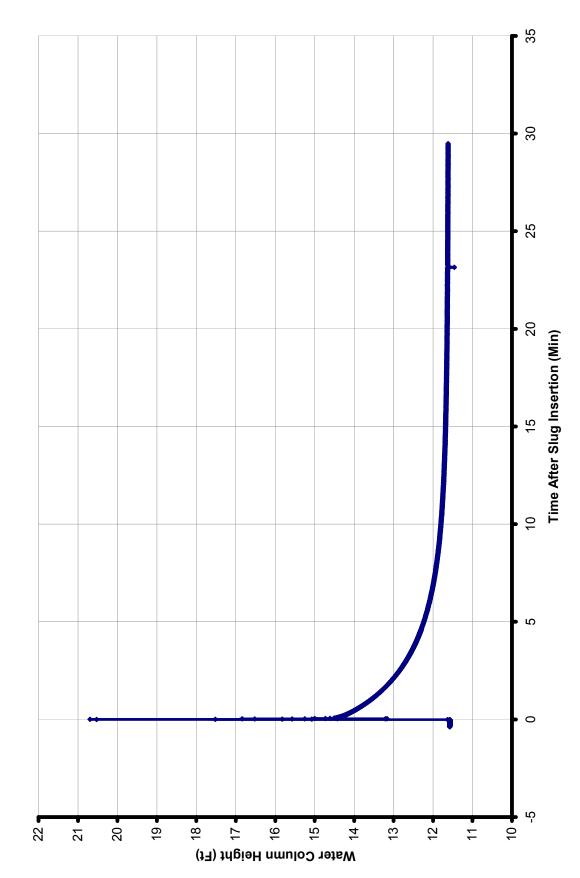
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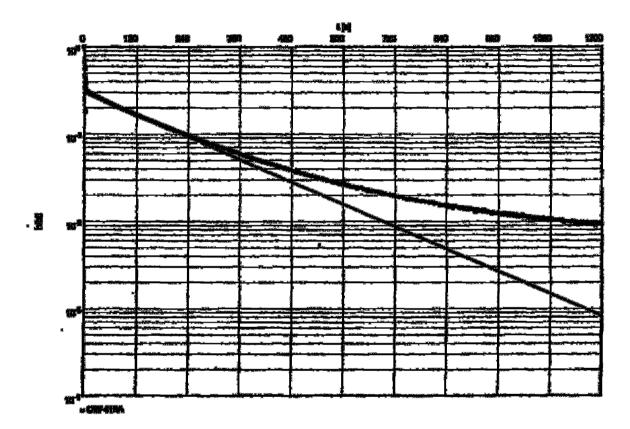
Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

**OW-418A Permeability Test** 





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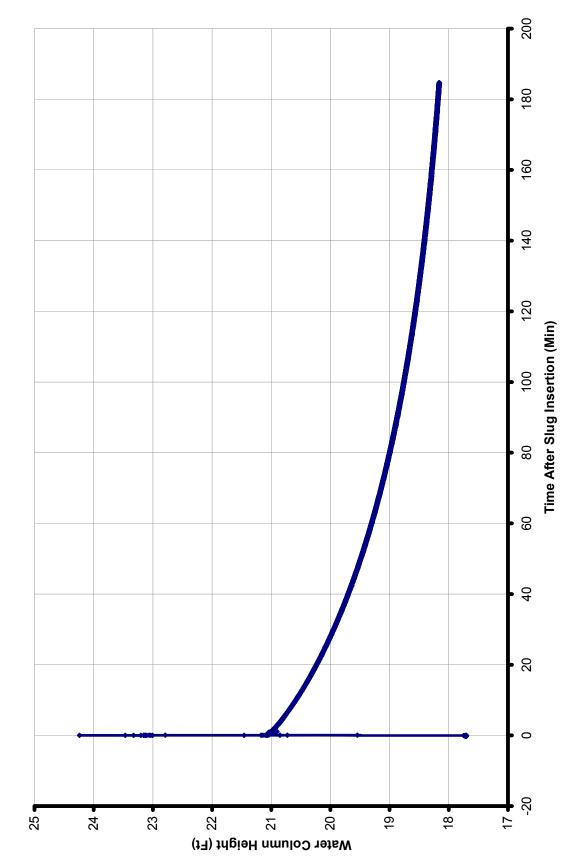
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Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

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## PERMEABILITY (SLUC) TEST FIELD FORM

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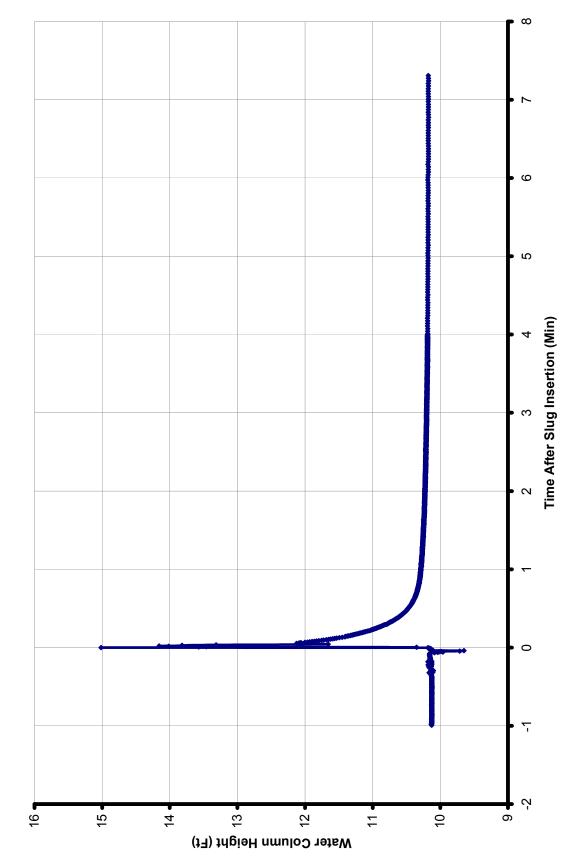
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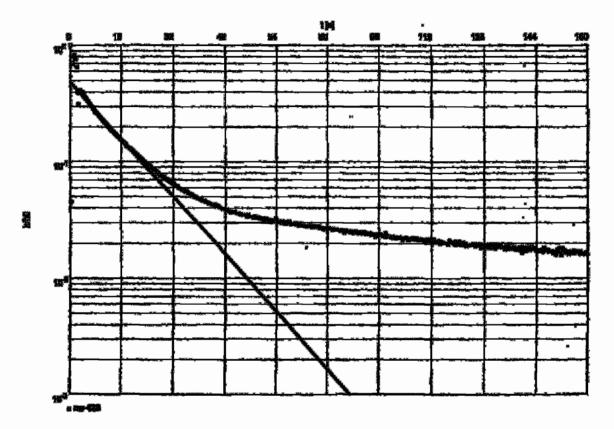
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**OW-423 Permeability Test** 





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## PERMEABILITY (SLUG) TEST FIELD FORM

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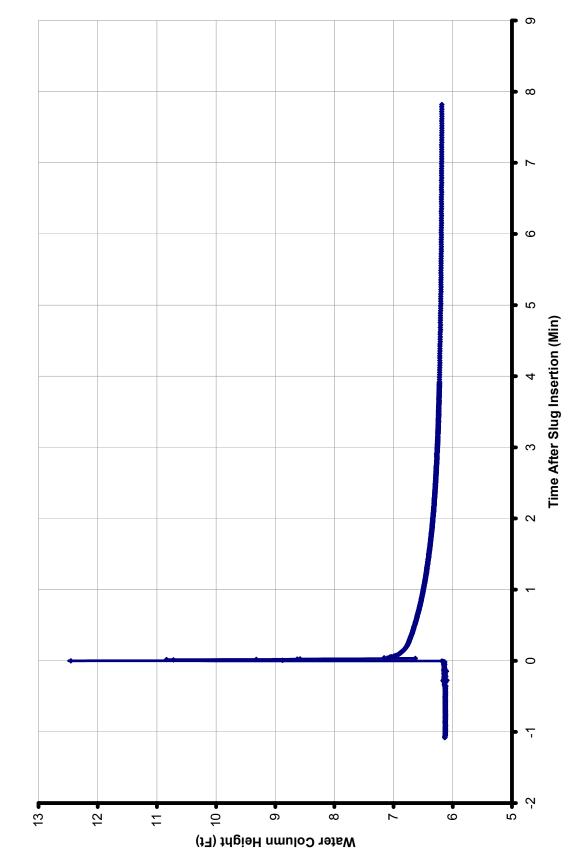
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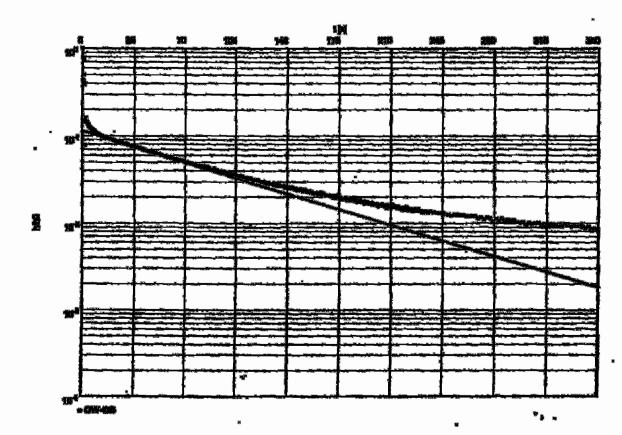
Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

**OW-428 Permeability Test** 





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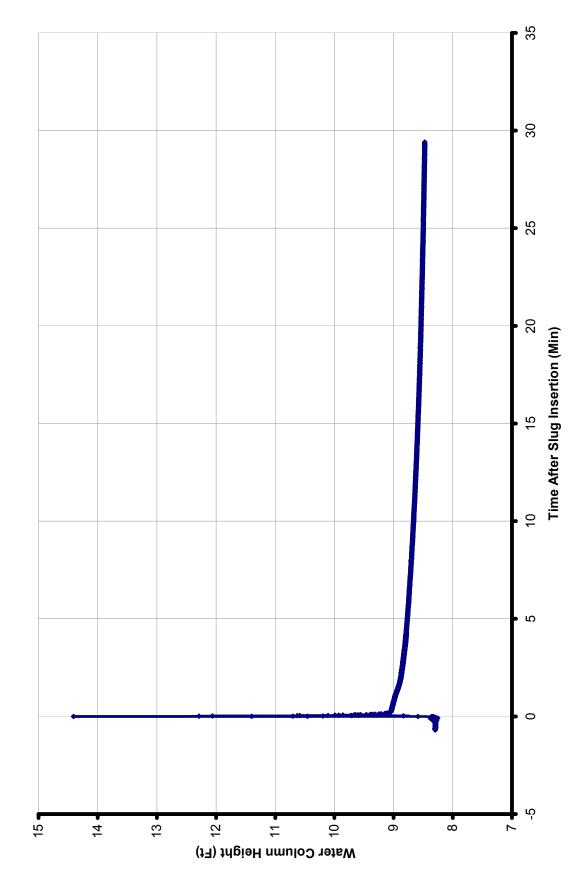
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Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

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## PERMEABILITY (SLUG) TEST FIELD FORM

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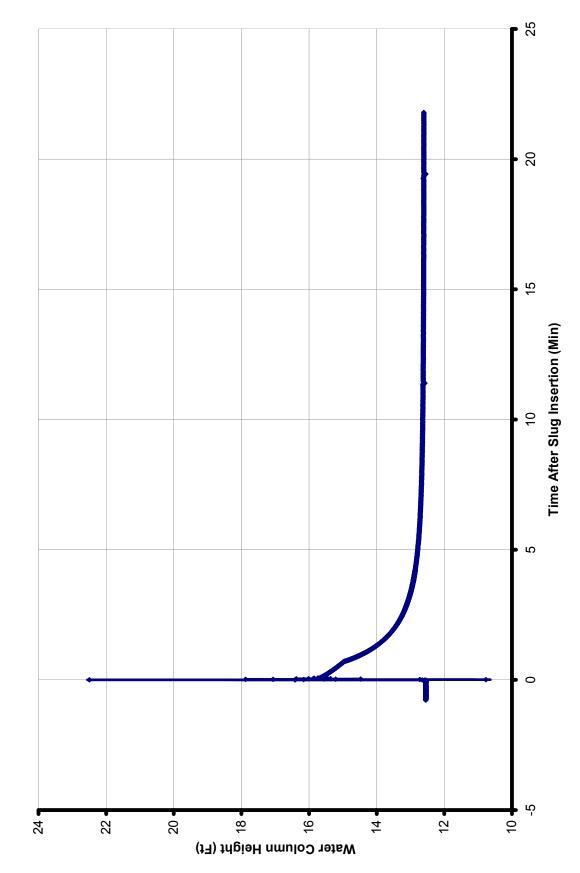
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Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

**OW-703A Permeability Test** 





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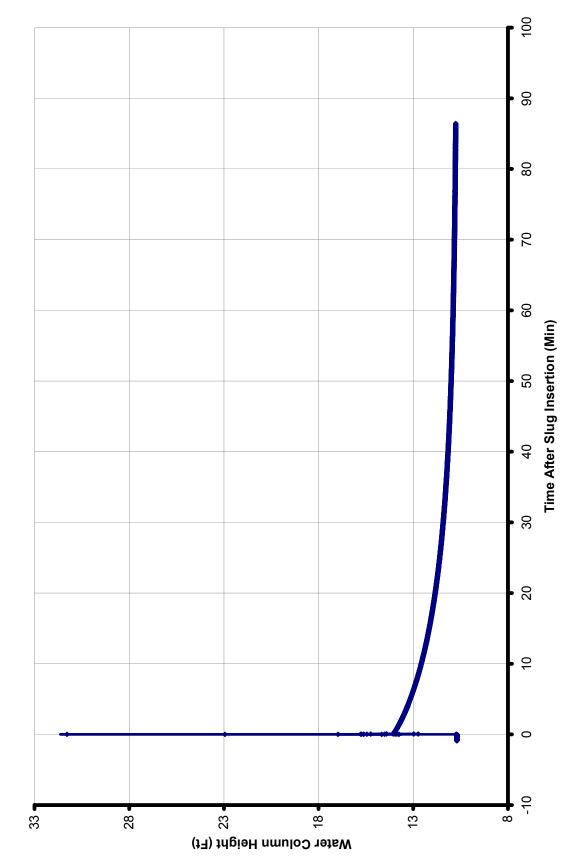
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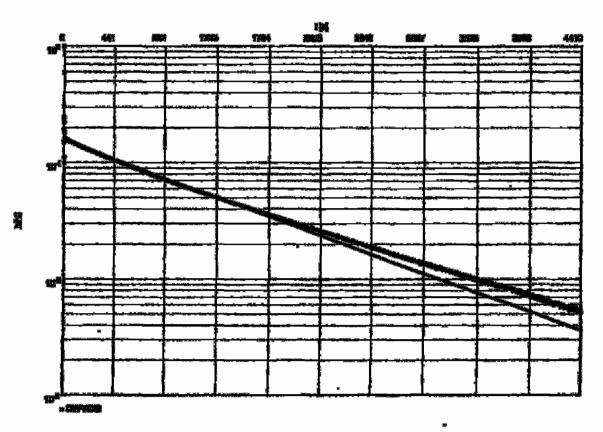
Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

**OW-703B Permeability Test** 





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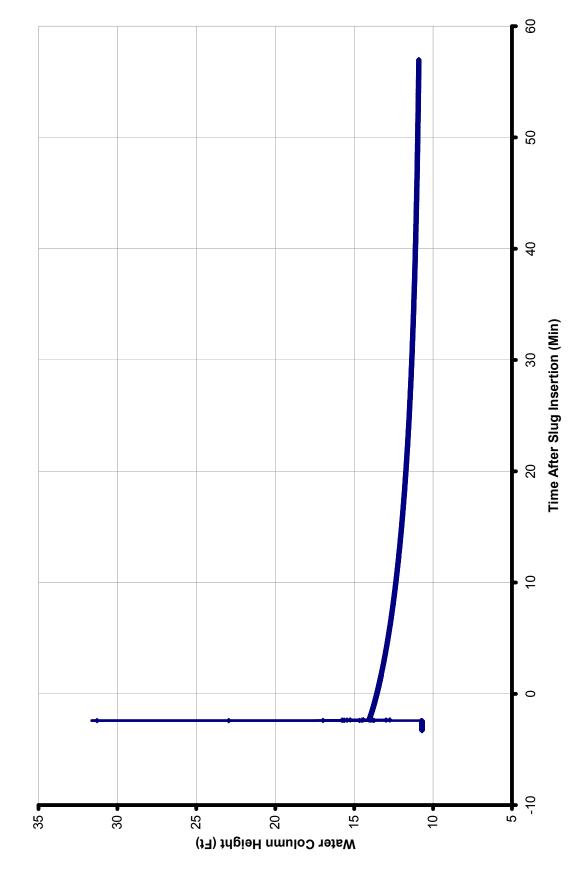
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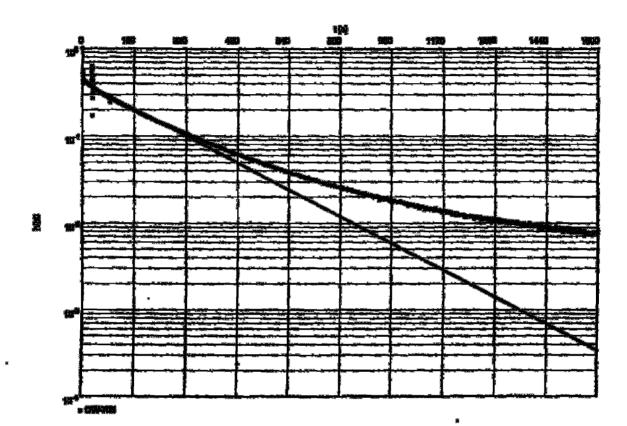
Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

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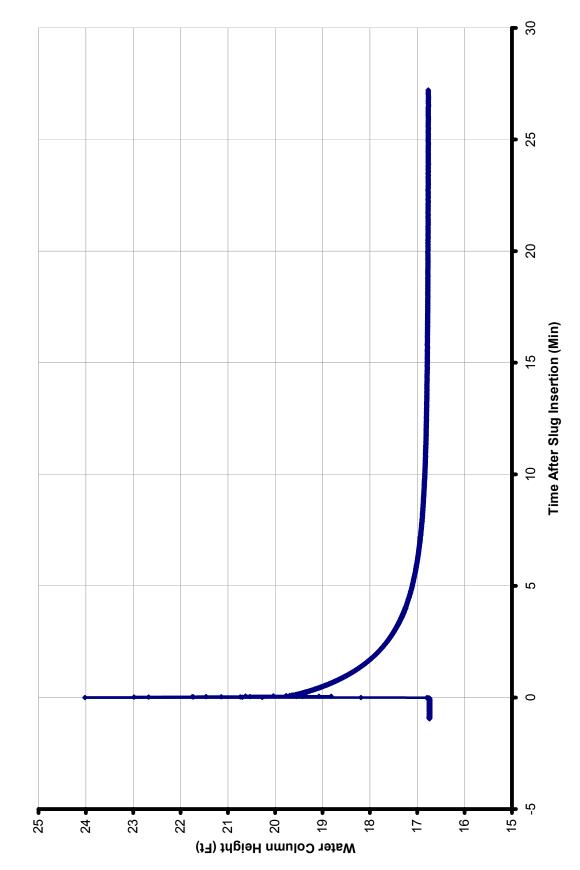
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Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

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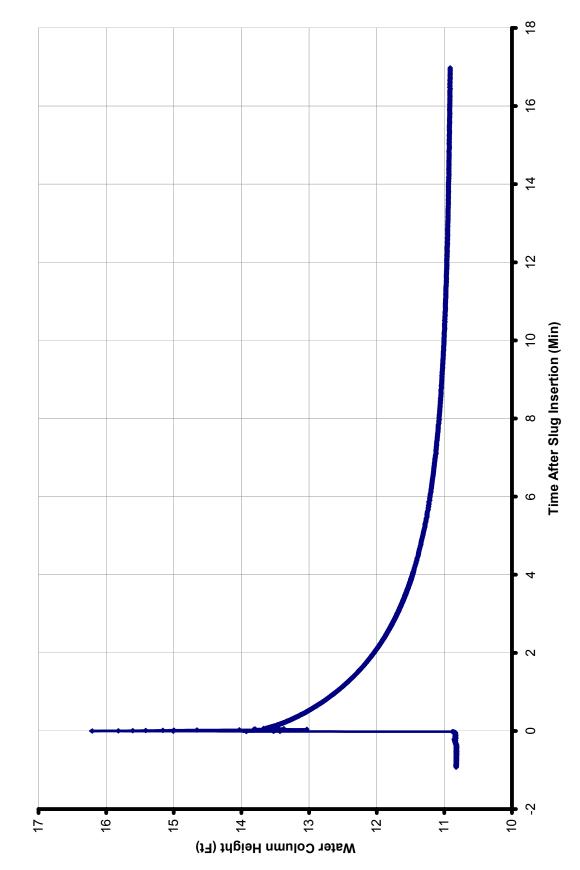
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Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

**OW-711 Permeability Test** 





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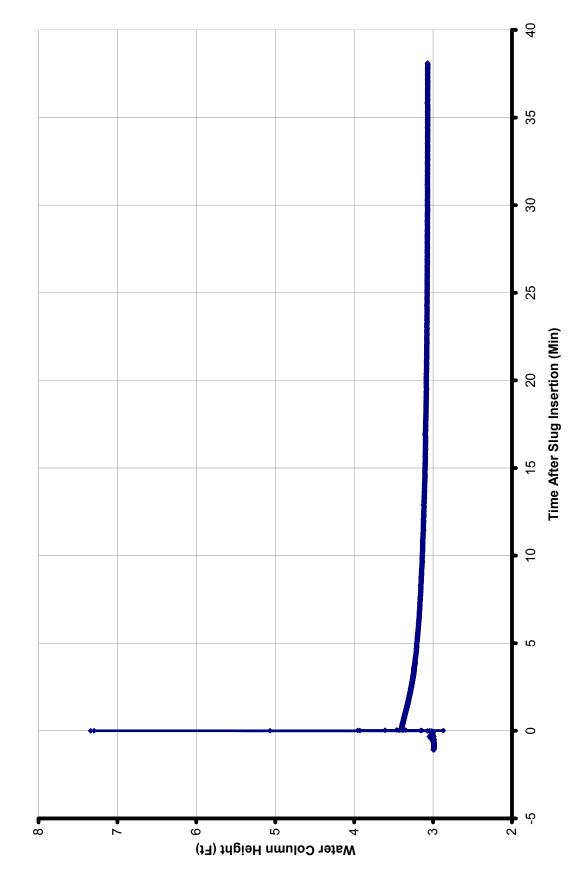
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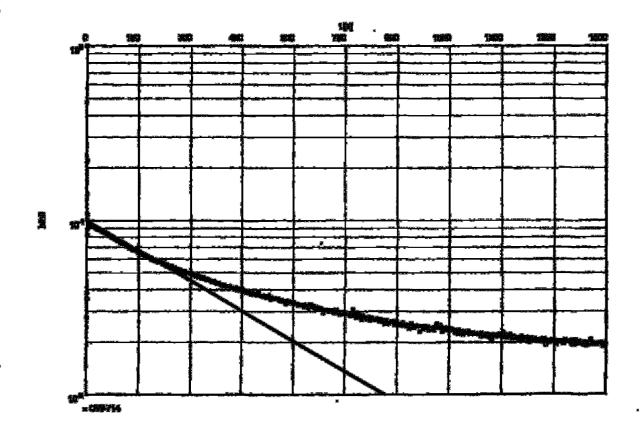
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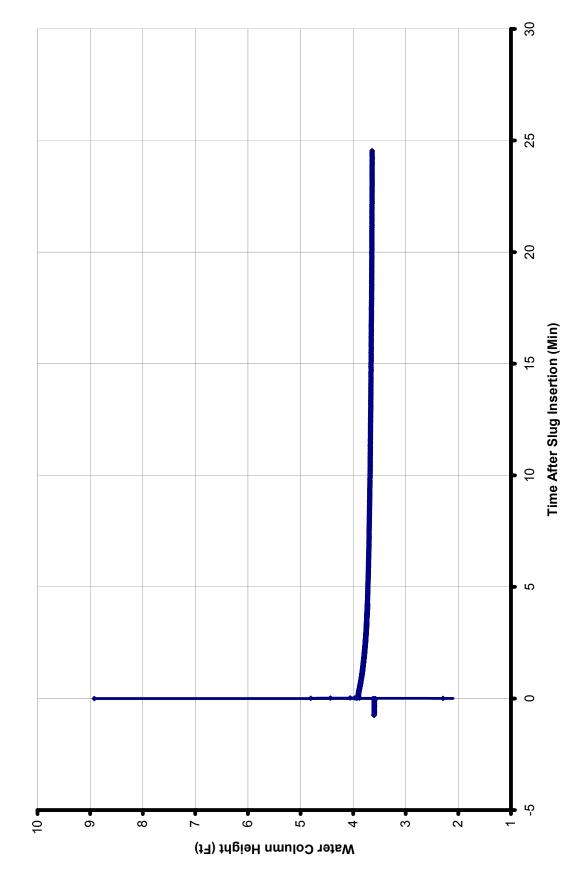
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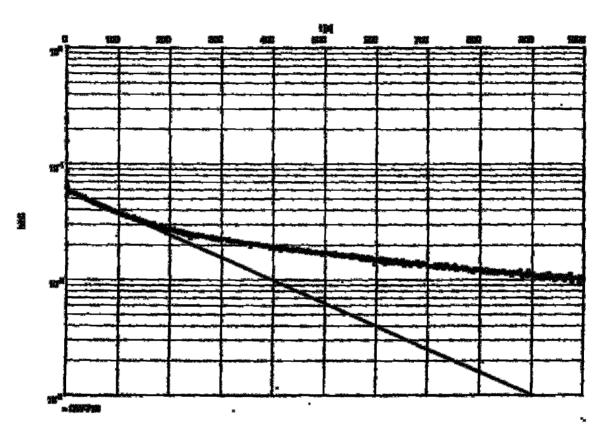
Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

**OW-718 Permeability Test** 





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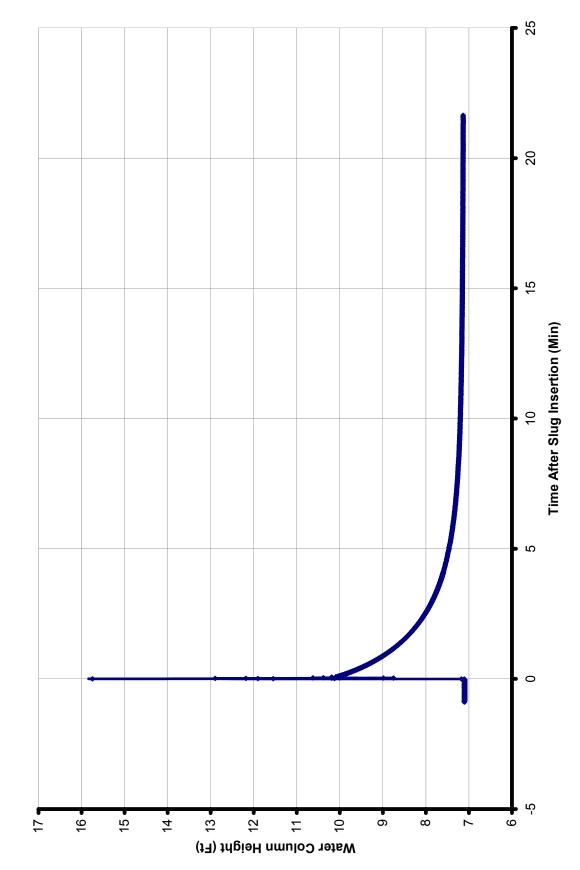
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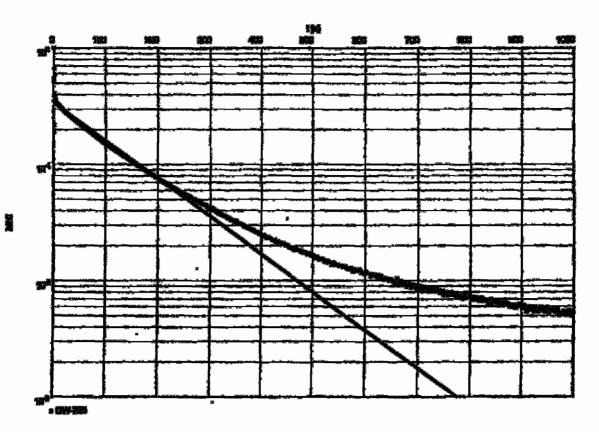
Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

**OW-725 Permeability Test** 





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# PERMEABILITY (SLUG) TEST FIELD FORM

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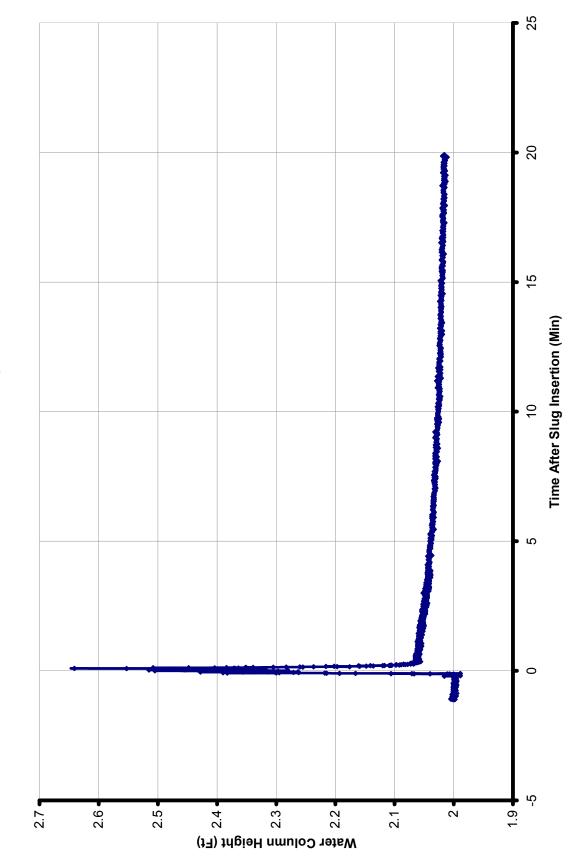
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Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

**OW-729 Permeability Test** 







# PERMEABILITY (SLUG) TEST FIELD FORM

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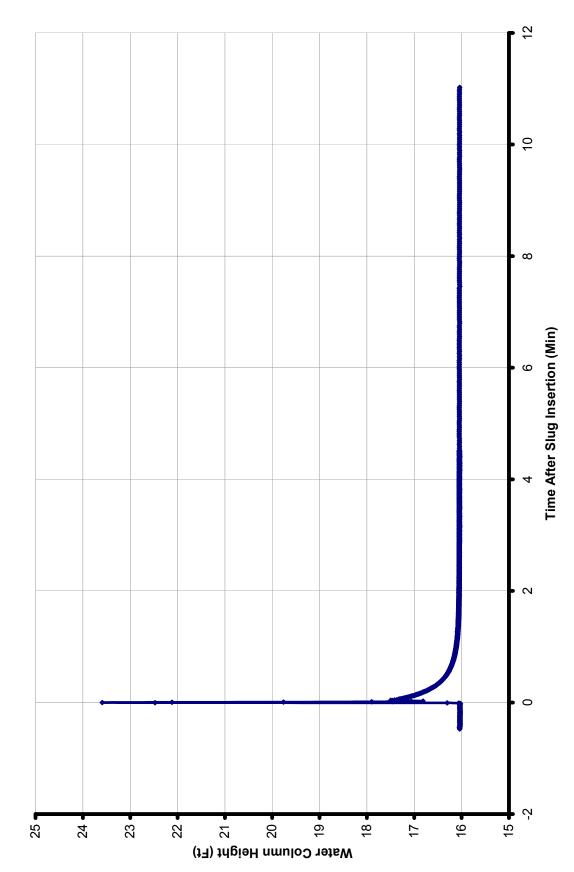
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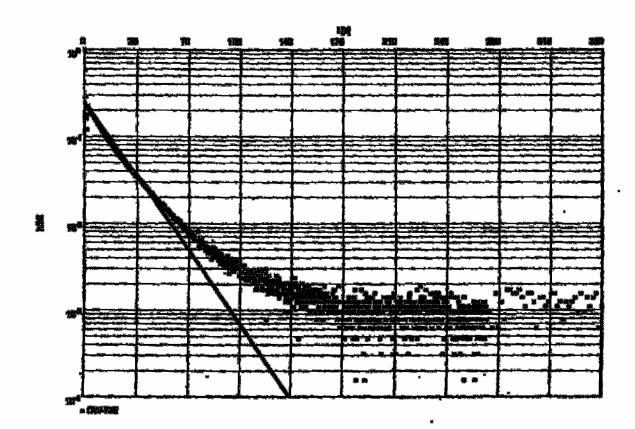
Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

**OW-735 Permeability Test** 





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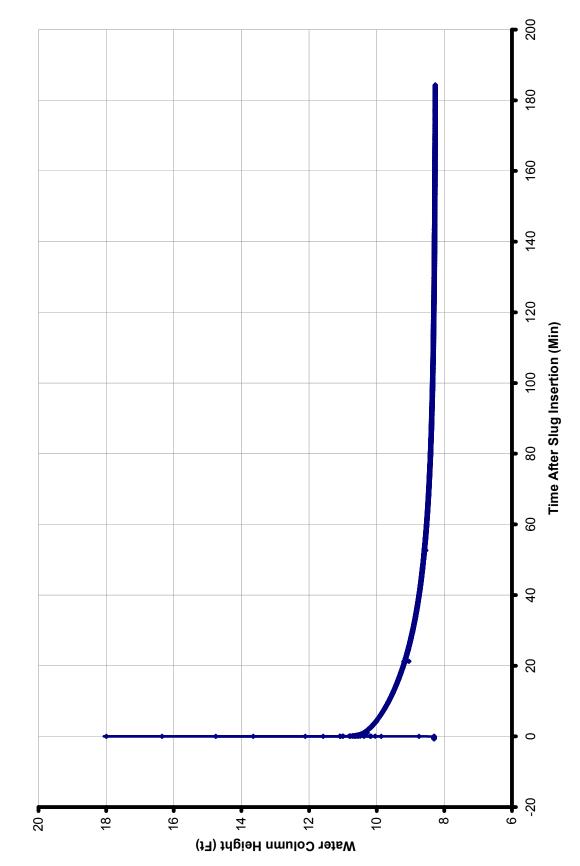
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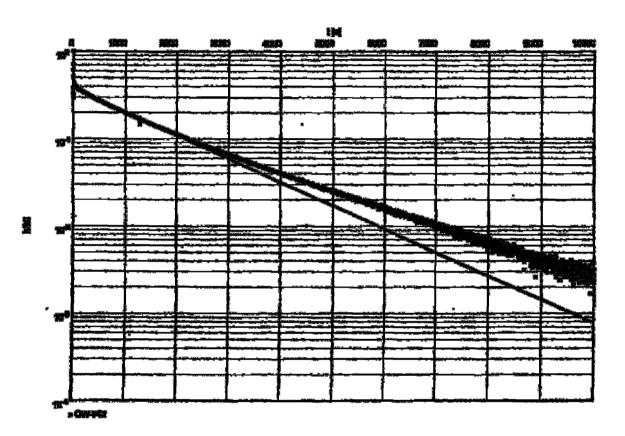
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**OW-743 Permeability Test** 





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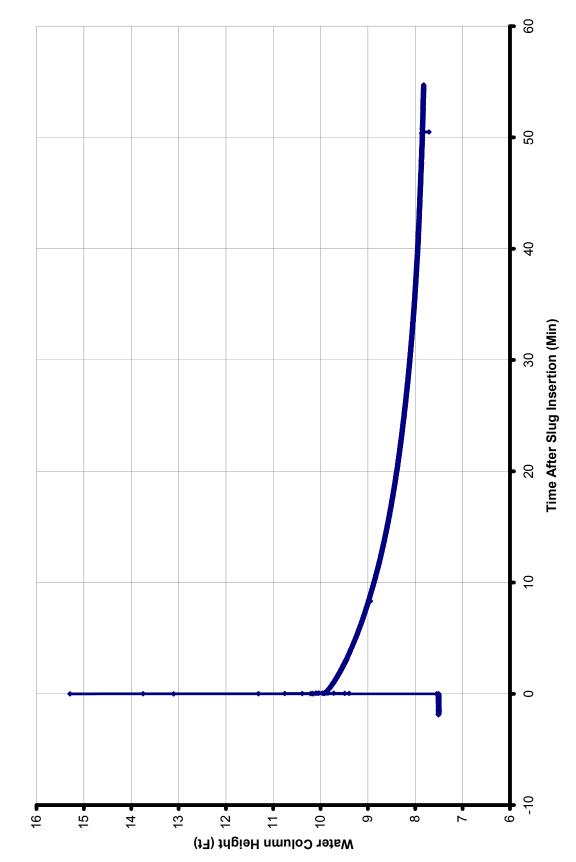
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Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

**OW-744 Permeability Test** 





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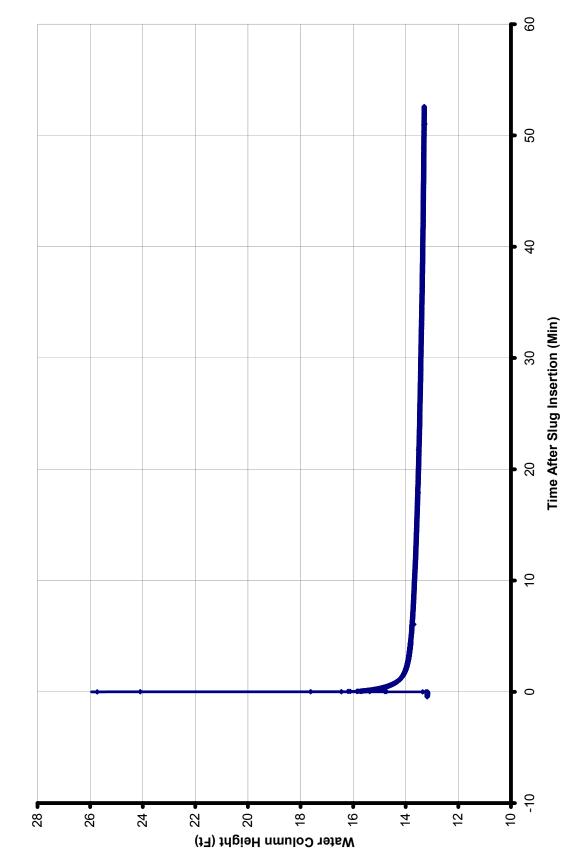
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Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

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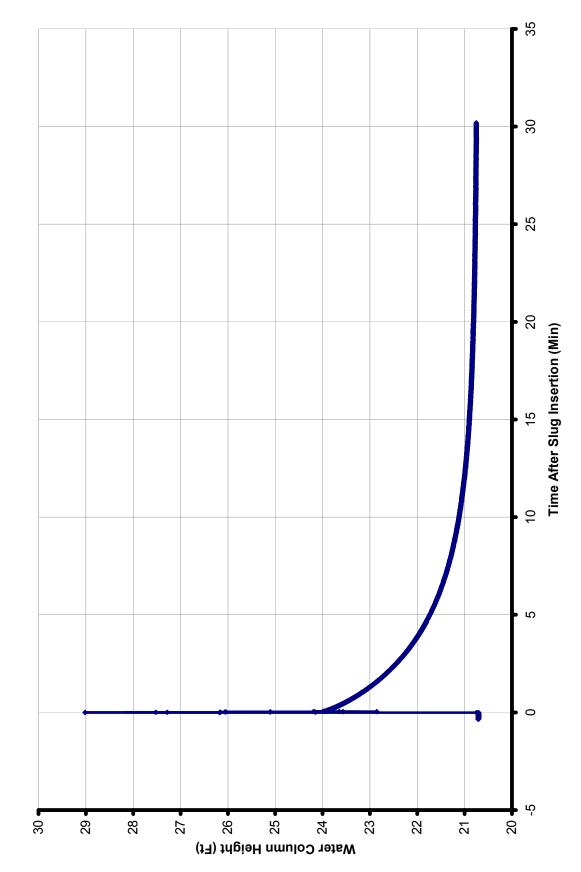
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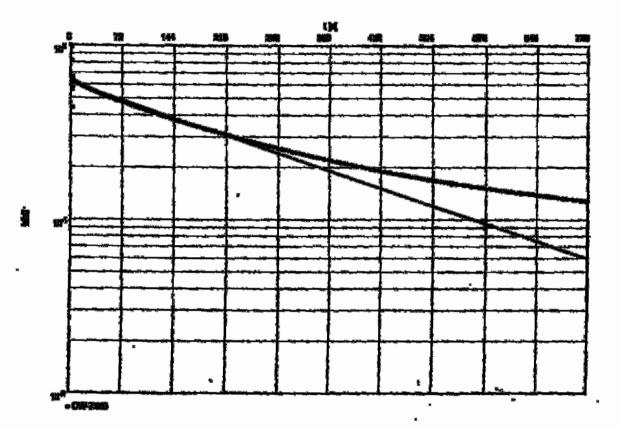
Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

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# PERMEABILITY (SLUG) TEST FIELD FORM

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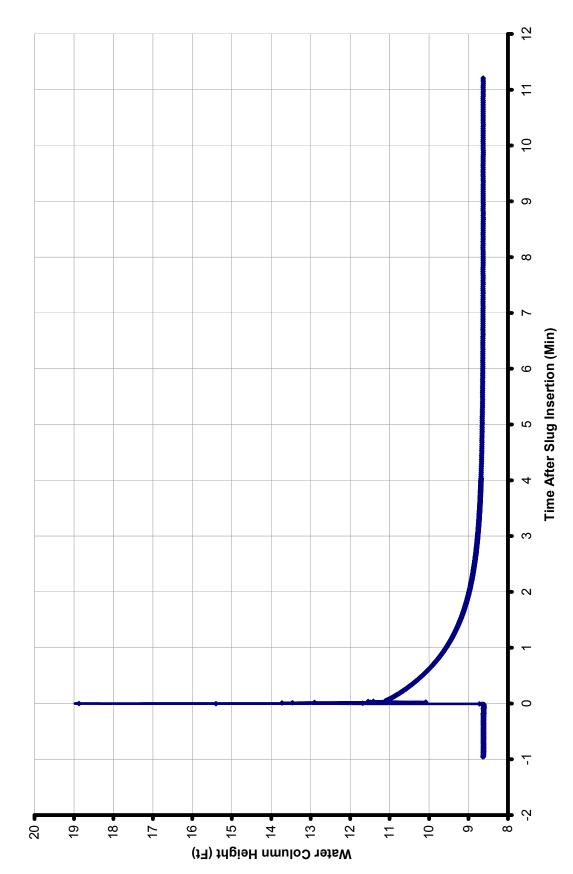
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Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

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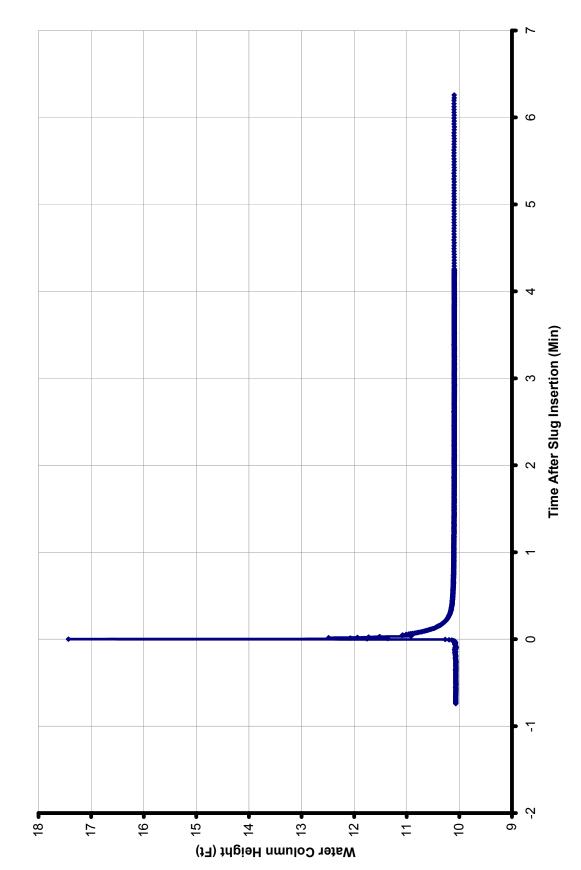
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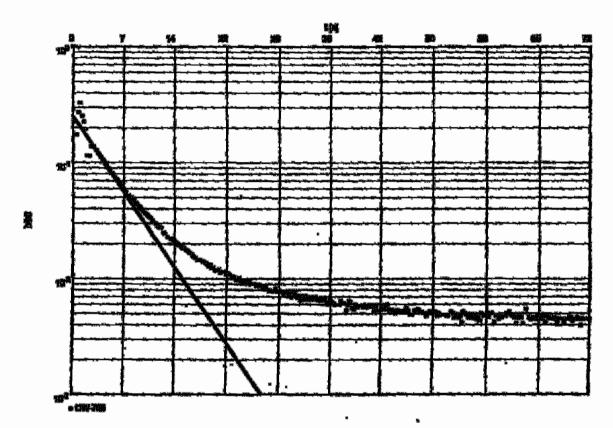
Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

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## PERMEABILITY (SLUG) TEST FIELD FORM

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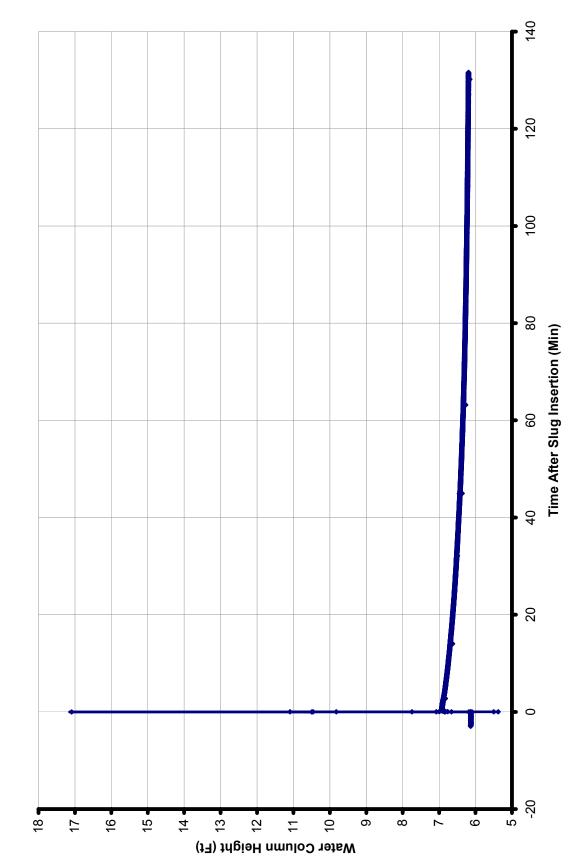
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Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

**OW-759A Permeability Test** 





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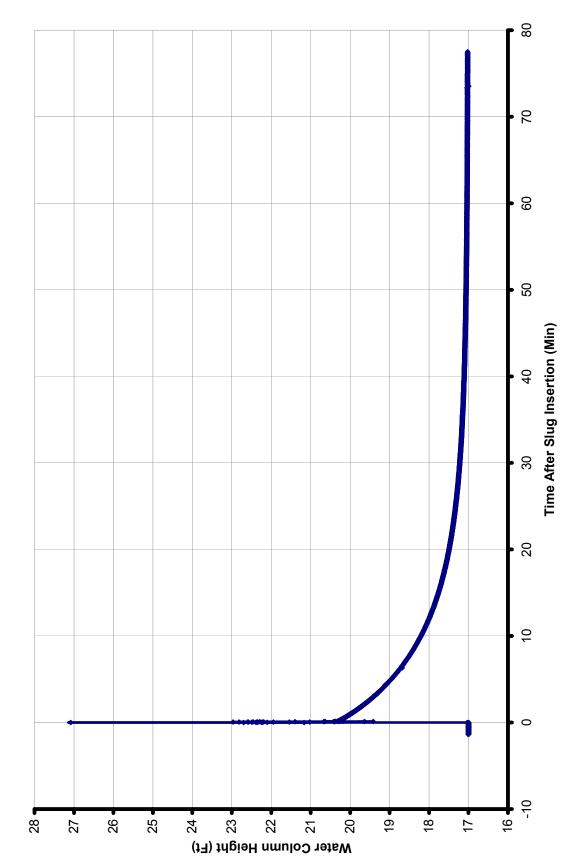
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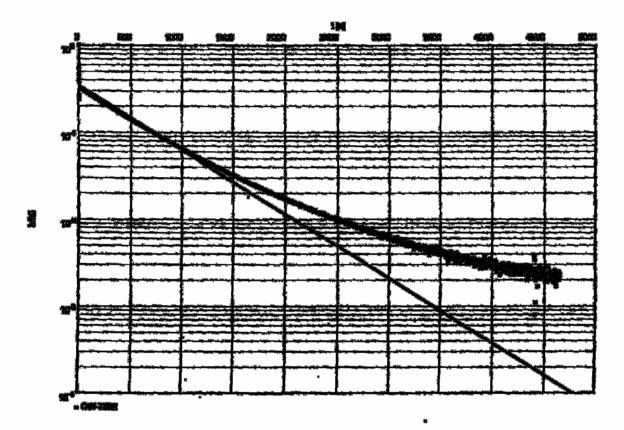
Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

**OW-759B Permeability Test** 





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# PERMEABILITY (SLUG) TEST FIELD FORM

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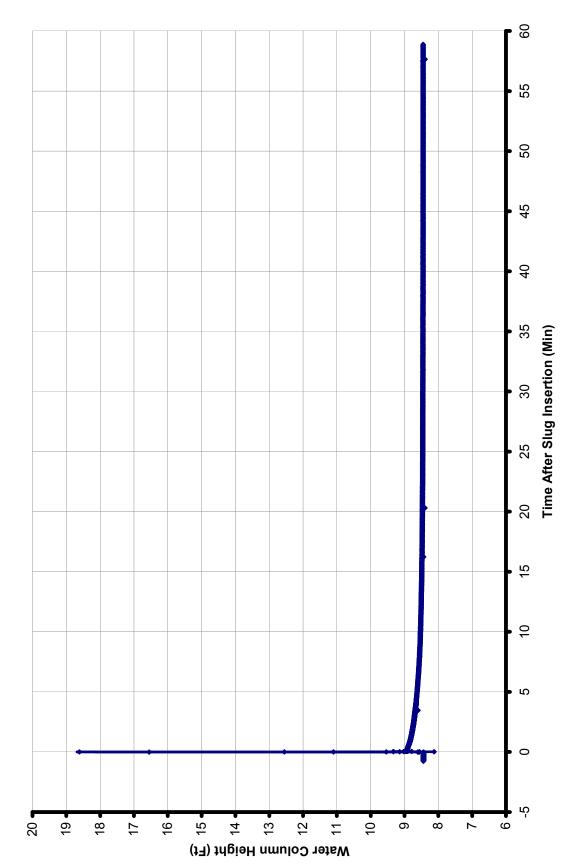
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Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

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## PERMEABILITY (SLUO) TEST FIELD FORM

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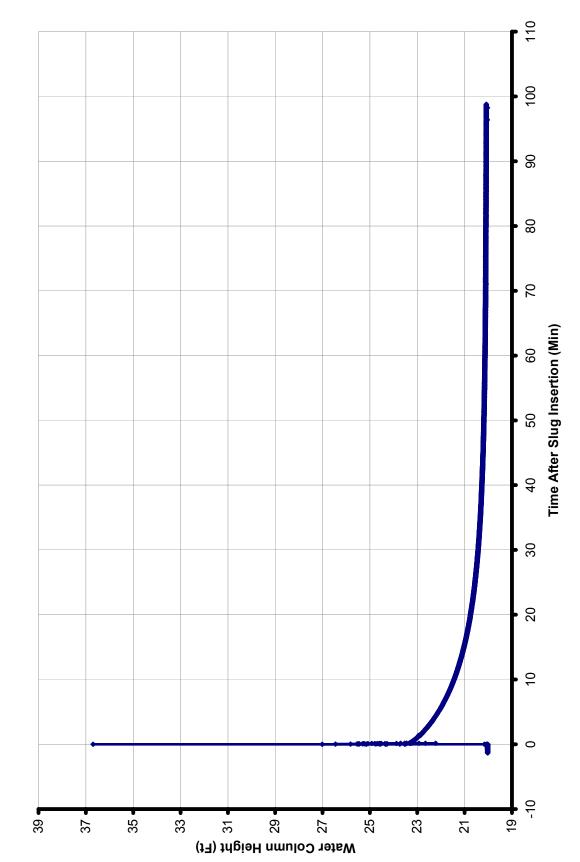
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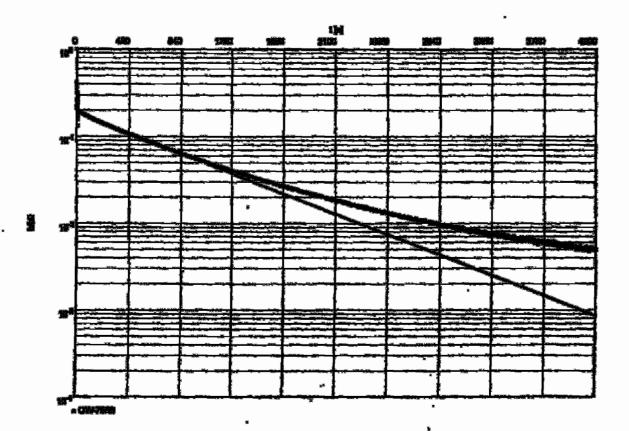
Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

**OW-765B Permeability Test** 





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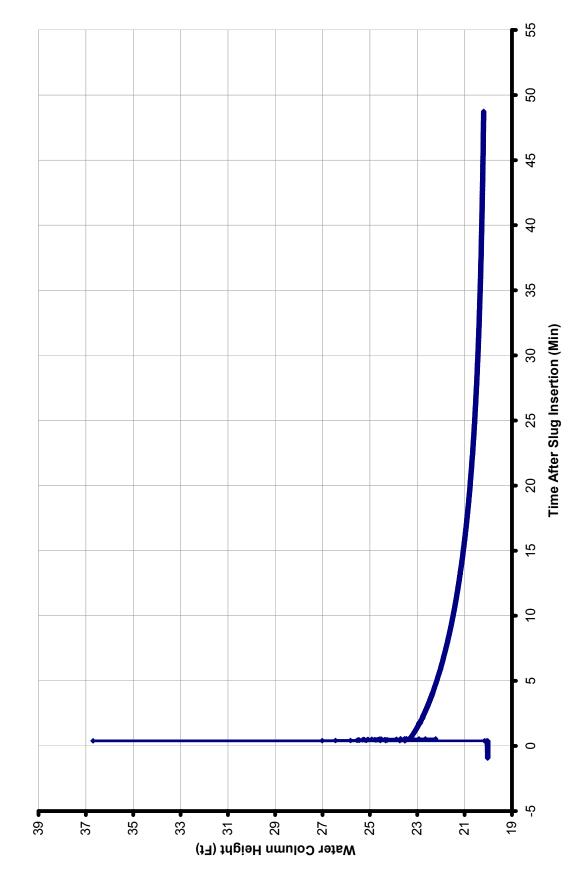
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Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

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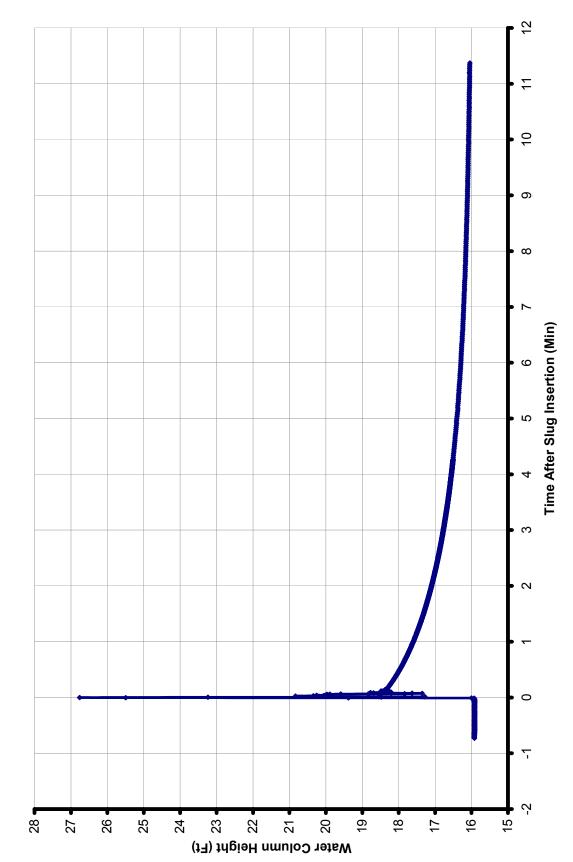
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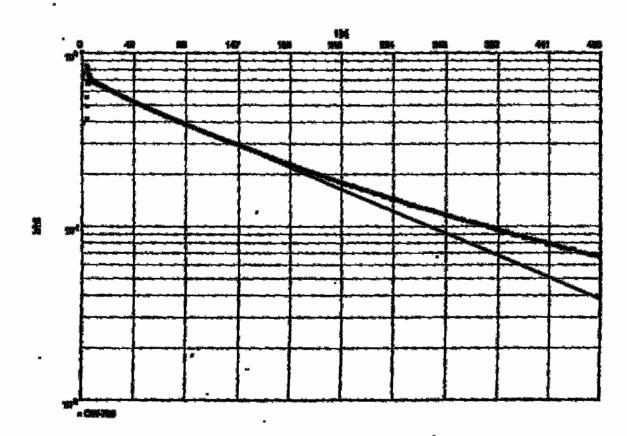
Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

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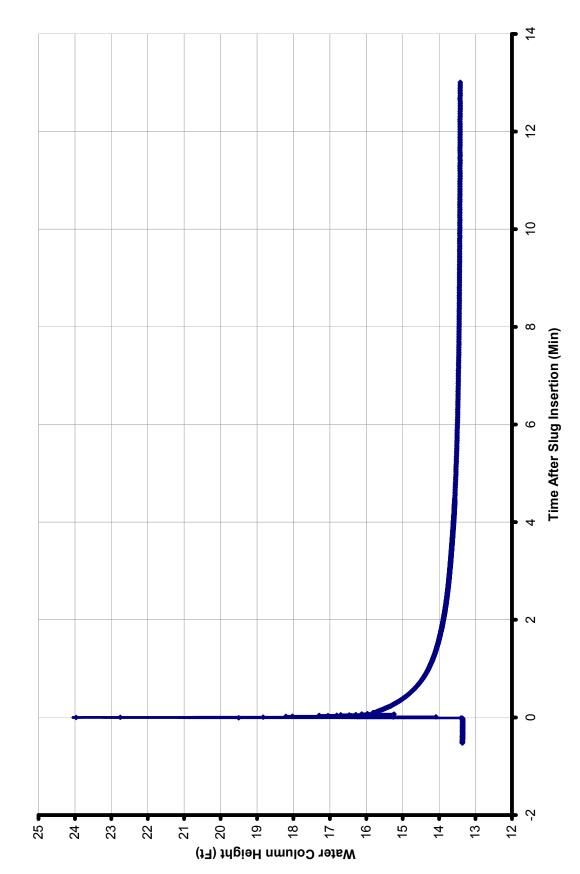
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Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

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# PERMEABILITY (SLUG) TEST FIELD FORM

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ATTENDED TO COMP.	Types of Tends A Palling Manual / Manual / Housed )	Approximate Values of Sign	The state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the s		

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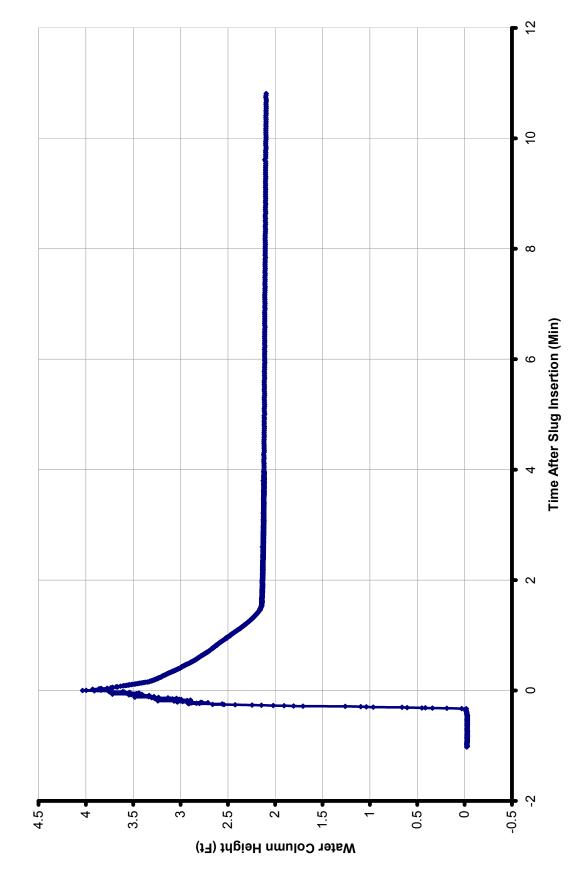
Office		0	-0.03	やっちずなって ひおんぶぶ	48 pm	42	O6120046-970-014-770-9200	
2 Water Lavel offer Pictor Insection (ft, 1000/17ms;	2 Treoresistent Depth:	4 Cats. Pre-Test Head coun Transducers	# Measured Pre-Tuet Head over Transduser:	Chartestan Posterior	Treat Dark Drafted.	* Tarak Tarak and Market	9 Defolyger File Norne:	

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Calvert Cliffs Nuclear Power Plant Combined Operating License Application (COLA) Schnabel Engineering Project No. 06120048

**OW-770 Permeability Test** 





### **Schnabel Project No.** 06120048 **Appendix D:** Ground Water Observation Wells

### WELL SAMPLING RECORDS

			PROJECT			·	WELL NO.	<del></del>	**************************************		
	chna mia bijimin		C	LNP	P	•		OW-301			
WELL SA		SAMPLING	JOB NO. <i>Ole 1,29 I</i> PURGING	CRITERIA	Calvert	, "#					
L	MEHOD	METHOD	1 7 -		14/12		12.Abi	- *	×		
2ª G	run føs		PURGING DATE: 12 2014 DATE OF SAMPLING: 12/2014 TIME OF SAMPLING: 12/55 SAMPLE MATRIX: GROUND WATER: INITIAL WATER LEVEL: 54.18								
160=(3 0(3) 15= (1) = 1	ルン3 ルン3 3.4X式 3.7(3)=	707	X The	n-porosity				02h*			
VT=2	2D						Checked	by: Val	И		
PURGING	DATA	*	FIELD PARAMETERS				COMMENTS				
	***************************************		x	X X	***	···					
Time Begin (ixa)	Time	Water Removal (gal)	Temp (°C)	Hq.	Conductivity (u miss) (t. 3%)	OHP (mV) ± 10mV)	DO (mg/L) (s: 10%)	Marbiolity (NTU) (± 10%)	Comments		
Time Begin	Time Finish (lus)	Removal (gal)			Conductivity (u missa)	OHP (mV) ± 10mV)	DO (mg/L)	Turblelity (NTU)	Comments		
Time Begin (test)	Time Finish (nos) 1423 1428	Removal (gal)		60	Conductivity (u missa) (± 3%)	ORP (mV) ± 10mV)	DO (mg/L)	Turblelity (NTU)	Comments		
Time Regin (ten)	Time Finish (tres)	Removal (gal)		60	Conductivity (u missa) (± 3%)	± 10mV)	DO (mg/L) (s. 10%)	Turbicilly (NTU) (± 10%)	Comments		
Time Regin (ten)	Time Finish (nos) 1423 1428	Removal (gal)	7.70	647	Conductivity (u missa) (± 3%)	± 10mW)	DO (mg/L) (s. 10%)	(http://www.pistories.com/doi/10/10/10/10/10/10/10/10/10/10/10/10/10/	Comments		
Time Regin (ten)	Time Finish (tms) 1423 1426 1433	Removal (gal)  44  5.5  5.5	13.93 13.90 14.31	6.89	Constantivity (u minus) (± 3%) D.460	± 10mW 12, 4 12,4	DO (mg/L) (s. 10%)	Control (± 10%)	Comments		
Time Regin (ten)	Time Finish (tms) 1423 1426 1433	Removal (gal)  44   5.5   5.5   5.5   5.5	12.00 14.31 14.31	6.89 7.09 7.14 7.16	Conductivity (u minus) (n:3%) D.460 D.478	12.4 12.4 12.4 2.5	DO (mg/L) (p. 10%)	(Artherity (Artu) (2 10%) (2 10%) (2 10%)	Comments		
Time Hegin (1821) 1353 1423 1423 1433 1444	Tiene Findah (tim) 1423 1428 1433 1438	Removal (gal)	150 150 143 14.1 14.1 14.37	6.89 7.09 7.14 7.16	Condustivity (unfice) (±3%) D.440 D.478 O.478	12.4 12.4 12.4 2.5 12.5	DO (mg/L) (s: 10%) 4.89 5.90 3.03 1.17	Marbidity (NTU) (±10%) 1-5 1-19 1-9 2-7	Comments		
Time Hegin (1881) 1353 1423 1423 1433 1444 1943	Tirne Finish (1116) 1428 1428 1438 1438 1438	Removal (gal)  44   5.5   5.5   5.5   5.5	15.95 14.31 14.37 14.37 14.58	1.47 1.89 7.09 7.14 7.16 7.18	Constantivity (u minus) (± 3%)  D.4460  D.478  D.478  D.478  D.477	12.4 12.4 12.4 12.5 12.5	DC (mg/L) (s. 10%)  6: 10%)  6: 10%)  6: 10%)  6: 10%)  6: 10%)  6: 10%)	Co.3 (±10%) (±10%) 1.5 1.6 1.9 2.7 2.9	Comments		
Time Begin (1881) 1353 1423 1428 1433 1444 1444	Tiene Findah (ma) 1428 1433 1438 1438 1438 1448 1448	Removal (gal)  44   5.5   5.5   5.5   5.5   5.5   5.5	12.53 14.31 14.37 14.58 14.13	6.89 7.09 7.14 7.16	Constructivity (u missa) (± 3%) D.44D D.478 O.478 O.478 O.477 b.48D	12.4 12.4 12.4 12.5 12.5 12.5	DO (mg/L) (s: 10%) 4.89 5.90 3.03 1.17	Marbidity (NTU) (±10%) 1-5 1-19 1-9 2-7	Comments		

Equipment Calibration Performed By:

Number of Sample Containers Collected:

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53el 60sec

PROJECT WELL NO. chnabel CLUPP epinemias Boris, LLE iob no. *Digi 200*4 8 ABresko Well sampling record PURGING CRITERIA: PURGE SAMPLING Volumes Stabilization K. Powell METHOD PURGING DATE: 1414/19 WEATHER: 1616/9 /Loo TEMPERATURE: 0416 INITIAL WATER LEVEL: 35,92 DATE OF SAMPLING: 12/14/00 TIME OF SAMPLING: 2019 SAMPLE MATRIX: GROUND WATER: 1 ft<sup>5</sup> = 7.48 gal PUMPING VOLUME CALCULATION dw - well diameter (in) h-well depths (ft) V,,=1 (dw) 2 h \* n-porosity V<sub>e</sub>=I<u>[db-dw]</u>2\*7.48 \* n 15-34(约号成成的) d<sub>b</sub> - Boring diameter = 14(3) = 34.22al Checked by: VT = 34.89 COMMENTS FIELD PARAMETERS 13de below Tas ر لا صوام Conductivity Time Begir Time Temp ORP (mV) (mg/L) . (± 10%) (u mhos) (NTU) (first) Finish (hos) Hemovel (gul) (°C) (±.01) ± 10mV) (± 3%) D735 1ZA 0750 0.079 0.9 1805 791D D\$15

Equipment Calibration Performed By:

. Number of Sample Containers Collected:

3,8 julain #

300 1:3 min

2	Schna del Injunio		CLNPP					WELL NO. 603-3360			
	METHOD	SAMPLING METHOD	PURBING I	Criteria: e+51	Literate Addizate	on	ABre Khoa	esto ell			
2º G	runfes		PURGING I WEATHER TEMPERATION INITIAL WA	C  000	, ,	TIME OF	Sampling:	GUND WAT	:' <i>58</i> 0 ·		
Vo=3 V3=3. · =4 V7=11	14(新) 2.23( 水台) 14(3)= 102d	E CALCULAT (13.69) (13.69) (21)(0.50) (21)(0.50)	公路)	/n-well de n-peresity d <sub>b</sub> - Berin	oths (ff) / g diameter		Checked	)2h* -dw 2*7.48 24 by: 44			
PURGING	Time	Water	FIELD PAI		S Conductivity	ORP (mW)	COMMEN SAMPLE 64.5	below t	Les Comments		
(brs)		Removel (gel)		pH (±.01)	(u mitos) (± 3%)	± 10mV)	(mg/L) (± 10%)	(NTU) (4 10%)			
1708	Tables 19	76	13,78	7.26	5427	125	1,89	1780	19.8		
1728		120	1408	729	0.421	12.5	1.00	14,6			
1737		120	442	7.70	0422	12.5	0.97	12,4	*		
1738		120	1343	7.30	0421	12,5	1.05	13,2	×		
1743	41713		14,05	7.30	0,420	25	1.00	12.2			
			× × ×								
	W 477 380.					2/2					
*									n na na na na na na na na na na na na na		
× ×			**************************************	V 8	2.2./	<del></del>		*	* * *		

Number of Sample Containers Collected:

540 / 2010 m 2.49 a/min

2	Chns real Especies		PROJECT	NP	0		WELL NO.	w -3.	<del>91</del> 401
WELL SA	PURGE METHOD	SAMPLING	2 67 4 3 67 4 54 19 19 19 1	CRITERIA:	1200	tion	A Bra	oby sto well	· · · · · · · · · · · · · · · · · · ·
Gim	rps	<i>3</i> *	WEATHER: TEMPERAT INITIAL WA	Clear URE: 40	icas	TIME OF	Sampling:		*
Vas = 3.44	と <b>あ</b> わせ カラニュ	E CALCULAT (-13.4) (-13.4) (-20.5)	义判	h-welt de n-parosity	· * * *		1 112 = 7.4 V.=1 (d) 2 V.=1 (d)	_	3*n
UT=3	0(3) = 13bgpl	J2.P				×	Checked	24 by: <b>///</b>	P
PURGING	B DATA		FIELD PAP	KAMETER *		*	COMMEN		
Time Begin (tue)	Time Finish (hrs)	Water Removal (gal)	Temp (°C)	Hq (1:0. ±)	Conductivity (u mhos) (± 3%)	ORP (mV) ± 10mV)	DO (mg/L) (± 10%)	Turbidity (NTU) (± 10%)	Commente
0924	<i>64</i>	Dad	*		*				dry
	0948	2020	116 mil	-7 . Jane	201		7 17	77_ 7	/ .
2949	-	11.1	14.04		0.394	12.4	3.13	30.2	
1954		1.1	14.57	741	0.380	12.5	2.4/	20.3	
100° 40° 48° 48° 11	10 out	1, f			0.382	12.5	U.IE	4,0	dru
			*	*					
			×		*			, x	
				.7					
	*		<u> </u>	· /	^ '				<u>I</u>

Equipment Calibration Performed By:	L Powell
Number of Sample Containers Collected:	

11 4/4

56AL=1.35min = 0-27

5 gel = 3.7 g // 1

			*			*			* · · · · · · · · · · · · · · · · · · ·
	<u> </u>	. Land	PROJECT		A 100 A 100 A 100 A 100 A 100 A 100 A 100 A 100 A 100 A 100 A 100 A 100 A 100 A 100 A 100 A 100 A 100 A 100 A	*	WELL: NO.	. 1	
	chna what industria			NPP				42	<b>3</b> ,
WELL S	AMPLING	RECORD	JOB NO.	748	Calcur	Colle	PREPARET		
	PURGE	SAMPLING	PURGING	CRITERIA:			ZP.	[]	
	METHOD	METHOD	V≥[C#	e+51	labilizad	n PIJ	Krai	26"	
PUMP TY	阳了		PURGING	DATE 17	20/06		SAMPLING:	12/20	104
12" C	arunfe	<b>~</b>	WEATHER	DRE 44	# Sonny		<mark>Sampling:</mark> Matrix: Gr	OLIND WA	FER:
			INITIAL WA	ITER LEVE	29.55				*
PUMPING	a vorniki	CALCULAT	TON/	dw - well	dierneter (in)	A A	1ft <sup>3</sup> =7,4	8 gal	
Vw = 3	5442 54 9946 -	}*(13.45) 3 = 23.7	,""	h-well de n-perosity			V <sub>w</sub> =1 ( <u>dw</u> 24	)2h*	•
19= 7.	州勒	(20)0	3) 猫	d <sub>b</sub> - Borin	g diameter		V, = I <u>(db</u>	<u>dw]<sup>2</sup>* 7,4</u>	B*n
= 1,	25×3=	3.75	<i>F</i> .				3	<b>14</b>	۱۸
	27.4 91	_					Checked	by: a	W
PURGING	3 DATA	* * * * * * * * * * * * * * * * * * * *	FIELD PA	VAMETER	B .		COMMEN	18	edd at
<b>,</b>			,	*	*	*		i Blos	
					Conductivity	1 "	DO	Turbidity	Comments
Time Begin (tus)		Water Removal (gal)	Temp (°C)	Hq (10.4)	(u mhos)	ORP (mV) ± 10mV)	(mg/L)	(MTU)	
						La assurant			
(bre)		Removal (gal)	(0)	(±.01)	(u mhos)	La assurant	(mg/L)	(MTU)	
(tre)  228  254		Removal (gal)	(0)	5-10	(v mhos) (± 3%)	± 10mV)	(mg/L) (± 10%)	(NTU) (± 10%)	
(tre) 1228		Removal (gal) 19, 73 h	14.53	5-10 5-15	(u rohou) (± 3%) D 1153	± 10miv)	(mg/L) (± 10%)	(NTU) (±10%)	
(tire) 1228 1264 1259 1304		Removal (gal) 19.2 19.2	14.53 15.09	5-10 5-15 5-15	(# mhow) (# 3%) D 153 O 156	± 10miv) 12,4 12-4	[mg/L] (± 10%) 18.7 1	1.7 41.2 8.4	*
(tun) 1228 1254 1254		Removal (gal) 19.2 19.2 19.2	14.53 15.09 15.14	5-10 5-15 5-15 5-17	(± 10hou) (± 3%) 0 .15 3 0 .15 % 0 .15 %	± 10miv) 12,4 12-4	18.71 18.71 18.44 18.47 18.44	1.7 41.2 8.4 6.4	Dumped dry
(tire) 1228 1264 1259 1304		Removal (gal) 19.2 19.2 19.2 19.2	14.53 15.09 15.14	5-10 5-15 5-15 5-17	(# 10hom) (# 29h) D 153 D 154 D 153	± 10miv) 12,4 12,4 12,4 12,5	18.71 18.71 18.44 18.47 18.44	1.7 41.2 8.4 6.4	gumped dry
(tire) 1228 1264 1259 1304		Removal (gal) 19.2 19.2 19.2 19.2	14.53 15.09 15.14	5-10 5-15 5-15 5-17	(# 10hom) (# 29h) D 153 D 154 D 153	± 10miv) 12,4 12,4 12,4 12,5	18.71 18.71 18.44 18.47 18.44	1.7 41.2 8.4 6.4	gomped-dry
(tire) 1228 1264 1259 1304		Removal (gal) 19.2 19.2 19.2 19.2	14.53 15.09 15.14	5-10 5-15 5-15 5-17	(# 10hom) (# 29h) D 153 D 154 D 153	± 10miv) 12,4 12,4 12,4 12,5	18.71 18.71 18.44 18.47 18.44	1.7 41.2 8.4 6.4	pumped dry
(tire) 1228 1264 1259 1304		Removal (gal) 19.2 19.2 19.2 19.2	14.53 15.09 15.14	5-10 5-15 5-15 5-17	(# 10hom) (# 29h) D 153 D 154 D 153	± 10miv) 12,4 12,4 12,4 12,5	18.71 18.71 18.44 18.47 18.44	1.7 41.2 8.4 6.4	
(tire) 1228 1264 1259 1304 1309 1309	Finish (ms)	Removal (gal) 19.2 19.2 19.2 19.2	14.53 15.09 15.14 15.24	5-10 5-15 5-15 5-15 5-17	(# 10hom) (# 29h) D 153 D 154 D 153	± 10miv) 12,4 12,4 12,4 12,5	18.71 18.71 18.44 18.47 18.44	1.7 41.2 8.4 6.4	pumped dry

5ot@ 11.7+29 = 31.7'

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			PROJECT			**************************************	WELL NO.	· · · · · · · · · · · · · · · · · · ·		
∴ <b>4</b>	chns		C	CNPI	<b>D</b> .		ow-	-428		
	AMPLING PURGE	REGORD SAMPLING	JOH NO. PURGING		Calvert	criffs	ABT L Pa	eske maell	13	*
9	METHO	Grado	VOLEN	445	fabliza	(IFI)	LFD	W - 1		
PUMPTY 2" 6	erun f	<i>05.</i> ,	PURGING I WEATHER TEMPERAT INITIAL WA	er:						
Vier 3	州街)	ECALCULAT (12.53)( 5.49.a)		dw - well h-well de; n-perceity	* *		1 ਜ਼ਿ <sup>5</sup> = 7.4 V <sub>w</sub> =I ( <u>dw</u> 24	~	y	
15=3	川出盐	)2(202)( = 11:8 g,	03)(2	Borin	g diameter			<u>:dw</u>   <sup>2</sup> *7.48 u	MD ·	
V						*	Checked	by: 44	<u> </u>	
PURGING	3 DAYA		FIELD PAI	VAMETER	\$		COMMENT Spape 44	celled 3.3° b.	ted at	
Time Begin (ins)	Time Finish (hm)	Whiter Removal (gal)	Tatonp (°C)	pH (±.01)	Conductivity ()1 mboe) (2 3%)	ORF (mV) ± 10mV)	DQ (mg/L) (± 10%)	Turblelity (NTU) (± 10%)	Commente	
1055	1059	20.25	***						pruy di	74
1124	1120	25get			*				<b>'.</b> '	
1174	43D	9.7	14.54		P.	12.5		4.1	DW All	W/ACT
13]			14.29	5341 = 29	0.128 0.127	44	23,36	2.0	7	
1136	aul"			7	DILOR	105	2771			7
11-71	RT.		146.17	3017	0.108	12.5	23.74	2,2	poupel	ery
		***************************************	*		****	* **	*	* *		-/-
***	, , , , , , , , , , , , , , , , , , ,				* &					
×	*			*						* * * * * * * * * * * * * * * * * * *
	l College	x Performed	Dax *	Llo	00	<u>[</u>		19	d = 20 5 ,75 min	
			- ,	7		*	×	6	,75 min	×
Sant)	de d	containers Co	ted c	2 48	3.3'	1 . //	××	led	,75 min	59 60s
. 1	d	ua b	stat	ic w	ity l	wel	* * * * * * * * * * * * * * * * * * *	120	<i>s</i> /	/ Ins

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			PROJECT				WELL-NO.	WELL-NO.			
ير	Schnabel State Spining Reis, U.S.			CCNPP				01-705 ·			
WELL SA	AMPLING	RECORD	JOB NO. DUIZO	046	Calvert	culls	PREPARE A.Bre	OBY COKO			
	PURGE METHOD	SAMPLING METHOD Stalo	1	siludist	bilian	77	2.8.	ed)	•		
PUMP TY	Cemp	. 2"	PURGING I WEATHER TEMPERAT INITIAL WA	CICAT TURE: 40	•	TIME OF	SAMPLING SAMPLING: MATRIX: GE	1435			
_	_	CALCULAT		dw - well	diameter (in)	### N. A. M. M.	1 ft <sup>3</sup> = 7.4	leg Bl	Un - well volum		
		2.32.48		h-well de			V <sub>w</sub> ≓ī ( <u>dy</u>	02h*	Vs - sandpack		
· =,	5,34d	*3= 15.9	1373	d Borin	/ <i>- D. 3D</i> g diameter -	العلا	V. ≈ Ildb	<u>⊢dwi<sup>2</sup>* 7.48</u>	שוני לפלי ייי		
1/3= 3	叫(約)	1703	448 pt.	- 8 11 15	<i>10</i> 3		i	24			
VT=	19.29	al.	147	・レ・タタン	A 2 3= 3	5. 3	Checked	by: <b>A</b>	yp		
PURGING			FIELD PAI	RAMETER	S	×	COMMEN	TS .	**************************************		
Time Begin (hre)	Time Finish (hrs)	Water Removel (gal)	Tentip (°C)	pH (±Qt)	Conductivity (u mhos). (± 3%)	ORP (m/V) ± 10m/V)	DO (mg/L) (± 10%)	Turbidily (NTU) (± 10%)	Cacarografia		
1530	1533	6.5						-	Pump dry		
1535	1538	30							ray llow for		
1540	1602	19.0	1						Low Son / 514 15		
1102	1607	9.4	13.55	,	0.512	124	0.12	28.60			
107		4,4	13.95		0.515	125	0.04	a trade Adjust 2			
1618		4.4	- m		0,517						
617		4.4	13.13	7.24	0.516	125	100	160			
1622		4.4	13.98	726	0.5/0		0.01	13013	<b>1</b>		
432		4,4	13.47	7.25	0.514	17.4	0.10	13.7	· · · · · · · · · · · · · · · · · · ·		
4124 7	1677		14.01	7.34	0,514	12.4	A 142	125	* ,		

Equipment Calibration Performed By:

LParell

Number of Sample Containers Collected:

7

	chna mbd Englawing	X	PROJECT CLN	PP	,		1	-70&A	
WELL SA	MPLING PURGE METHOD	SAMPLING	JOB NO. DU 17E PURGING VOLVIN		Labiliza	ction	K Pom	rell	
PUMP TY	m fe	5	PURGING WEATHER TEMPERATION INITIAL WA	DUNE;	起生	TIME OF	SAMPLING:	12/17/2 12/25 ROUND WAT	
V <sub>10</sub> < 3. °/3.	叫到代 5)(2)=	E CALCULA 21.34/ 24 - 10-5 gel	<b>5</b>	h-well de n-porosity		*	1 ft <sup>8</sup> = 7.4 V <sub>e</sub> = <b>i</b> ( <u>dv</u> 24	Ø2h*	
57. VI= 19	963=8 2,D	!\$\\0.38\ 3.7g.d				×	Checked	by:	<u> </u>
PURGING	ſ	*****	FIELD PAI		S Conductivity	ORP (m/v)	COMMEN DO	TS'	Comments
Time Begin (100)	Time Finish (hrs)	Weter Removel (gal)	Temp (°C)	(+ '01) hH	(u mhae) (± 3%)	± 10mV)	(mg/L)\ (±,10%)	(NTU) (± 10%)	*
945	*	gal.	16.34	679	0.380	12,5	156	337.7	dry
		<i>10</i>							Edeal Domets
1055	1059	3.5	4.34	7.07	0.749	12.5	2.3	126.8	. #
115	1129	N-179 16	14.80	708	0.74	77	1.74	1231.4	dry.
477	133		16.73	7,21	0.727	(KI)	bill	477.1	hi flow
1138 1143	1138	15.1	#183		20.73	135		481.1	* *
<del>"   } -</del>	*	1		<i></i>	*			1 247	*
		,							
		*		*				***************************************	2
Equipmen	t Calibratic	on Performed	Ву:	Kibi	y le	vell		*	

Cu-1 708a Cu-2 708a Cu-3 708a Cu-3 708a

Contract of the second

0750.

	PROJECT	**************************************	IWELL NO.			
Schnabel Religioning North, LLC	CLNPP		וור-יים	0~-711		
WELL SAMPLING RECORD PURGEL SAMPLING	JOB NO. OLIZODA PURGING CRITERIA:	Entrart Cliffs	A Brosko			
METHOD METHOD	Volume ! Stabilis	Mion	I Bresko V Powell			
Grantos 2"	PURGING DATE: 12/1 WEATHER: CLOW / 1 TEMPERATURE: 3,2 INITIAL WATER LEVE	FINE O	F SAMPLING: 12/20/ F SAMPLING: 04/50 E MATRIX: GROUND WA			
PUMPING VOLUME CALCULATION TO SHEET SHEET GI-5 X 2		diameter (in) pins (fi)	1 ft² = 7.48 gai V <sub>w</sub> =I (dw) 2 h *			
= (5-14)3 = 154/54 14=3.14( =) 2(20)=3) = 3.9(3)=11.7	n-porosity	/ g diameter	24 V <sub>a</sub> = 1 <u>(db-dw)</u> 2 * 7.4 · 24	18*n		
VT=21,192	*	•	Checked by:			
PURGING DATA	FIELD PARAMETER	8	COMMENTS dry	then collect saggle.		
Time Hegin Time Water (hrs) Finish (hrs) Flamovsk (gal	Temp pH (*C.) (£.01)	Conductivity ORP (m/v (u mhos) ± 10mV)	(mg/L) (NTU) (± 10%) (± 10%)	Comments		
0805 0817 1615				dru		
03:20 0924 3.75				Sheare		
08.26 0931 0.9	12.06 4.75	5.439 426	6.77 43.9			
0831 0937 0.5	13.92 7.22	0,454 12.5	6.08 12.0			
0937 0942 0-5	14.73 7.33	0.452 125	707 4,8			
1942 -	1503 739	0452 125	5.96 5.2	ĭ		
				я ж		
			1			
			1			

Equipment Celibration Performed By: \( \frac{\lambda Po \lambda \lambda}{2000} \)

Number of Sample Containers Collected: \( \frac{30856}{30856} \)

	PROJECT	<u></u>	7.0.	**************************************	WELL NO.			
Schnabel Robbing British	CC	NPP		*	·0W-725			
WELL SAMPLING RECO		248	Calvart C	affs		PREPARED BY, A Bresko		
PURGE SAM	PLING PURGING O	24-5h	bulizat	ion	KFSW	sel/		
2 grundes	PURGING I WEATHER: TEMPERAT INITIAL WA	URE:	12,1	TIME OF	SAMPLING: SAMPLING: MATRIX; GR	435		
PUMPING VOLUME CAL V山 = 3.44(五)であ = 5.47(3) デ	39)(13) 17.9.d	tiw - well of h-well dep n-porcetty	* *		1 ft³ = 7.4 V <sub>w</sub> =ĭ ( <u>dw</u>	)2h*	-	
Vs=314(数)211 - 27413 - 81	必必当	d <sub>e</sub> - Baring	g diameter			446° • 7.48		
VT= 26.1921								
PURGING DATA	FIELD PAI	CAMETER		*	COMMEN	18		
Time Begin Time Vi (hrs) Finish (hrs) Remo	later Temp val (gal) (°C)	pH (±.01)	Conductivity (u mhos) (± 3%)	ORP (mV) ± 19mV)	DO (mg/L) (± 10%)	Turbidity (NTU) (± 10%)	Convenients	
1320 1324 9.	5					***************************************	dry	
1326 1358 30	15 1				)			
1358 9.	Mark to Mark to	6.66	0.38/	23.2	252	34.5		
1408 9		6.67	0.386	6282	44	3.0		
1418 9.	7	6.68	0.385	67.3	262	8,4		
1428 1428 -	4.58	4.68	0.386	47.1	252	8.2		
				*	×	*	,	
		<i>U</i> 0					^ , ,	

Equipment Calibration Performed By:

Llowell

Number of Sample Containers Collected:

542/5.25 0.95gd/min

4	ø.		CCNPP				WELL NO.		
	Chna mbd Esplanting	*****					OW	ーフ	35
WELL 84	MPLING		job no. <i>Obl<b>žo</b>t</i>		Calvart	aiffs	PREPARE	esko	
	METHOD	SAMPLING METHOD 95AD	Purging (	RITERIA: NE+5	tabliz	•	KP	well	
2" C			PURGING I WEATHER: TEMPERAT INITIAL WA	Cleudy URE 448	Cost	TIME OF	SAMPLING:	12/23 100MD WA	
Vw=	3.川(新 3.04()	CALCULATO (18.62) (18.62) (18.62) (18.62) (18.62) (18.62)	3	h-well dep n-peresity	, .,		1 th = 7.4 V <sub>w</sub> =T(dy 2 V <sub>w</sub> =T(d)	-	8*n
V7 =	17:39	) = 4.2					Checked		
PURGING	DATA"	3	FIELD PARAMETERS			Sample collected at 66.4 pt below v notah.			
Time Begin (fre)		Water Removel (gal)	Temp (°C)	) (土(八)	Conductivity (u mhos) (± 3%)	ORP (mV) ± 10mV)	DO , (mg/L) (± 10%)	Turbidity (NTU) (± 10%)	Commente
1025	1105	155	,				*		MA COMPONENT DISCOURT OF THE
1105	1110	2.3	13,36	6,2	0.217	24.3	4.97	0.7	
1110	1115	23	Mary Wallet Company	6.35	D.215	17.9	3.0	2.7	
1115	1120	2.3	13,72	A	0.212	20,4	3.19	2.3	
1120	1178		13.79	b.37	0.214	21.6	3.14	2,8	
× ×				* * * * * * * * * * * * * * * * * * * *					
Equipmen	: Calibratio	n Performed	By:	K	Powell			Say	

Number of Sample Containers Collected:

\_3

2	Chna mulai Inglanda		CC N	SPP	*		OK.	ノーフリ	4	
WELL S	MEDHOL	SAMPLING METHOD	JOB NO. DIGIZDA PURGING VOIV M	CRITERIA;	Calvert abilizati		A B LBV	osho		
PUMPTY 2"g	Land	5 ·	PURGING WEATHER TEMPERA	CAPETY CAPETY TURE: 42	I COP I	TIME OF	Sampling	2/24/0 0445 ROUND WAT		
160=31 = 1, 16=3.0	UB)Y 10 (3):	(14) (0.3	,	h-well de n-porosity			1 ft <sup>8</sup> = 7. V <sub>w</sub> =1 (g) 2 V <sub>w</sub> =1 [g]	1000	;*п -	
	5ad	7'^	FIELD PAI	RAMETER		<u> </u>	Checked COMMEN Sample	Calva	ted 4	7.21
	*						Lakers	i V uustel	7	
Time Bagin (hra)	. Time Finish (hra)	Water Removel (gal)	Temp (°G)	Hq (1•0,±)	Conductivity (u mhos) (± 3%)	ORP (m/v) ± 10m/v)	DO (mg/L)	Turbicity (NTU) (st 10%)	Commenta	
(hra) D853	Finish (hra)		Temp (*C)				00	Turbidity	W. W. W. W. W. W. W. W. W. W. W. W. W. W	/dru
0953 0900	Finish (hra) 0455 0405 0416			(±.01)	(± 356)		DO (mg/L) (± 10%)	Turbidiy (NTU) (t: 10%)	dry liste fi line file	w/dry
0953 0900 0911 0921	Finish (nea) 0455 0405 0416 0421	Removed (pal)	13.54	(±.01) 5.79	(1 mhos) (± 3%) (- 3%)	± 10mV)	100 (mg/L) (tz 10%)	Turbidity (NTU) (d: 10%)	dry low fl ascoll	hw/4ry m/4ry m/4ry
0953 0900 0911 0921 0931	Finish (nos) 0955 0105 0916 0921 0938 0943	Removed (pal)	13:54 16:01	5.79 6.02 6.15	(1 mhos) (2 3%)  D.104  D.104  D.104  D.106	# 10mW) 74.3 72.3 72.4 46.4	100 (mg/L) (a 10%) 7.02 6.37	Turbility (NTU) (b: 10%) (b: 10%) (b: 10%)	dry belo fi leo fi wro fi	hw/4ry w/4ry ow 74.8
0953 0900 0911 0921 0931	Finish (nos) 0955 0105 0916 0921 0938 0943	Removed (pal)	13,54	5.79 6.02 6.15	(± 3%)  (± 3%)  (± 3%)	# 10mW) 74.3 72.3 72.4 46.4	100 (mg/L) (te 10%)	Turbility (NTU) (tr 10%)	dry belo fi leo fi wro fi	hw/4ry m/dsh ow 74.8

Number of Sample Containers Collected: \_\_

ير	Chne	***************************************	PROJECT	NF	P.		O K	) - 7c	汉
	PURGE METHOL SUPPLIES	RECORD SAMPLING METHOD	1		Catve	× ^1	1		
2" g	runfe	F	WEATHER TEMPERA	DATE 12 Cloud TURE: 4 TER LEVE	i lagel	TIME OF	SAMPLING	: <i>1212111</i> : <i>1225</i> ROUND WAT	*
V20 = 3 V3 = 3	3.19( - 2.11 ( h14(数	E CALCULA (3) = (.34 (3) = (.34 (18) (18) (18) (18)	多学	.dw - well h-well de p-porosity U <sub>b</sub> - Borin	dierneter (in) pihs (it) / g dierneter		1 ft = 7.  V_=1 (d)  2  V_=1 [d]  Checked	w) 2 h * 4 h <u>-dw</u>   <sup>2</sup> * 7.48 24	·
PURGING	DAPA	x	FIELD PA	RAMETER	18	· · · · · · · · · · · · · · · · · · ·	SAMP 33.7	le colle	oled at
Time Begin (hrs)	Time Finish (hre)	. Water Removel (gal)	Tamp (°C)	pH (全.01)	Conductivity (u mhos) (± 3%)	ORP (mV) ± 10mV)	DO (mg/L) (±10%)	Turbidity (NTU) (± 10%)	Comments .
1144	145	2,4							dry
1147	1148	1.8							dry /slow purge
1149	1150								del Some some
1153	1208	2.5	*						miero punge/day
	1215	-25			6.209			1257.2	/
1215	1220	.25	1640	5,27	\$0.210	10.4	6.62	790.9	*
12.20	מבח		17.08	5.28	0.207	1123	4.29	261.9	*
	*								
* ,				10	al	*			

.Eq	ulpment Calibratic	n Performed By:	rover	*	
Nu	imber of Sample C	ontainers Collected:	3		
* *	Sample	collected B	33.7 H	below "V" AP	lah

Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Schnabal Sch
REAL SAMPLING RECORD  NELL SAMPLING RECORD  PURGE SAMPLING  PURGE SAMPLING  PURGING CRITERIA:  Volume - Stabilization  PURGING PURGING DATE: DIRANG  PURGING DATE: DIRANG  PURGING DATE: DIRANG  PURGING DATE: DIRANG  PURGING DATE: DIRANG  PURGING DATE: DIRANG  PURGING DATE: DIRANG  PURGING DATE: DIRANG  PURGING DATE: DIRANG  PURGING DATE: DIRANG  PURGING DATE: DIRANG  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  PURGING DAT
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NEEL SAMPLING RECORD  PURGE SAMPLING PURGING CRITERIA:  METHOD  FUND TYPE  PURGING DATE SHAND  PURGING DATE SHAND  PURGING DATE SHAND  PURGING DATE SHAND  PURGING DATE SHAND  PURGING DATE SHAND  PURGING DATE SHAND  PURGING DATE SHAND  PURGING DATE OF SAMPLING: 17/15  TIME OF SAMPLING: 17/15  SAMPLE MATRIX: GROUND WATER:  PURIPPING VOLUME CALCULATION  OW - well depitie (ii)  In " = 7.48 gal  In porosity  In porosity  In porosity  In = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If = 17/2 of (3) = 8.2  If =
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WEATHER Cod INNV TEMPERATURE: (1) INITIAL WATER LEVEL: SAMPLE MATRIX: GROUND WATER:  PURIPHING VOLUME CALCULATION  OW - well dearnester (in)  1
PUBIPING VOLUME CALCULATION cw - well districter (in) 1 in = 7.48 gal  Vul = 3 in (2i) (18 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in) (2 in
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PUMPING VOLUME CALCULATION dw - well districtor (in)  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 1 ft = 7.48 gal  1 ft = 1 ft = 7.48 gal  1 ft = 1 ft = 7.48 gal  1 ft = 1 ft = 7.48 gal  1 ft = 1 ft = 7.48 gal  1 ft = 1 ft = 7.48 gal  1 ft = 1 ft = 7.48 gal  1 ft = 1 ft = 7.48 gal  1 ft = 1 ft = 7.48 gal  1 ft = 1 ft = 7.48 gal  1 ft = 1 ft = 7.48 gal  1 ft = 1 ft = 7.48 gal  1 ft = 1 ft = 7.48 gal  1 ft = 1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  1 ft = 7.48 gal  2 ft = 7.48 gal  2 ft = 7.48 gal  2 ft = 7.48 gal  2 ft = 7.48 gal  2 ft = 7.48 gal  2 ft = 7.48 gal  2 ft = 7.48 gal  2 ft = 7.48 gal  2 ft = 7.48 gal  2 ft = 7.48 gal  2 ft = 7.48 gal  2 ft = 7.48 gal  2 ft = 7.48 gal  2 ft = 7.48 gal  2 ft = 7.48 gal  2 ft = 7.48 gal  2 ft = 7.48 gal  2 ft = 7.48 gal  2 ft = 7.48 gal  2 ft = 7.48 gal  2 ft = 7.48 gal  2 ft = 7.48 gal  2 ft = 7.48 gal  3 ft = 7.48 gal  4 ft = 7.48 gal  4 ft = 7.48 gal  4 ft = 7.48 gal  5 ft = 7.48 gal  6 ft = 7.48 gal  6 ft = 7.48 gal  7 ft = 7.48 gal  7 ft = 7.48 gal  6 ft = 7.48 gal  7 ft = 7.48 gal  7 ft = 7.48 gal  7 ft = 7.48 gal  7 ft = 7.48 gal  7 ft = 7.48 gal  7 ft = 7.48 gal  7 ft = 7.48 gal  7 ft = 7.48 gal  7 ft = 7.48 gal  7 ft = 7.48 gal  7 ft = 7.48 gal  7 ft = 7.48 gal  7 ft = 7.48 gal  7 ft = 7.48 gal  7 ft = 7.48 gal  7 ft = 7.48 gal  7 ft = 7.48 gal  7 ft = 7.48 gal  7 ft = 7.48 gal  7 ft = 7.48 gal  7 ft = 7.48 gal  7 ft = 7.48 gal  7 ft = 7.48 gal  7 ft =
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Checked by:  PURGING DATA  FIELD PARAMETERS  COMMENTS  Fine Begin Time Water Temp pH Conductivity (u misses) (nm) Finish (ma) Removal (gall) ("G) (z.81) (u misses) (a.3%) (a.10%) (a.
PURGING DATA  FIELD PARAMETERS  COMMENTS  Property day  Prime Begin (non) Pinter (nun) (self) ("C) (±.84) (t mines) (±.8%)  [2:30   2:33   5:8   (*C) (±.84) (±.8%) (±.8%) (±.10%) (±.10%) (±.10%)  [3:30   0.4   2.88 7.47   0.610   (2.5   2.64   42.0   6.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.66   4.6
PURGING DATA  FIELD PARAMETERS  COMMENTS  PRINT PLANT  Print Begin (ne) Finish (ne) Removal (gel) ("C) (±.84) (ne) (ne) (ne) (ne) (ne) (ne) (ne) (ne
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* * * * * * * * * * * * * * * * * * *	* * * * * * * * * * * * * * * * * * * *		<u> </u>			İ			x
PUMPING	S VOLUM	E CALCULAT			diameter (in)		1 ft <sup>2</sup> = 7.4		
		1)2(14.24)		h-well de	10 10 10 10 10 10 10 10 10 10 10 10 10 1		V,,≓ĭ ( <u>dv</u>	02h*	
*		3=7.99		n-peroally	•		20		
1.1/5=3	//(新)	2(21) (6.3)	1 7.45gl	d <sub>b</sub> – Bonn	g diameter			<u>⊦dw</u> j² • 7.48 ⊌	ת"ו
	+4.76		400			*		7.00	ulan
•	1.47	y					المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد المحمد	by:	
<b>1</b>						<del></del>	CHECKEL	W. ALM	<u> </u>
PURGING	J DALA	* *	FIELD PAI	KAME I EK	8		COMMEN	19	
1									,
Time Begin	Time	Water	Temp	pH	Conductivity	ORP (mV)	DO	Turbidity	Comments
(fire)		Removel (gal)	(70)	(£.01)	(u mhas) (± 3%)	± 10m//)	(mg/L) (± 10%)	(NTU) (± 10%)	
1525	1531	. 2							dru.
1520	1610	13.8		. *					bullow.
15/610		D.8	11.73	7.85	250.4	817.8	1240	149	dre Invilor
1011	III lake	0,6	*		I Alleman and				7 11211
11015			143		0.44	1245	martines & god removated	152.5	
1422		0.6	13,25	7,10	0.193	12.5	4102	1901	
1628	1/24		14.61	710	0.47/	12.5	9.12	277.4	The second of the second
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			×					, , , , , , ,	д 3
¥	<del> </del>	*		. 0	vel)	1 180 1	- 12 7W2XX.X	• · · · · · · · · · · · · · · · · · · ·	*
*			*	** **	اقسيات س				

z	Number of Sample Containers Collected	:3	
;	175-190 M8	1144/55 131	7
,	545 13. 800l	4805 C	
×	35min =	14 7 Julin	

Emin 190 600 -

### <u>APPENDIX E</u> FIELD ELECTRICAL RESISTIVITY

• Field Electrical Resistivity Test Data

### FIELD ELECTRICAL RESISTIVITY TEST DATA



# RESISTIVITY SOUNDING DATA SHEET

Page 1 of 3

Representative: Project: Calvert Cliffs COLA June 19, 2006 Date:

Array type: Wenner Array 06120048 Project Number: Weather: Sunny, 92 Degrees

Forest litter Surficial Soil:

Meter: Sting R1 Earth Resistivity Meter S/N 990324

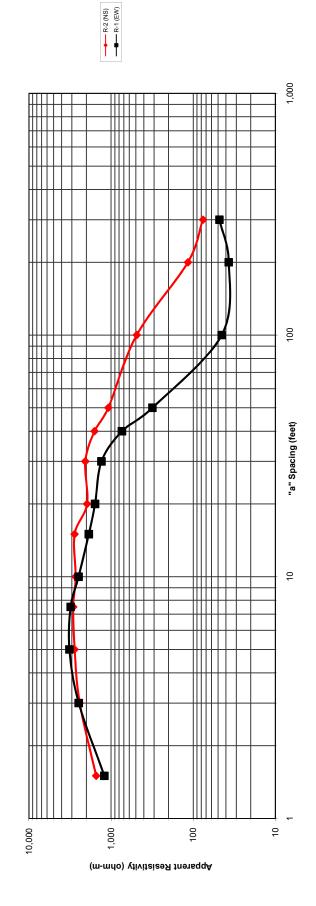
Todd White

100.0   200.0   300.0	0.2375   0.09787   0.08322	149 123 157	45 37 48	4,500 3,700 4,800
50.0	3.274	1,030	314	31,400
40.0	9.643	2,424	682	73,900
30.0	22.87	4,310	1,310	131,000
20.0	40.87	5,140	1,570	157,000
15.0	65.16	6,141	1,870	187,000
10.0	129.9	8,162	2,490	249,000
7.5	216.5	10,200	3,110	311,000
5.0	336.3	10,570	3,220	322,000
3.0	431.4	8,130	2,480	248,000
1.5	419.800	3,960	1,210	121,000
"a" spacing (feet)	R-1 (EW) R	φ (ohm-ft)	(m-mho) q	ohm-cm)

"a" spaci.	ng (feet)		1.5	3.0	5.0	7.5	10.0	15.0	20.0	30.0	40.0	50.0	100.0	200.0	300.0
R-2 (NS)		R	529.800	419.3	290.7	201.4	140.9	96.71	51.12	35.83	20.71	11.3	2.541	0.3023	0.1331
	ф (ok	hm-ft)	4,993	7,904	9,133	9,491	8,853	9,115	6,420	6,750	5,205	3,550	1,600	380	250
	do) d	hm-m)	1,520	2,410	2,780	2,890	2,700	2,780	1,960	2,060	1,590	1,080	487	116	9/
	ρ (oh	m-cm)	152,000	241,000	278,000	289,000	270,000	278,000	196,000	206,000	159,000	108,000	48,700	11,600	7,600

Notes: Resistivity calculated using the standard equation for the Wenner array as shown: Electrodes were hammered into the subsurface at various depths depending on the "a" spacing.

 $\rho = 2\pi aR$ 





# RESISTIVITY SOUNDING DATA SHEET

Page 2 of 3

Representative: **Project:** Calvert Cliffs COLA June 19, 2006 Date:

Forest litter

Surficial Soil:

Array type: Wenner Array Weather: P-Cloudy,80 Degrees Project Number: 06120048

Sting R1 Earth Resistivity Meter S/N 990324

Meter:

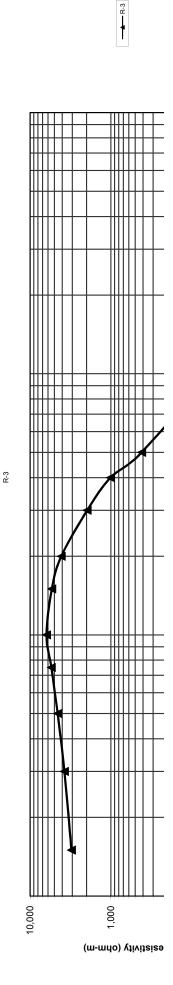
Todd White

0.05408  $\frac{31}{3,100}$ 100 0.1002 3,800 130 0.3577 69 220 1,360 415 101.00040.0 3,320 1.010 6,440 1,960 196,000 34.14 30.013,460 4,100 20.0 107.1 17,620 5,370 187 20,460 624,000 6,240 325.7 17,830 544,000 5,440 378.4 4,550 14,920 474.8 3,750 375,000 651.8 12,290 1069.000 10,080 3,070 307,000 (ohm-ft) (ohm-m) (ohm-cm) "a" spacing (feet) 9 9 R-3 (NS)

Notes:

 $\rho = 2\pi aR$ 

depending on the "a" spacing.





# RESISTIVITY SOUNDING DATA SHEET

Page 3 of 3

Representative: **Project:** Calvert Cliffs COLA June 20, 2006 Date:

Todd White

Array type: Wenner Array Weather: P-Cloudy, 80 Degrees Project Number: 06120048

Forest litter

Surficial Soil:

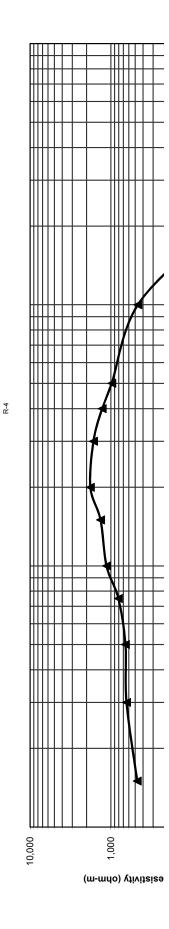
Sting R1 Earth Resistivity Meter S/N 990324

300.0	0.07195	140	41	4,100
200.0	0.1492	190	57	5,700
100.0	2.418	1,520	463	46,300
50.0	10.18	3,200	975	97,500
40.0	16.73	4,200	1,280	128,000
30.0	28.51	5,370	1,640	164,000
20.0	46.73	5,870	1,790	179,000
15.0	46.53	4,390	1,340	134,000
10.0	59.21	3,720	1,130	113,000
7.5	56.1	2,640	908	80,600
5.0	98.89	2,160	099	65,950
3.0	111.3	2,100	640	64,000
1.5	164.000	1,550	471	47,100
et)	R	(ohm-ft)	(m-mho)	(ohm-cm)
"a" spacing (fe	R-4 (NS)	Ф	Ф	ρ

Notes: Resistivity calculated using the standard equation for the Wenner array as shown: Electrodes were hammered into the subsurface at various depths

depending on the "a" spacing.

 $\rho = 2\pi aR$ 



₽-R-4