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GEOTECHNICAL LABORATORY

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GEOLOGY AND BYDROGEOLOGY OF THE AMMUNITION BURNING GROUND CRANE NAVAL WEAPONS SUPPORT CENTER

VOLUME I: MAIN TEXT

by

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An investigation of the geologic and hydrogeologic conditions at the Ammunition Burning Ground (ABG), Naval Weapons Support Center (NWSC), Crane, Indiana, was performed by the Waterways Experiment Station in 1986-1987. The purpose of the investigation was to identify and define factors influencing and controlling the flow of potentially contaminated ground water into and out of the ABG. Work included the drilling of several continuous core borings and emplacing well screens in them to monitor potentiometric levels and to obtain water samples for laboratory analysis. Geologic and hydrologic field mapping, literature surveys, and consultation with state geologists were conducted to complement the boring program. The study area was expanded early in the investigation to include the area surrounding the ABG, especially to the south, the down-gradient direction.

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The NWSC is in south-central Indiana approximately 25 miles southwest of Bloomington. The site lies in gently dipping sedimentary strata of Mississippian and Pennsylvanian age. The strata consist primarily of sandstones, shales, and limestones. Aquifers within the study area occur in sandstones and limestones. The shales form confining or semiconfining Layers between aquifers and prevent or partially prevent hydraulic connection between aquifers. Recent alluvial and colluvial soils consisting of clays, silts, sands, and gravels occupy the stream beds and valley floors. The topography at the NWSC is characterized by steep sided, narrow ridges, and valleys. Maximum relief in the study area is approximately 140 ft.

Fifty-three monitoring wells were installed in the ABG study area. Well screens ware of Teflon, 2 in. in diameter, and were 5 or 10 ft long. The riser pipes for all wells were of PVC. Each aquifer zone was sealed from the next lower zone before continuing drilling for well emplacement to p&vent hydraulic connection between aquifers. Only one well was installed in each boring, and as many as three wells were installed at a given drilling site.

Detailed surface and subsurface geologic mapping of the study area revealed the detail in site stratigraphy necessary to determine the continuity, depth, and thickness of potential aquifers. Three aquifers which was determined to be the Beaver Bend Limestone were identified within the area and depth of interest: an upper aquifer in the Golconda/Haney Formation (primarily limestone), a middle aquifer in the Big Clifty (primarily sandstone)-Beech Creek (primarily limestone) Formations, and a lower aquifer in the Beaver Bend (primarily limestone) Formation. The Beech Creek and Beaver Bend aquifers are separated by relatively impermeable shale strata and are not hydraulically connected. The Beech Creek (middle) and Golconda/Haney (upper) aquifers are hydraulically connected beneath much of the ABG and are accessible by potentially contaminated surface waters at the ABG site proper. Ground-water levels in all three aquifers were monitored to determine piezometric surface configurations and flow directions.

Ground-water flow in the Golconda/Haney, Beech Creek, and Beaver Bend aquifers is believed to be primarily through rock joints. Rock joints in the Beech Creek aquifer have been enlarged locally by solution, and flow through the solution zones can be rapid. Solution passage ground-water flow is believed to be the controlling influence on the subsurface hydrology within the ABG study area. A system of solution passages exists in the two main drainage valleys of the ABG study area, Little Sulphur Creek, and Johnson Hollow. Primary flow from the ABG site is to the east and south down Little Sulphur Creek, with secondary flow southwest and south through Johnson Hollow. The ground water issues from springs in the exposed Beech Creek Limestone south of the ABG site in Little Sulphur Creek.

PREFACE

This study was performed during the period June 1986 to December 1987 by the US Army Engineer Waterways Experiment Station (WES) for the Commanding Officer, Naval Weapons Support Center, Crane, Indiana. The work was performed under authority provided by NAVCOMPT Document Number N0016486WR09371, dated 5 June 1986.

The field work was performed by Mr. Richard W. Hunt. geologist, Engineering Geology Group (EGG), Engineering Geology and Rock Mechanics Division (EGRMD), and drilling crews under supervision of Mr. Mark Vispi, Chief, Explorations Group, EGRMD, all of the Geotechnical Laboratory (GL), WES. The report was written by Mr. Hunt with assistance from Mr. William L. Murphy, EGG, EGRMD. Mrs. Joyce H. Walker, Information Products Division, Information Technology Laboratory, edited the report. Direct supervision was provided by Mr. James H. May, Chief, Site Characterization Unit, EGRMD. Additional supervision was provided during the work period by Mr. John H. Shamburger, former Chief, EGG, and Dr. Lawson M. Smith, Chief, EGG, EGRMD. The project was conducted under the general supervision of Dr. Don C. Banks, Chief, EGRMD, and Dr. William F. Marcuson III, Chief, GL.

COL Dwayne G. Lee, EN, was Commander and Director of WES. Dr. Robert W. Whalin was Technical Director.

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* Plates and Boring Logs are published in Volumes II and III, respectively.

CONVERSION FACTORS, NON-SI TO SI (METRIC) UNITS OF MEASUREMENT

Non-SI units of measurement used in this report can be converted to SI (metric) units as follows:

Multiply	By	To Obtain
acres	4,046.873	square metres
feet	0.3048	metres
feet per mile	0.1893935	metres per kilometre
inches	2.54	centimetres
miles (US statute)	1.609347	kilometres

GEOLOGY AND HYDROGEOLOGY OF THE AMMUNITION BURNING GROUND CRANE NAVAL WEAPONS SUPPORT CENTER

PART I: INTRODUCTION

Background

1. A ground-water monitoring program was established in 1981 at the Ammunition Burning Grounds (ABG) treatment site at the Naval Weapons Support center (NWSC). The monitoring program was initiated to keep NWSC, Crane, in compliance with US Environmental Protection Agency (EPA) 40 CFR 265 Subpart F, which requires ground-water monitoring by managers of hazardous waste in surface impoundments and/or waste piles. Results of the monitoring program suggested the presence of ground-water contamination at the ABG (Naval Weapons Support Center 1986). A background well (Well 3-1) was found to be contaminated with explosive. Other wells showed evidence of contamination as determined by statistical analyses of results of indicator parameters. Subsequently, after notifying the State and Region V EPA of the findings, a Ground Water Assessment Plan was prepared (Naval Weapons Support Center 1986). This report presents the results of a detailed hydrogeologic and geologic study of the ABG conducted in 1986-87 under this plan.

scope

2. The main objective of the study was to identify and define the factors that influence and control the flow of ground water into and out of the ABG. Once the factors controlling ground-water flow have been identified, the potential areas and routes of contaminant migration can be closely monitored and compared with ground-water conditions around the ABG.

3. The scope of work included the emplacing of several continuous core borings which were fitted with well screens. Preliminary interpretations of geologic and hydrologic settings made during the drilling program were evaluated and updated continuously. Geologic cross sections were prepared and kept current with each additional boring. Field mapping, literature surveys, and interviews with personnel from the Indiana State Geological Survey were

conducted in conjunction with the drilling program. The location of each new boring was selected to offer the greatest information using the previous borings as a guide. The boring locations and time of drilling were planned so that the work would not interfere with the ongoing ABG activities.

4. As site investigations progressed, the accumulating hydrogeologic data indicated a need to include the area surrounding the ABG as a general part of the overall study. Springs issuing both north and south of the ABG were suspected to be hydraulically connected to ground water at the ABG. several borings have been drilled to the north and south of the ABG to trace pertinent hydrogeologic relationships associated with the ground-water flow pattern at the ABG. A line of monitoring wells was also installed across the Little Sulphur Creek valley at the NWSC boundary as a part of the overall ABG ground-water/contamination investigation.

Study Area Location

5. The NWSC, Crane, is located in southwest Indiana approximately 75 miles* southwest of Indianapolis and 71 miles northwest of Louisville, Kentucky (Figure 1). The NWSC occupies 62,463 acres (approximately 100 square miles) of the northern portion of Martin County and small portions of neighboring Greene, Daviess, and Lawrence Counties. Surrounding towns that are within 30 min or less driving time from the NWSC include Bloomington, Bedford, Bloomfield, and Washington. The ABG study area lies in the eastern part of the NWSC (Figure 2) and consists of about 50 acres.

* A table of factors for converting non-SI to SI (metric) units of measurement is presented on page 3.

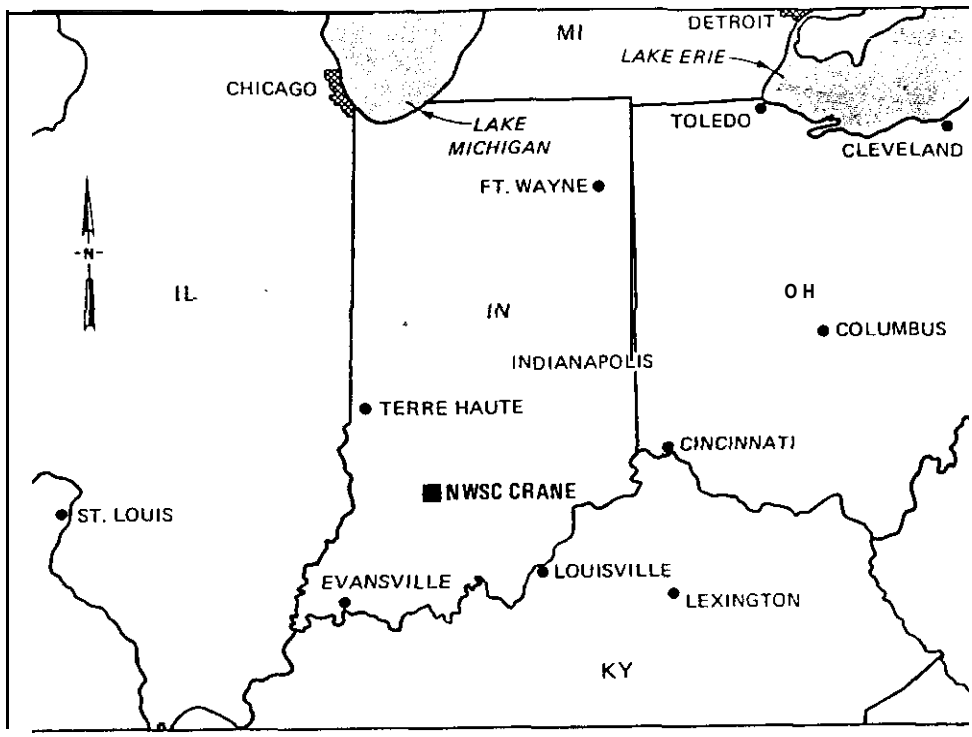

Figure 1. Location of Crane Naval Weapons Support Center (Chesapeake Division Naval Facilities Engineering Command 1979)

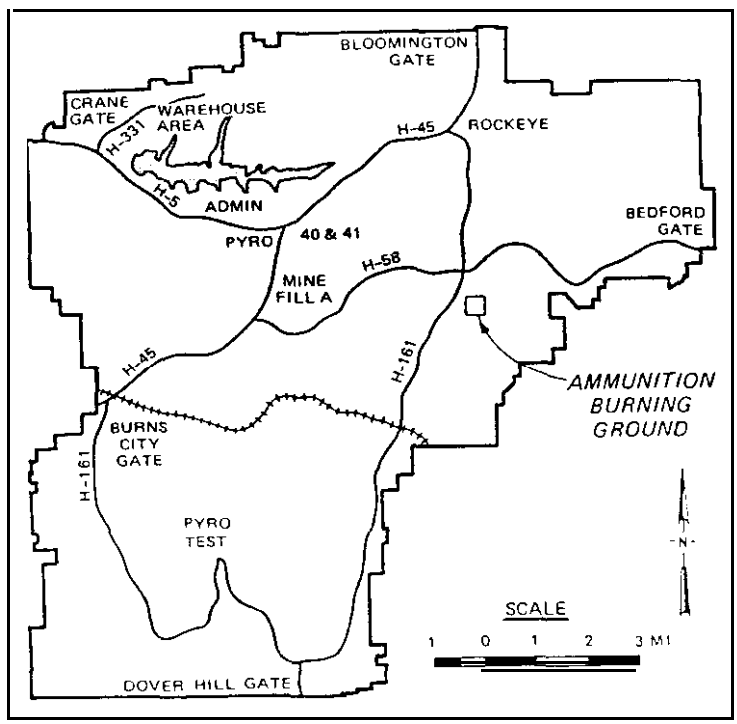

Figure 2. Location of Ammunition Burning Ground, NWSC, Crane

PART II: REGIONAL GEOLOGY AND HYDROGEOLOGY

Regional Geology

6. The state of Indiana and NWSC lie in the midwestern region of the United States where stresses within the earth's crust have been relatively mild throughout geologic 'time. The crustal deformation that has occurred has produced structural arches and basins of regional proportions where the sedimentary rocks are gently tilted and faulting has been minimal. The major structural provinces of the region in relationship to the state of Indiana are shown in Figure 3. The boundaries of the geologic provinces lying in the

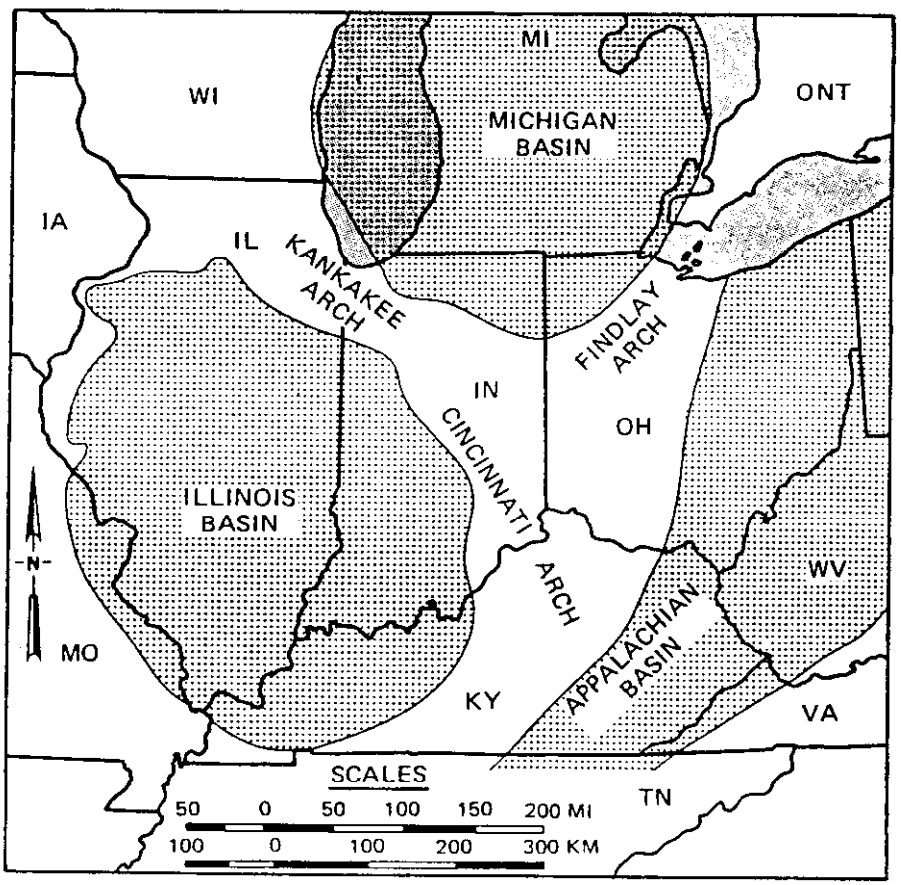

Figure 3. Major structural provinces of Midwestern United States (Carpenter et al. 1975)

state of Indiana are shown in relationship to county locations and the general location of the NWSC in Figure 4. The Kankakee and Cincinnati arches join and extend diagonally across Indiana from the southeast to the northwest. The combined arches form a structural divide from which sedimentary rocks dip

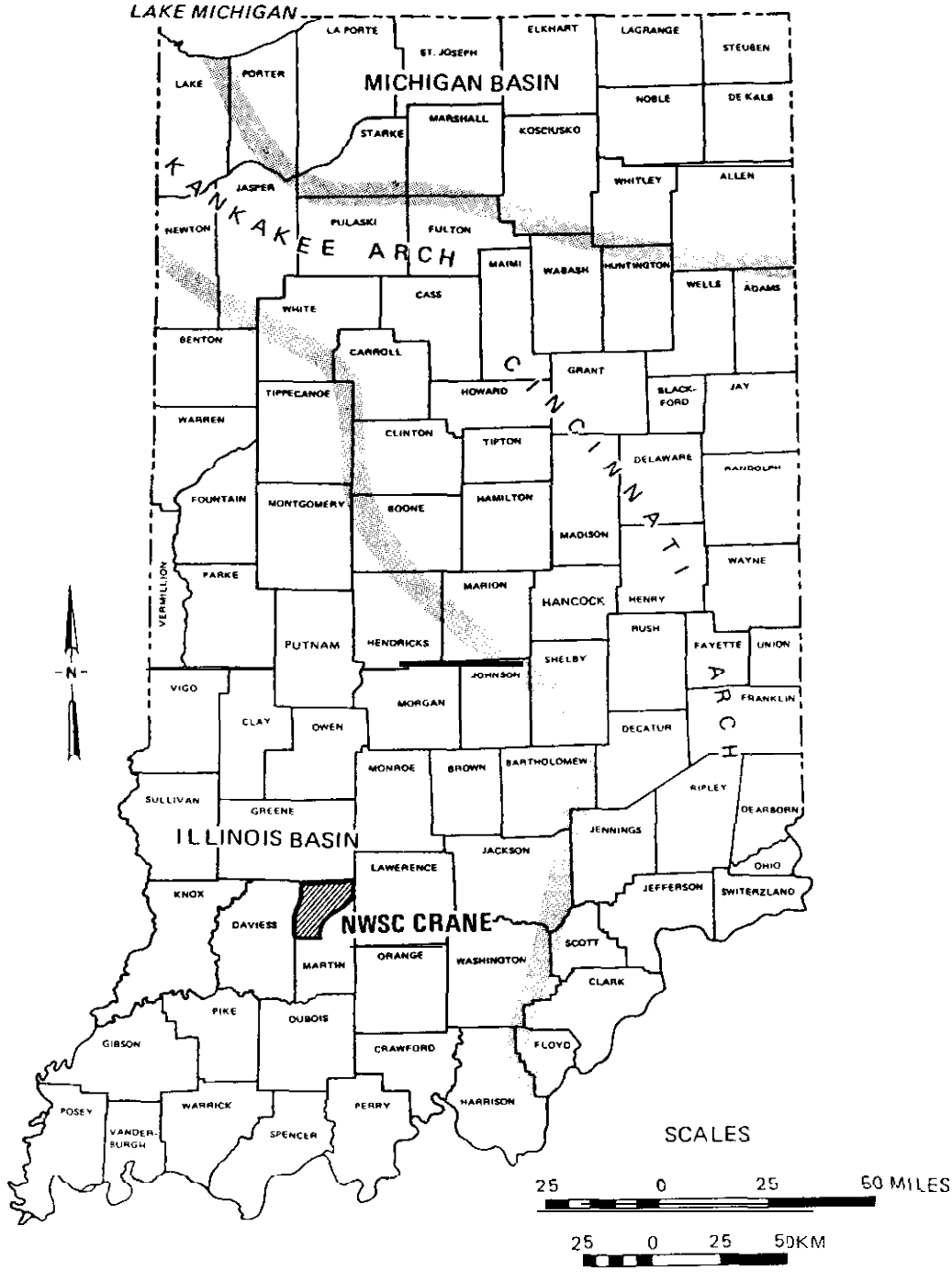

Figure 4. Boundaries of geologic provinces in Indiana

northeast into the Michigan basin and southwest into the Illinois basin. The sedimentary rocks were deposited in cyclic seas and coastal plains that fluctuated across the region between 280 and 500 million years ago.

7. Geologic time periods extending from the Pennsylvania" through the Cambrian (nearly all of the Paleozoic era) in descending order by age are represented in the sedimentary sequence underlying the region. Total accumulations of the sedimentary rocks range from 3,500 ft thick across the Kankakee and Cincinnati arches to in excess of 13,000 ft thick "ear the center of the Illinois basin. Surface rocks are older and thinner across the arches and become progressively thicker and deeper in the subsurface as the strata dip into the basins. Consequently, the surface rocks become progressively younger in a direction outward from the arches toward the basins. In Indiana, the youngest sedimentary rocks associated with the regional geologic structural features are Pennsylvanian in age. The absence of younger strata implies that Indiana has remained above sea level for the past 280 million years or that younger strata have been subsequently removed by erosion.

8. The NWSC lies in the eastern edge of the Illinois basin where the underlying sedimentary rocks dip west-southwest at approximately 50 ft per mile. The surface rocks underlying the NWSC are in the Lower Pennsylvanian and Upper Mississippian geologic time periods. A generalized stratigraphic column at the NWSC is presented in Figure 5. Mississippian rocks of the Chester Series are extensively exposed in the valley walls and hollows along the eastern portions of the NWSC and in the lower zones of deeper valleys toward the west. Pennsylvanian rocks of the Pottsville Series cap most of the hills and ridges along the eastern side of the NWSC and become the predominant surface rocks toward the west boundary of the NWSC. The stratigraphic units in the Pottsville Series consist of interfingered sandstones, shales, claystones, and clastic siltstones, with occasional, relatively thin interbeds of coal that were deposited in multicyclic seas and swamps. The stratigraphic units in the Chester Series consist of alternating and repetitive sequences of limestones, shales, and sandstones that were deposited in shallow seas. Several hundred feet of continuous limestone, middle Mississippian in age, underlie the Chester rocks but remain in the subsurface at the NWSC. The contact between the Mississippian and the Pennsylvanian rocks is a" unconformity where erosional processes extending over a long period of time removed upper portions of the Chester Series prior to Pottsville deposition. Local relief

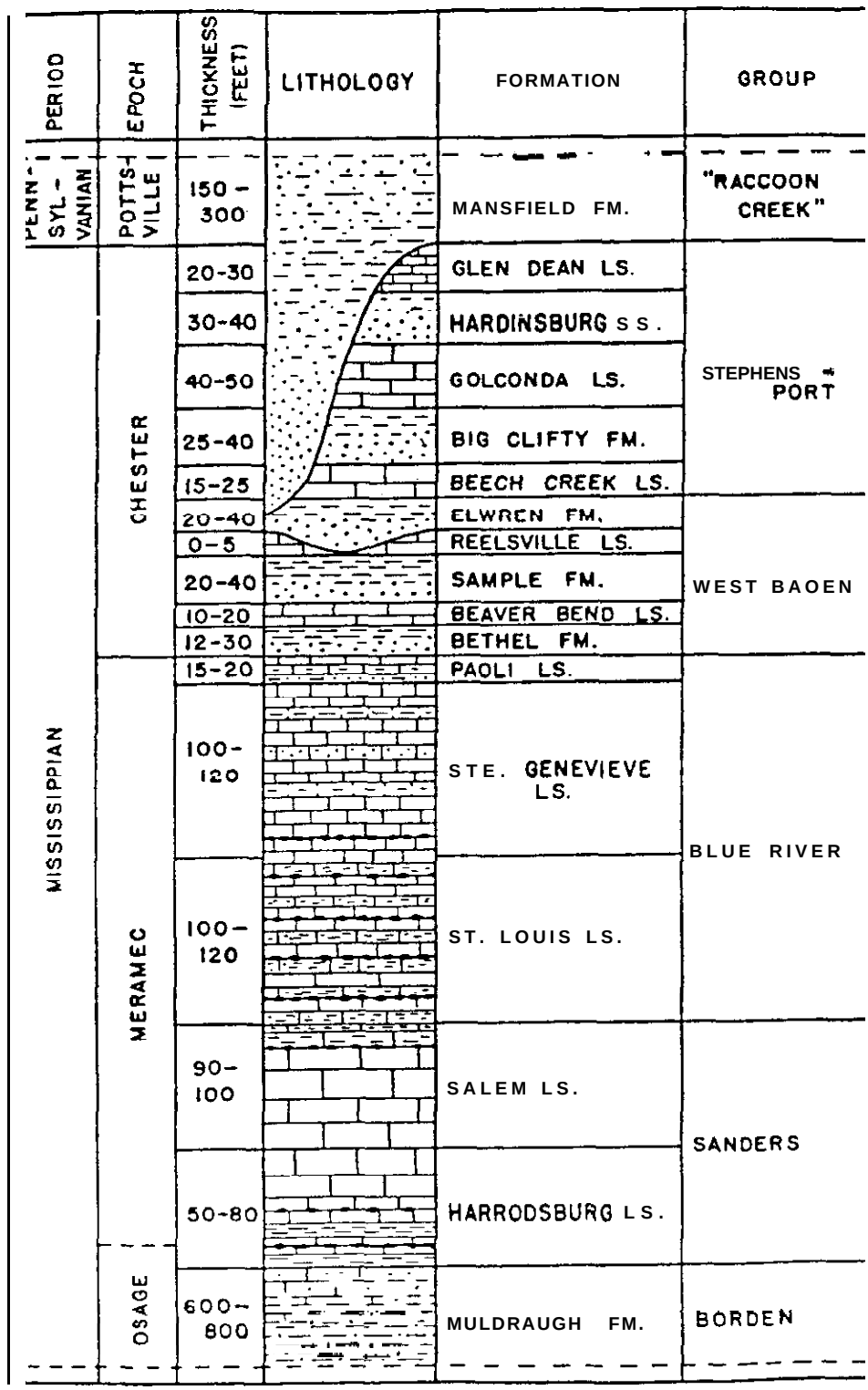

Figure 5. Stratigraphic column for rock units encountered at Nwsc (Palmer 1969)

along the unconformity may be as much as 150 ft in some areas.

9. No faults have been mapped in the NWSC general area. The closest mapped major fault, known as the Mt. Camel fault, trends northwest-southeast and passes approximately 20 miles east of the NWSC.

Regional Physiography

10. The physiographic divisions of the state of Indiana, the limits of Pleistocene glaciation. and the location of the NWSC are shown in Figure 6. The NWSC lies in an unglaciated area of the Crawford Upland, a rugged dissected plateau bound on the east by the Mitchell Plain and on the west by the Wabash Lowland. The Mitchell Plain is a low dissected limestone plateau characterized by sinkhole topography and other karst features. The boundary between the Crawford Upland and the Mitchell Plain is called the Chester Escarpment, a highly irregular east-facing cuesta escarpment. The escarpment trends northwest-southeast and passes just east of the NWSC. The face of the escarpment is somewhat obscured by elongated upland spurs and upland outliers along with karst valley reentrants that extend into the uplands for several miles. Numerous springs, cavern passages and caves occur along the Chester Escarpment and in the eastern part of the Crawford Upland. Some of these solution features are found in the eastern portion of the NWSC. The Crawford Upland grades into the Wabash Lowland near the western NWSC boundary. Elevations on the Crawford Upland at the NWSC range from less than 500 ft mean sea level (msl) to greater than 850 ft msl. Relief on the upland varies from about 100 ft to 350 ft, with higher elevations and greater relief occurring generally in the eastern part of the NWSC. Surface drainage in the upland is to the south and southwest.

Regional Drainage

11. The surface drainage along major streams in Indiana is shown in Figure 7. With the exception of the extreme northeast corner of Indiana, all the surface drainage is to the southwest and south. Approximately two-thirds of the state drains into the Wabash River which in turn empties into the Ohio River. Surface drainage at the NWSC eventually flows into the White River and thence to the Wabash to the southwest. The major drainage at the NWSC is divided into five basins, as shown in Figure 8. The ABG site is located in Basin III, near the headwaters of Little Sulphur Creek.

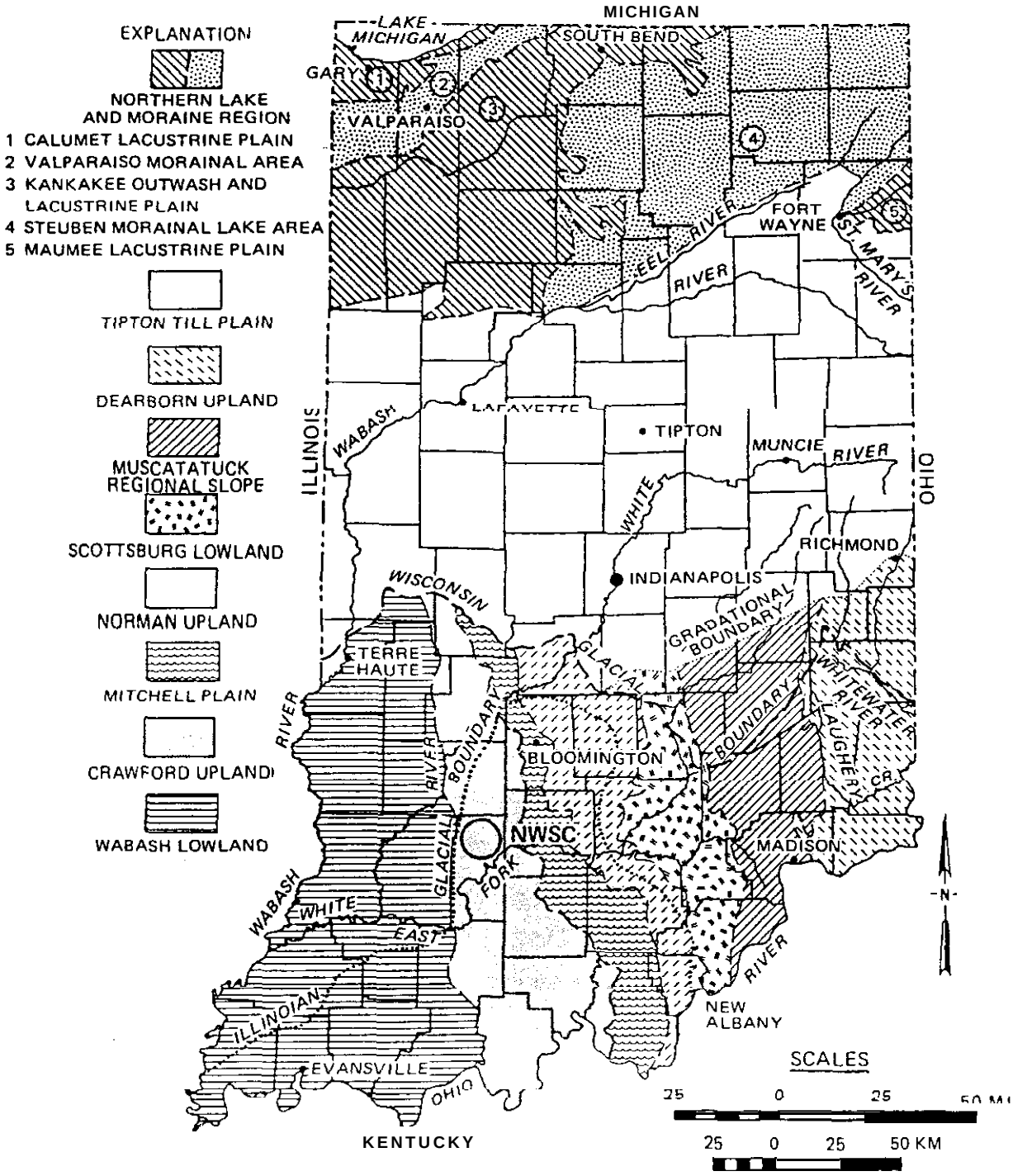

Figure 6. Physiographic divisions of the State of Indiana (Perry and Smith 1958)

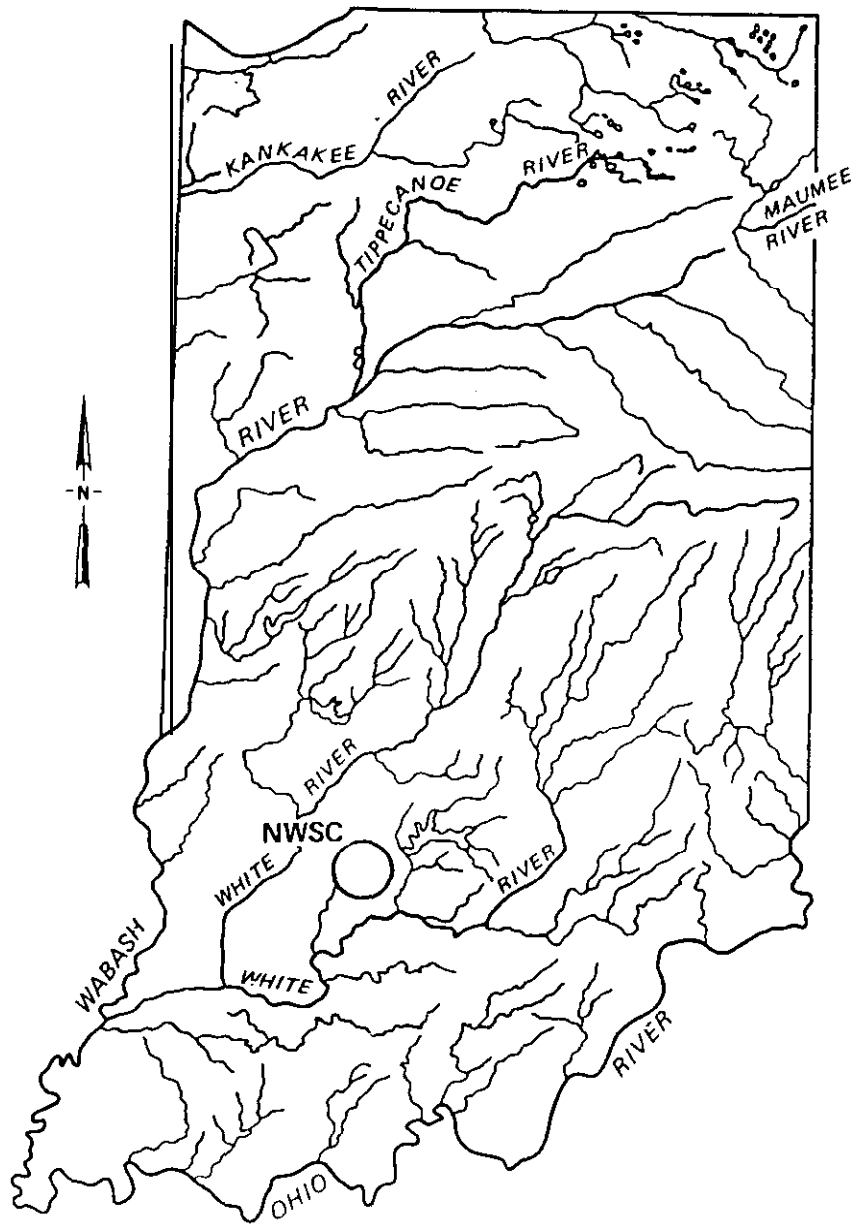

Figure 7. The stream system in Indiana (Indiana Academy of Science 1966)

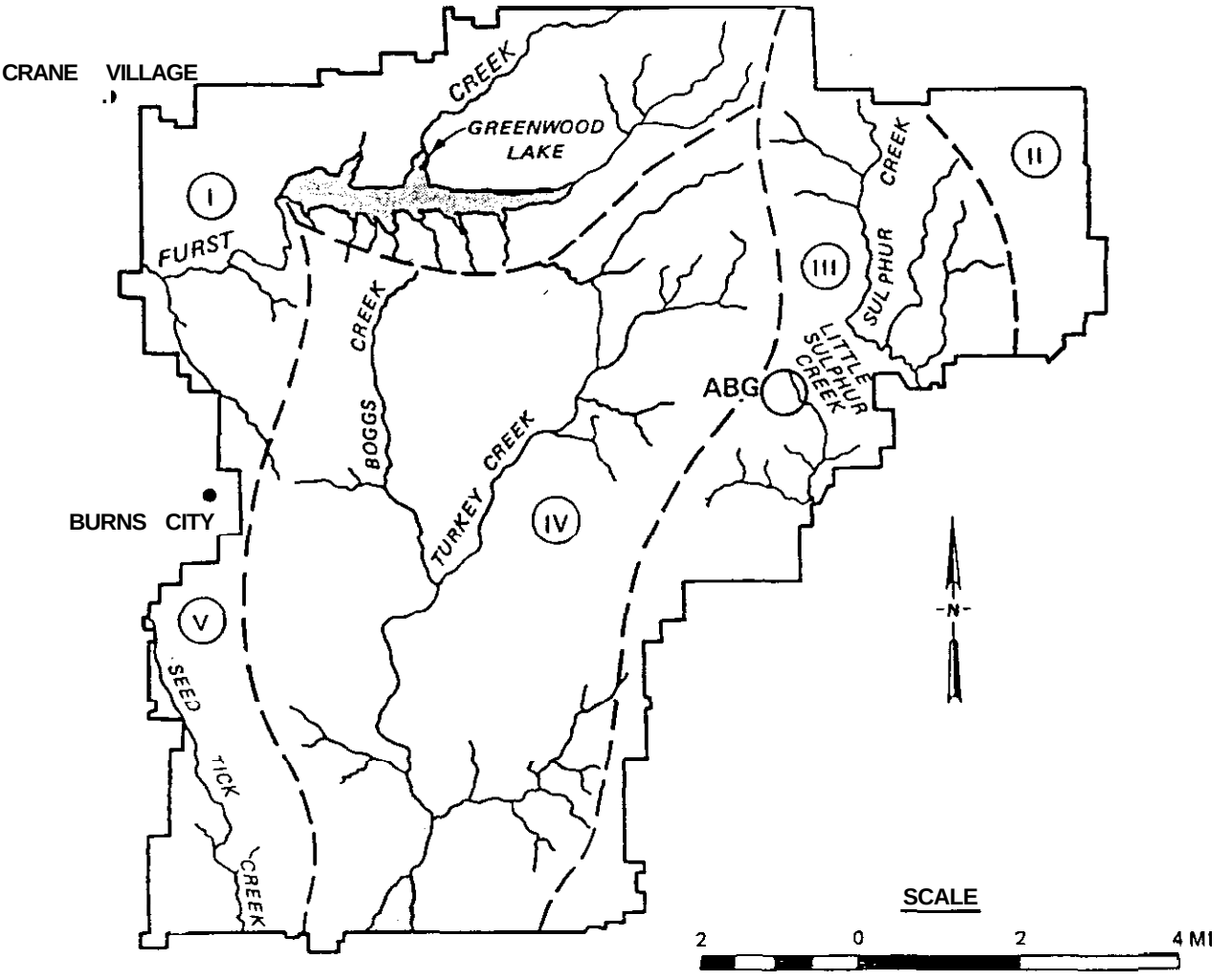

Figure 8. Surface drainage at the NWSC, Crane. Indiana (Chesapeake Division Naval Facilities Command)

Regional Ground-water Trends

12. Ground water in the unglaciated southwest portion of Indiana in general is contained in joint openings of limestone and sandstone aquifers. In the area of the Crawford Uplands, aquifers are *essentially* isolated from each other vertically by interlayered shale beds which act as aquicludes (Figure 6). Ground water enters the aquifers through outcrops and flows by gravity down the dip of the strata. Because the regional dip of the strata is to the southwest, the regional flow pattern of ground water in each aquifer is also to the southwest. Locally, however, variations in bedding dip, incision of an aquifer by surface drainage, and karstic conditions produce conditions

anomalous to regional trends. Numerous springs and seeps issue from the aquifer in areas of valley incision, locally complicating ground-water flow patterns. Ground water issuing from springs in higher aquifers becomes surface water that has the potential for reentering a lower aquifer exposed downstream.

PART III: SUMMARY OF PREVIOUS HYDROGEOLOGIC STUDIES

13. Past drilling programs at the ABG produced a large number of roller rock bit borings which were drilled with air. Consequently, the only samples available were cuttings. Determining stratigraphic breaks and lithologic conditions based on drilling characteristics and cuttings was difficult at best. Well screens were set in each of the borings based on the first encounter with water but without reliable data to correlate the stratigraphically controlled ground-water occurrences between borings. One of the main objectives of the earlier studies was to verify the presence of and identify any contaminants that might have entered the ground-water system at the ABG. The objective was accomplished and certain contaminants were found to be present in the ground water at several boring locations. In fact, two of the supposed background wells, one located at the west end of the ABG and the other at the northwest end. showed contamination. In addition, the line of compliance at the east end of the ABG became questionable, and the need for further investigations arose. Also, several borings located in the eastern zone of the ABG encountered large cavities. The presence of cavities has resulted in the initiation of additional investigations to determine the relationship of the cavities to the ground-water flow system out of the ABG area.

PART V: RESULTS OF CURRENT ABG HYDROGEOLOGIC INVESTIGATIONS

Preliminary Surveys

14. Prior to the start of drilling operations. literature and field surveys were conducted to establish background data on the geology of the area. Personnel from the Indiana State Geological Survey accompanied the site geologist on part of the field reconnaissance. The results of the predrilling surveys showed that the analysis of the stratigraphy presented in earlier reports on the ABG was in error. The stratigraphic units identified in an earlier report (Dunbar 1982) were out of sequence by one formation (too high) in descending order of occurrence. For example, the formation labeled Hardinsburg in the earlier report is actually the Big Clifty Formation, and that labelled Golconda Limestone is actually the Beech Creek Limestone (Figure 5).

15. Boring logs of two producing water wells at the ABG, one installed in 1941 and the other in 1968, were reviewed and discussed with personnel from the Indiana State Geological Survey. The aquifer supplying these wells was determined to be the Beaver Bend Limestone. Drinking water at the ABG is supplied by one of these wells. The Bethel Formation underlies the Beaver Bend and is relatively impervious. The boring logs indicated that the formations between the Beech Creek Limestone and the Beaver Bend Limestone contained thick, low permeability shale beds. The boring log data and discussions with the state survey indicate that these shale formations would serve as aquicludes to prevent ground-water interconnection between the two limestone formations. Personnel from the state survey also advised that there was a possibility of encountering sulfides in the ground water contained in the limestone below the Bethel Formation. Based on the above data, it was decided prior to the beginning of the drilling operations that the Beaver Bend Formation would be the lowest ground-water zone of investigation and that only a few widely spaced verification wells were necessary in the Beaver Bend.

Boring Program

16. A total of 66 borings have been completed as part of the current ABG subsurface investigations. A plan of borings at the ABG site is presented

in Plate 1* (locations shown are for boring clusters, each cluster containing 1, 2 or 3 wells). Boring cluster locations for the entire study area are included in Plate 13. A summary of boring data is presented in Tables 1 and 2. The borings include 33 core borings. 12 roller rock-bit borings, and 21 splitspoon soil sample borings. Monitoring well screens were set in 53 of the borings. Twelve of the splitspoon borings were used to obtain soil samples of the ABG valley fill material and were backfilled after completion (see Table 2 for summary). The remaining nine split-spoon sample borings are located along the NWSC boundary in Little Sulphur Creek alluvium (see B1 through B9 in Table 1). Well screens were set at the base of the alluvium in the nine borings in Little Sulphur Creek alluvium.

17. Well screens were set in all of the 33 core borings and 12 roller rock bit borings. Five of the core borings extended through the Beaver Bend Limestone and bottomed in the Bethel Formation. Thirty-one of the core and rock bit borings extended through the Beech Creek Limestone and bottomed in the Elwren Formation. Eight of the borings extended through the Golconda/ Haney Limestone and bottomed in the Big Clifty Formation, Indian Spring Shale Member. General well screen locations for selected wells installed in earlier investigations are shown in Table 3. Locations of earlier wells are shown in Naval Weapons Support Center 1986.

18. The borings drilled with a roller rock bit were located adjacent to deeper borings in which core samples had been obtained and in which the stratigraphy had been established. Detailed field logs were made for each of the core borings and are included in Volume III of this report. The well screens were set in each of the borings at depths determined by the aquifer to be investigated. Each well screen "as set in a separate boring with as many as three wells located within 5 ft of each other at a few of the boring "clusters." Detailed well screen placement data are included at the back of each boring log. The boring clusters correspond to the core boring numbers; i.e., WES-3-Cl-86 through WES-3-C33-86. Where more than one well screen is set at a particular cluster, there is a detailed well screen placement sheet included at the back of the appropriate boring logs for each of the wells set at each of the multiple well sites. The well numbers at the multiple well sites correspond to the following example: WES-3-Cl-86 (core boring and deepest well

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* References to plates refer to the plates in Volume II of this report.

Note: This table replaces original Table 1. Contains data from official survey for Ground and TOC elevations.

Table 1. Monitoring Well Data for Site 03 Ammunition Burning Ground

Well Number	Total Dep, Ft	Grnd Elev Ft NGVD	TOC Elev Ft NGVD	Screen Dep, Ft	Geologic Formation	Date Scrn set
03C01	197.2	624.58	627.28	174.0-184.0	Beaver B.	12/12/86
03C01P2	110.0	624.35	626.85	92.0-102.0	Beech Crk	09/22/86
03C01P3	25.6	624.00	626.50	19.6-24.6	Golconda	04/ /86
03C02	132.7	580.99	583.49	119.5-129.5	Beaver B.	10/24/86
03C02P2	49.0	580.65	583.15	38.0-48.0	Beech Crk	10/29/86
03C03	150.7	597.58	600.08	139.0-149.0	Beaver B.	09/13/86
03C03P2	67.0	597.70	600.20	55.8-65.8	Beech Crk	10/23/86
03C04	85.3	621.92	624.42	73.5-83.5	Beech Crk	11/25/86
03C05	44.0	578.86	581.36	32.0-42.0	Beech Crk	10/29/86
03C06	100.6	622.90	625.40	87.0-97.0	Beech Crk	10/16/86
03C07	101.6	633.97	636.47	88.7-98.7	Beech Crk	10/21/86
03C08	187.7	Well lost	and repla	ced by	03C08A	
03C08P2	101.6	626.84	629.34	90.0-100.0	Beech Crk	11/26/86
03C08A	186.0	628.00	630.50	171.0-181.0	Beaver B.	04/03/87
03C08AP3	20.5	627.93	630.43	14.5-19.5	Golconda	04/05/87
03C09	162.8	600.89	603.39	145.0-155.0	Beaver B.	12/05/86
03C09P2	73.0	601.06	603.56	62.0-72.0	Beech Crk	12/07/86
03C10	78.8	605.53	608.03	66.0-76.0	Beech Crk	01/22/87
03C11	59.5	589.86	592.36	47.5-57.5	Beech Crk	01/28/87
03C12	51.2	584.70	587.20	39.0-49.0	Beech Crk	02/03/87
03C13	83.2	615.25	617.75	70.2-80.2	Beech Crk	02/09/87
03C14	115.5	640.29	642.79	104.5-114.5	Beech Crk	02/20/87
03C15	101.1	618.51	621.34	88.5-98.5	Beech Crk	02/26/87
03C15P3	22.0	618.61	621.11	15.6-20.6	Golconda	04/ /87
03C16	157.0	680.75	683.25	146.0-156.0	Beech Crk	03/12/87
03C17	149.5	693.65	696.15	138.5-148.5	Beech Crk	03/19/87
03C18	22.5	622.59	625.09	15.5-20.5	Golconda	04/ /87
03C19	122.5	648.00	650.50	110.8-120.8	Beech Crk	05/08/87
03C19P3	44.0	647.20	649.70	37.0-42.0	Golconda	05/13/87

Table 1. (con'd)

Well Number	Total Dep, Ft	Grnd Elev Ft NGVD	TOC Elev Ft NGVD	Screen Dep, Ft	Geologic Formation	Date Scrn set
03C20	120.0	644.12	646.62	108.0-118.0	Beech Crk	05/24/87
03C21	123.0	639.72	642.22	108.4-118.4	Beech Crk	05/28/87
03C21P2	41.0	639.72	642.22	33.6-38.6	Golconda	05/29/87
03C22	16.5	615.08	617.58	10.0-15.0	Golconda	06/04/87
03C23	15.5	616.11	618.61	8.5-13.5	Golconda	06/09/87
03C24	28.2	550.64	553.24	22.0-27.0	Beech Crk	06/16/87
03C25	70.7	594.53	597.03	59.7-69.7	Beech Crk	06/18/87
03C26	105.7	638.07	640.57	94.0-104.0	Beech Crk	08/03/87
03C27	73.3	601.34	603.84	60.5-70.5	Beech Crk	08/14/87
03C28	77.1	610.76	612.96	65.0-75.0	Beech Crk	08/22/87
03C29	278.8	794.67	797.37	267.5-277.5	Beech Crk	09/01/87
03C30	263.6	776.41	778.91	250.5-260.5	Beech Crk	09/17/[illegible]
03C31	267.2	789.70	792.10	255.0-265.0	Beech Crk	11/01/87
03C32	176.9	709.06	711.56	164.0-174.0	Beech Crk	11/14/87
03C33	249.8	782.53	785.03	238.5-248.5	Beech Crk	11/31/87
03C34	193.9	724.57	727.07	177.4-187.4	Beech Crk	/ /89
03C35	177.7	695.50	697.00	164.4-174.4	Beech Crk	/ /89
03C36	183.1	715.74	718.24	169.0-179.0	Beech Crk	/ /89
03C37	116.7	617.78	620.28	105.5-115.5	Beech Crk	/ /89
03C38	55.5	570.47	572.97	42.7-52.7	Beech Crk	/ /89
03B01	23.3	501.97	504.47	7.5-12.5	Alluvium	06/19/87
03B02	15.8	501.46	503.96	9.6-14.6	Alluvium	06/27/87
03B03	14.5	502.46	504.96	8.5-13.5	Alluvium	06/29/87
03B04	16.5	503.97	506.47	9.5-14.5	Alluvium	06/30/87
03B05	15.0	504.55	507.05	9.0-14.0	Alluvium	07/01/87
03B06	13.5	506.76	509.26	8.0-13.0	Alluvium	07/02/87
03B07	10.5	508.22	510.72	4.0-9.0	Alluvium	08/04/87
03B08	12.5	510.90	513.40	6.0-11.0	Alluvium	08/05/8[illegible]
03809	12.0	513.54	516.04	5.5-10.5	Alluvium	08/07/87
03810	58.7	559.46	561.96	48.5-58.5	Beech Crk	10/22/87

Table 1. (con'd)

Well Number	Total Dep, Ft	Grnd Elev Ft NGVD	TOC Elev Ft NGVD	Screen Dep, Ft	Geologic Formation	Date Scrn set
03-01	56.2	601.67	604.67	41.6-50.8	Big C/BC	/ /81
03-02	12.9	619.67	622.67	3.5-10.0	Mansfield	/ /81
03-03	100.4	581.29	584.29	85.9-95.0	Sample sh	/ /81
03-04	70.0	591.17	594.17	55.1-64.5	Beech Crk	/ /81
03-05	60.0	~592.75	~595.75	45.4-54.7	?	/ /81
03-06	52.0	586.71	589.71	37.3-46.6	Beech Crk	/ /81
03-07	27.0	553.46	556.46	12.4-21.7	?	/ /81
03-08	47.0	~583.76	~586.76	32.4-41.8	?	/ /81
03-09	80.5	621.72	624.72	65.9-75.1	Big Clift	/ /81
03-10	27.0	554.94	557.94	12.2-21.5	?	/ /82
03-11	20.5	550.05	553.05	5.7-15.1	?	/ /82
03-12	27.0	554.99	557.99	12.2-21.6	?	/ /82
03-13	27.0	549.24	552.24	12.0-21.4	?	/ /82
03-14	20.0	549.37	552.37	5.2-14.7	?	/ /82
03-15	30.5	~557.05	~560.05	15.7-25.1	?	/ /82
03-16	38.0	556.09	559.09	23.2-32.6	?	/ /82
03-17	27.0	550.44	553.44	12.3-21.7	?	/ /82
03-18	29.5	549.80	552.80	14.6-23.9	?	/ /83
03-19	35.0	~556.37	~559.37	20.1-29.5	?	/ /83
03-20	29.3	551.83	554.83	14.4-23.7	?	/ /83
03-21	27.5	557.12	560.12	12.8-22.1	?	/ /83
03-22	29.3	555.72	558.72	14.5-23.9	?	/ /83
03-23	29.7	559.34	562.34	14.9-23.3	?	/ /83
03-24	56.8	586.04	589.04	42.0-51.4	?	/ /83
03-25	39.0	570.64	573.64	24.2-33.5	?	/ /83
03-26	50.4	~592.89	~595.89	35.9-45.0	?	/ /83
03-27	33.0	596.08	599.08	18.5-27.6	Big Clift	/ /83
03-28	27.0	624.49	627.49	12.5-21.6	Mans, Gol	/ /83
03-29	51.0	595.61	598.61	36.6-45.6	Big Clift	/ /83
03-30	53.5		608.60		Big Clift	10/04/85

Table 1. (con'd)

Well Number	Total Dep, Ft	Grnd Elev Ft NGVD	TOC Elev Ft NGVD	Screen Dep, Ft	Geologic Formation	Date Scrn set
03-31	46.0		582.84		Big C/BC	10/10/85
03-32	45.0		583.54		Big C/BC	10/11/85
03-33	41.0		583.39		Big C/BC	10/13/85
03-34	50.0		585.06		Big C/BC	10/21/85
03-35	51.0		586.60		Beech Crk	10/23/85
03-36	70.0		617.54		Big Clift	10/25/85
03-37	48.9		586.52	33.9-43.9	Big C/BC	10/27/85
03-38	57.0		604.79		Big C/BC	11/02/85
03-39	55.0		603.25		Big C/BC	11/02/85

NOTE: REPLACED

Table 1

Summary of Boring and Monitoring Well Data

Boring and Monitoring Well No.'s	Boring Sites (Cluster or Single Monitoring Wells)	Boring Types	Depth ft	Elevation, Ground Surface ft	Elevation, Top of Well Monitoring Riser Pipe, ft	Well Screened Interval (Depth Below Ground Surface, ft)	Geologic Formation Screened	Date Well Screen Set
WES-3-C1-86		Core	197.2	624.8	627.5	174.0 to 184.0	Beaver Bend	12/12/86
WES-3-C1P2-86	Cluster	Core	110.0	624.7	627.2	92.0 to 102.0	Beech Creek	09/22/86
WES-3-C1P3-86		Rock bit	25.6	624.8	627.3	19.6 to 24.6	Golconda/Haney	04/ /86
WES-3-C2-86	Cluster	Core	132.7	581.5	584.0	119.5 to 129.5	Beaver Bend	10/24/86
WES-3-C2P2-86		Rock bit	49.0	581.1	583.6	38.0 to 48.0	Beech Creek	10/29/86
WES-3-C3-86	Cluster	Core	150.7	597.8	600.3	139.0 to 149.0	Beaver Bend	09/13/86
WES-3-C3P2-86		Rock bit	67.0	597.7	600.2	55.8 to 65.8	Beech Creek	10/23/86
WES-3-C4-86	Single	Core	85.3	622.1	624.6	73.5 to 83.5	Beech Creek	11/25/86
WES-3-C5-86	Single	Core	44.0	579.3	581.8	32.0 to 42.0	Beech Creek	10/29/86
WES-3-C6-86	Single	Core	100.6	623.4	625.9	87.0 to 97.0	Beech Creek	10/16/86
WES-3-C7-86	Single	Core	101.6	634.3	636.8	88.7 to 98.7	Beech Creek	10/21/86
WES-3-C8-86		Core	187.7	627.4		Well was lost and replaced by WES-3-C8A-86 (below)		
WES-3-C8P2-86	Cluster	Rock bit	101.6	627.2	629.7	90.0 to 100.0	Beech Creek	11/26/86
WES-3-C8A-86		Rock bit	186.0	628.3	630.8	171.0 to 181.0	Beaver Bend	04/03/87
WES-3-C8AP3-86		Rock bit	20.5	628.3	630.8	14.5 to 19.5	Golconda/Haney	04/05/87
WES-3-C9-86	Cluster	Core	162.8	601.3	603.8	145.0 to 155.0	Beaver Bend	12/05/86
WES-3-C9P2-86		Rock bit	73.0	601.5	604.0	62.0 to 72.0	Beech Creek	12/07/86
WES-3-C10-86	Single	Core	78.8	603.9	608.4	66.0 to 76.0	Beech Creek	01/22/87
WES-3-C11-86	Single	Core	59.5	590.3	592.8	47.5 to 57.5	Beech Creek	01/28/87
WES-3-C12-86	Single	Core	51.2	585.1	587.6	39.0 to 49.0	Beech Creek	02/03/87
WES-3-C13-86	Single	Core	83.2	615.7	618.2	70.2 to 80.2	Beech Creek	02/09/87
WES-3-C14-86	Single	Core	115.5	640.7	643.2	104.5 to 114.5	Beech Creek	02/20/87
WES-3-C15-86	Cluster	Core	101.1	618.6	621.2	88.5 to 98.5	Beech Creek	02/26/87
WES-3-C15P3-86		Rock bit	22.0	618.2	620.7	15.6 to 20.6	Golconda/Haney	04/ /87
WES-3-C16-86	Single	Core	157.0	681.3	683.8	146.0 to 156.0	Beech Creek	03/12/87
WES-3-C17-86	Single	Core	149.5	693.9	696.4	138.5 to 148.5	Beech Creek	03/19/87
WES-3-C18-86	Single	Core	22.5	623.1	625.6	15.5 to 20.5	Golconda/Haney	04/ /87
WES-3-C19-86	Cluster	Core	122.5	648.4	650.9	110.8 to 120.8	Beech Creek	05/08/87
WES-3-C19P3-86		Rock bit	44.0	648.0	650.5	37.0 to 42.0	Golconda/Haney	05/13/87
WES-3-C20-86	Single	Core	120.0	644.9	647.4	108.0 to 118.0	Beech Creek	05/24/87
WES-3-C21-86	Cluster	Core	123.0	639.8	642.3	108.4 to 118.4	Beech Creek	05/28/87
WES-3-C21P3-86		Rock bit	41.0	640.0	642.5	33.6 to 38.6	Golconda/Haney	05/29/87
WES-3-C22-86	Single	Rock bit	16.5	615.6	618.1	10.0 to 15.0	Golconda/Haney	06/04/87
WES-3-C23-86	Single	Rock bit	15.5	616.6	619.1	8.5 to 13.5	Golconda/Haney	06/09/87
WES-3-C24-86	Single	Core	28.2	551.2	553.8	22.0 to 27.0	Beech Creek	06/16/87
WES-3-C25-86	Single	Core	70.7	595.0	597.5	59.7 to 69.7	Beech Creek	06/18/87
WES-3-C26-86	Single	Core	105.7	638.6	641.1	94.0 to 104.0	Beech Creek	08/03/87
WES-3-C27-86	Single	Core	73.3	602.14	604.64	60.5 to 70.5	Beech Creek	08/14/87
WES-3-C28-86	Single	Core	77.1	602.16	613.52	65.0 to 75.0	Beech Creek	08/22/87
WES-3-C29-86	Single	Core	278.8	803.53	798.53	267.5 to 277.5	Beech Creek	09/01/87
WES-3-C30-86	Single	Core	263.6	784.69	779.71	250.5 to 260.5	Beech Creek	09/17/87
WES-3-C31-86	Single	Core	267.2	797.63	792.93	255.0 to 265.0	Beech Creek	11/01/87
WES-3-C32-86	Single	Core	176.9	709.28	711.78	164.0 to 174.0	Beech Creek	11/14/87
WES-3-C33-86	Single	Core	249.8	791.03	786.01	238.5 to 248.5	Beech Creek	11/31/87
WES-3-B1-86	Single	Split-spoon	23.3	502.87	505.37	7.5 to 12.5	Alluvium	06/19/87
WES-3-B2-86	Single	Split-spoon	15.8	502.15	504.65	9.6 to 14.6	Alluvium	06/27/87
WES-3-B3-86	Single	Split-spoon	14.5	503.03	505.53	8.5 to 13.5	Alluvium	06/29/87
WES-3-B4-86	Single	Split-spoon	16.5	503.77	507.27	9.5 to 14.5	Alluvium	06/30/87
WES-3-B5-86	Single	Split-spoon	15.0	505.51	508.01	9.0 to 14.0	Alluvium	07/01/87
WES-3-B6-86	Single	Split-spoon	13.5	507.37	509.87	8.0 to 13.0	Alluvium	07/02/87
WES-3-B7-86	Single	Split-spoon	10.5	508.65	511.15	4.0 to 9.0	Alluvium	08/04/87
WES-3-B8-86	Single	Split-spoon	12.5	511.42	513.92	6.0 to 11.0	Alluvium	08/05/87
WES-3-B9-86	Single	Split-spoon	12.0	513.84	516.34	5.5 to 10.5	Alluvium	08/07/87
WES-3-B10-86	Single	Core	58.7	560.17	562.67	48.5 to 58.5	Beech Creek	10/22/87

Table 2

Summary of Soil Sample Borings in ABG Valley Alluvium

Boring Numbers	Depth ft	Elevation ft	Number of Jar Samples
WES-3-VFI-87	3.5	584.5	2
WES-3-VF2-87	7.5	581.5	5
WES-3-VF3-87	4.8	580.5	3
WES-3-VF4-87	5.2	581.5	4
WES-3-VFS-87	9.8	591.4	7
WES-3-VF6-87	7.8	595.5	5
WES-3-VF7-87	10.0	596.3	6
WES-3-VF8-87	11.7	599.5	8
WES-3-VF¶-87	9.6	600.4	7
WES-3-VFlO-87	8.3	603.7	6
WES-3-VFll-87	11.8	602.8	7
WES-3-VF12-87	7.5	603.3	5

screen) ; WES-3-C1P2-86 (roller rock bit boring middle well screen); WES-3-C1P3-86 (roller rock bit boring and upper well screen).

19. The first boring, WES-3-CI-86, was started with a 4 by 5-1/2-in. diamond core barrel, but required three separate setups and an HQ (2-1/2-in. diam core) wire line core barrel rigging to complete. In the first setup. the core barrel was hung and lost along with approximately 30 ft of drill stem at a depth of about 70 ft. A new 4 by 5-1/2-in. core barrel was used to continue coring to a depth of approximately 114 ft in a second setup, offset 5 ft from the first, before it was also lost. A third boring, offset an additional 5 ft, was finally completed to the required depth using an HQ wire line core barrel. The third boring was numbered WES-3-Cl-86 and included the well screen set in the lower aquifer. Since the second boring had penetrated through the middle aquifer, a well screen was set in it, but the well included the lost core barrel at the bottom. The first boring was grouted to the surface. The remaining core borings throughout the drilling program were completed with the HQ wire line rigging.

Table 3

Locations of Well Screens in Wells of Previous ABG Investigations

Boring No.	Stratigraphic Locations of Well Screens
03-01-81	Bottom of Big Clifty Sandstone
03-02-81	Mansfield Sandstone, just above Golconda Limestone (screen 3.5 to 10.0 ft deep)
03-03-81	Sample shale
03-04-81	Lower Beech Creek Limestone
03-06-81	Upper Beech Creek Limestone
03-09-81	Middle/lower Big Clifty Sandstone
03-27-83	Middle/lower Big Clifty Sandstone
03-28-83	Mansfield and Golconda Limestone (above Big Clifty Indian Springs Shale Member)
03-29-83	Bottom of Big Clifty Sandstone
03-30-85	Bottom of Big Clifty Sandstone
03-31-85*	Spans Big Clifty/Beech Creek contact (solution zone)
03-32-85	Spans Big Clifty/Beech Creek contact (solution zone)
03-33-85	Spans Big Clifty/Beech Creek contact (solution zone)
03-34-85	Spans Big clifty/Beech Creek contact (solution zone)
03-35-85	Top 10 ft of Beech Creek (solution zone)
03-36-85	Bottom zone of Big Clifty Sandstone
03-37-85	Spans Big Clifty/Beech Creek contact (solution zone)
03-38-85	Bottom of Big Clifty Sandstone and top 2-3 ft of Beech Creek Limestone
03-39-85	Bottom of Big Clifty Sandstone and top l-2 ft of Beech Creek Limestone

* 03-31-85 was drilled to 105.0 ft, grouted back up to 39.0 ft, and drilled back to 46.0 ft. Screen was set from 29.0 to 39.0 ft (grout may have sealed off part of flow from aquifer).

20. The riser casing of the deep core boring WES-3-C8-86 apparently became plugged with grout from casing grouting operations and was unusable. A second deep boring, WES-3-C8A-86, located approximately 40 ft east of the original site, was drilled with a rock bit and a well screen was set as a replacement data point. The surface evidence of WES-3-C8-86 was destroyed and the well was grouted to the surface.

Drilling and Well Installation Procedures

Drilling

21. Prior to the start of drilling and between setups at each of the boring sites thereafter, the drill rig and drilling tools were steam-cleaned or in a few instances flushed with clean water. After setup. the soil zone in each of the core borings was sampled with a 7-in. diam folding auger down to refusal. If the depth to refusal was less than approximately 11 ft (the depth needed to start coring with the HQ wire line core barrel) then a 2-ft-long NX core barrel was used to sample to 11 ft. All the remaining core samples below 11 ft were taken with the HQ wire line system with the exception of boring WES-3-Cl-86, as discussed earlier under the heading "Boring Program." The core samples were placed, in order of removal, into plywood boxes for future reference, and detailed geologic logs were prepared.

22. The drill cuttings were removed by circulating clean water in a steel mud pa" sealed around the boring top. Most of the water used in drilling was obtained from a hydrant located in the heavy equipment shops area at the NWSC. At the beginning a small portion of the drilling water was obtained from the well located "ear the center of the ABG, which is supplied by the Beaver Bend aquifer. This well had been checked previously and is supposedly free of any contamination. Another well located "ear the ABG office shack is supplying drinking water from the same aquifer.

23. During drilling operations, the mud pan was cleaned and refilled with new water whenever conditions became necessary. In most borings, the drilling water was lost in the more porous and jointed aquifer zones. When water loss occurred, the mud pan was replenished with a continuous flow of clean water. Where more than one aquifer zone was penetrated in a particular boring, the upper zone or zones were sealed off before advancing the boring deeper. PVC casing was grouted 3 to 5 ft into the relatively impervious shale

beds that underlie each aquifer and allowed to set, generally overnight. The procedure used in casing the higher aquifers was to set 6-in.-diam casing in the upper zone, followed by 4-in.-diam casing in the middle zone. The 4-i". casing was grouted up through the previously set 6-in. casing. where there was no upper aquifer, the 6-in. casing was used to seal off surface soils. In all borings where drilling water had been lost in the aquifer zones, the water circulation returned after the casing was set. In most of the borings, the circulation was again lost in the next lower aquifer zone.

24. After completion of each boring, a bailer was attached to the drill cable hoist and the drilling fluids were bailed out until the water became relatively clear. The bailing operation usually lasted 1 to 2 hr using a 2-1/2-in.-diam, 10-ft-long bailer. In most borings the water flow into the boring was adequate to maintain a regulated steady pace of bailing. In a few borings. the aquifer was tighter and there were slight delays in bailing operations to allow the inflow of additional water. After the bailing operations, monitoring well screens and riser pipes were installed in each boring.

Monitoring well installation

25. A system of 2-in.-diam Teflon and PVC pipe was used to install the monitoring wells. The screens are all made from Teflon, having three vertical columns of horizontal slots 0.020 in. wide and spaced approximately a quarter of an inch apart. The riser pipe consists of Teflon extended upward to a point approximately 5 ft above the previously measured water level in each aquifer zone. The upper portion of the riser pipe consists of PVC extending from the Teflon connection to approximately 2.5 ft above the ground surface. The bottoms of the well screens have nonslotted Teflon traps extending 1 ft below the screens. All screens in the middle and lower aquifer zones are 10 ft in length. Screens in the upper aquifer are 5 ft in length. The top of each well has a vented PVC cap. The riser pipe is protected at the surface by 3-in.-diam steel pipes with lockable caps and are grouted 3-1/2 ft inside the 4- and 6-in.-diam PVC surface casing. A typical well installation is shown diagramatically in Figure 9. A summary of all well installations is included in Table 1. In the first two or three wells, which were installed prior to the establishment of the above system of well placement, the PVC pipe extended below the aquifer water level.

26. Once the pipe system was installed in the boring, the screened section and the total aquifer zone were packed with a siliceous coarse sand and

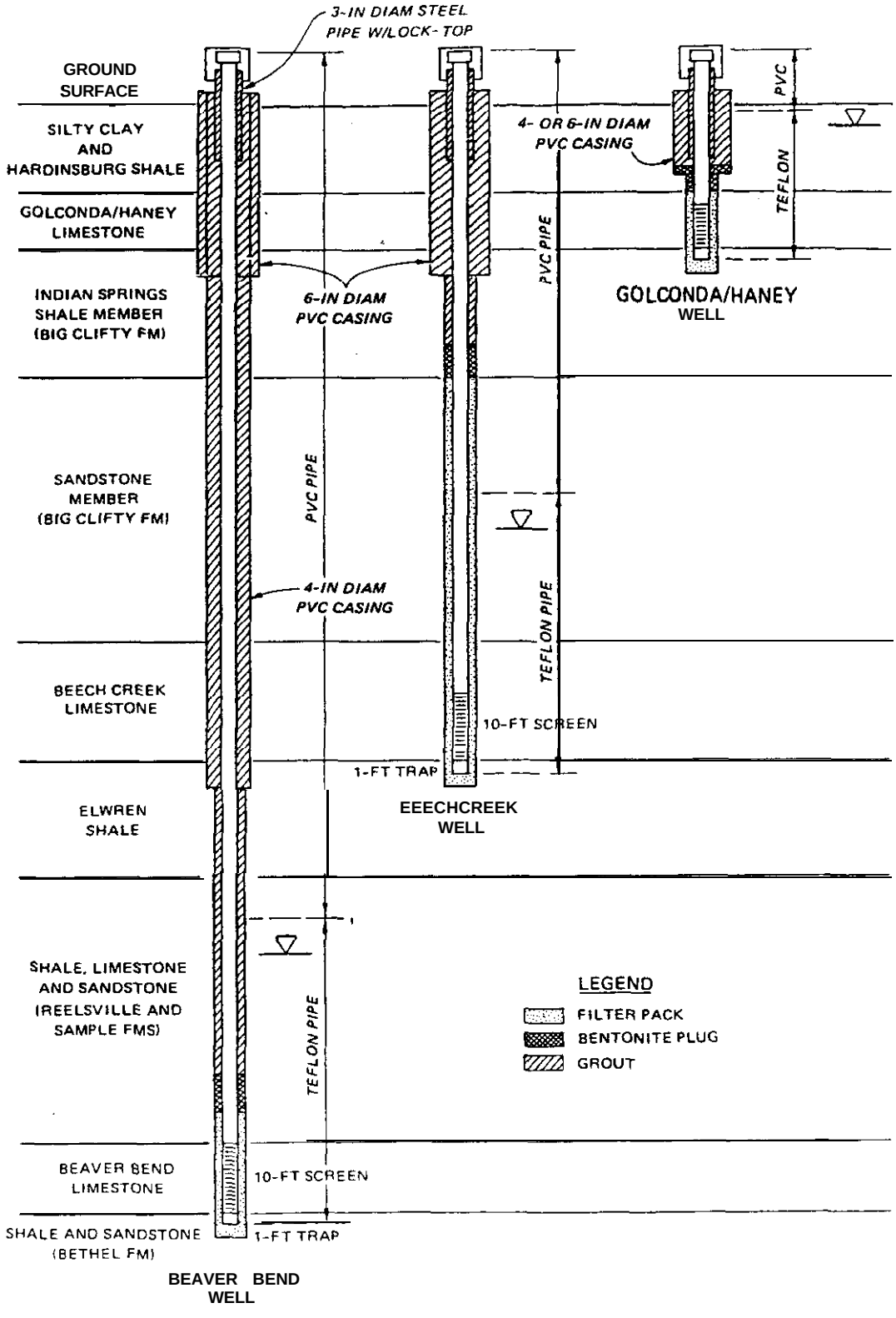

Figure 9. Well installation diagrams

pea gravel filter material. The filter material was poured in from the top slowly by hand and checked for depth periodically with a tape measure. The bottoms of all the screens were placed at or near the base of the particular aquifer being tested. The bottom of each boring extends 1 to 3 ft into the shale beds below the aquifer zones. The filter pack was brought up to the next higher shale zone to obtain a good seal above the aquifer. In the lower aquifer the filter pack averages between 15 and 20 ft thick. In the middle aquifer the filter pack averages about 60 ft thick. In the upper aquifer the filter pack averages 10 to 12 ft thick. A 3- to 5-ft thickness of bentonite pellet-s was poured in from the top to secure a seal above the filter pack in each well. The bentonite was allowed to set 30 min to 1 hr for swelling time, and the well was grouted to the surface above the bentonite. The grout consisted of a cement-bentonite mixture and was pumped in from the bottom through a 3/4-in.-diam pipe.

Well development

27. Initially, the first 12-15 wells were developed by pumping compressed air through a filtered hose system placed at the bottom of the screens, forcing water out at the riser tops. The blowing operations were alternated with periods of surging in the screened intervals. The surge tool consisted of an l&in.-long, 1-1/4-in.-diam stainless steel rod with rubber washers attached at each end. The washers were cut slightly smaller than the inside diameter of the well pipe. The surge tool was lowered into the well with l/&in.-diam stainless steel cable and pulled briskly up and down in the slotted zones to create a pumping/pushing action. The processes were repeated for several hours in each well or until the water forced out at the top became relatively clear. The time involved usually required an entire day, especially in wells where the recovery rate was slower.

28. The use of compressed air for well development was terminated when it was determined that oil was escaping into the wells even after the inline filters were changed periodically.

29. The procedure for developing the remaining wells consisted of bailing well water, alternating with periods of surging. The same stainless steel cable used for surging was used to lower and raise a 1-l/8-in.-diam, 5-ft-long stainless steel bailer. To speed up operations and ease muscle strain, a frame was constructed on a small trailer in conjunction with a portable wire line winch to run the tools in and out of the wells. The time for development

was about the same as when using air. The wells were bailed until the water became clear. The developing tools were flushed with clean water between each well setup.

Physiography and Geology of the ABG Study Area

Physiography

30. A topographic nap that includes the total study area and shows the location of the ABG site is presented in Plate 2. The map was prepared by combining the Indian Springs and Williams, US Geological Survey 7-1/2 min quadrangles and photographically enlarging them to a scale of 1 in. = 1,000 ft. The topography of the study area is relatively rugged, consisting of a series of steep sided, narrow ridges and valleys. The topography is a product of erosional incision into gently dipping strata of varying resistance. A major drainage divide extends southwest-northeast through the area and is followed by NWSC Road 161. East of the divide, approximately two-thirds of the area drains to the south through Little Sulphur and Sulphur Creeks. West of the divide, the remaining portion of the area eventually drains into Turkey Creek, which lies farther to the west. The entrance valleys show strong east-west, southwest, and southeast trends. The overall drainage pattern is a reflection of joints in the bedrock. Joints having strikes similar to the drainage trends were measured at a number of outcrops. Elevations across the area range from about 480 ft msl in the lower drainage valleys to a maximum of 845 ft msl along the major drainage divide.

31. The ABG site lies across the northern reaches of the Little Sulphur Creek Valley. The site is approximately 2,000 ft long by 1,000 ft wide with the long axis oriented east-west. A detailed topographic map of the ABG site, with a contour Interval of 1 ft, is presented in Plate 1. Elevations in the valley portion of the site range from 620 ft msl at the western end to 580 ft msl at the eastern end. Elevations on ridges bordering the site range from 720 to 810 ft msl. Surface drainage flows into the site from the west and northwest, and flows out of the site to the east. At the east end of the site Little Sulphur Creek turns south and continues off the NWSC boundary, 1-1/2 miles south of the ABG site. Little Sulphur Creek eventually joins Sulphur Creek which in turn empties into Indian Creek, approximately 5-1/2 miles south of the ABG site.

Geology

32. Stratigraphy. The geologic formations encountered by borings in the study area are described in the following paragraphs, in descending order of geologic age (youngest units first).

a. Raccoon Creek Group (Pennsylvanian). Mansfield Formation. The Mansfield Formation caps the hills and ridges in the study area and varies from 0 to 65 ft thick in the core borings. The formation consists of interfingered fine- to medium-grained, cross-bedded, friable, and oxidized sandstones; thinly bedded laminated shale and sandstone; thinly bedded to massive carbonaceous shale; massive claystone; clastic siltstone; and occasional thin seams of coal. The various beds tend to rapidly "lens out" laterally.

b. Stephensport Group (Mississippian).

(1) Glen Dean Formation. The Glen Dean is the uppermost formation of the Mississippian Stephensport Group and occurred immediately below the Mississippian-Pennsylvanian unconformity in three borings (C-29, C-30 and C-31) southwest of the ABG. Only the lower 1.2 to 5.3 ft of the formation was encountered, consisting of light to medium gray, granular to crystalline, oolitic, very hard and dense limestone.

(2) Hardinsburg Formation. The Hardinsburg occurred immediately below the Mississippian-Pennsylvanian unconformity in many of the borings because of absence of the Glen Dean and has been thinned by pre-Pennsylvanian erosion. The formation's total observed thickness of 43.2, 45.6, and 46.6 ft was encountered in borings C-29, C-30, and C-31, respectively, southwest of the ABG. The formation consists of thick, laterally varying beds of fine-grained. friable sandstone, thinly laminated sandstone and shale, dark-gray, thinly bedded carbonaceous shale and medium green shale containing dark red-brown mottling. The green shale zones are similar in appearance to the Elwren Formation. The Glen Dean and Hardinsburg Formations lie above the uppermost aquifer of the ABG study area.

(3) Golconda/Haney Formation. Several years ago the name for this formation was changed from the Golconda to the Haney. However, to ensure easy cross reference to earlier reports both names are used in this report. The formation occurs immediately below the Pennsylvanian-Mississippian unconformity in several borings. The thickness varies from a few feet to about 14 ft. The formation consists of gray-brown, medium to coarsely crystalline, fossiliferous very hard and dense limestone in beds ranging from 2 to 14 ft thick, with interbeds or zones of dark gray shaley limestone encountered in several borings. A 1-1/2- to 2-ft-thick shale bed occurs near the middle of the formation in

most borings. The Golconda/Haney forms the upper aquifer of the study area.

(4) Big Clifty Formation. The Big Clifty Formation is divided into two distinctly different lithologic members. The upper member is known as the Indian Springs Shale and consists of a 20-ft-thick bed of dark gray, thinly bedded, platey to fissile, carbonaceous shale that is fossiliferous locally. The lower 3 to 4 ft of shale is generally massive, olive to olive gray and tan, and oxidized in contact with the underlying sandstone. The Indian Springs serves as an aquiclude at the base of the Golconda/Haney aquifer zone in the western portion of the ABG but is absent (eroded) in the eastern portion. The lower member of the Big Clifty Formation consists of 40 ft of yellow to olive tan, massive, rippled, very fine, well sorted, friable, and permeable sandstone that is cut by numerous intersecting joints. The lower portion of the Big Clifty Sandstone forms the middle aquifer with the underlying Beech Creek Formation.

(5) Beech Creek Formation. The Beech Creek consists of fossiliferous, very hard and dense limestone that ranges from 18 to 22 ft thick except in areas where downward solutioning has removed the upper portions. In the upper one-third to one-half of the formation, the limestone is light to medium gray brown, medium to coarsely crystalline, and has occasional stylolites. In the lower zone the limestone is dark gray, fine to medium crystalline, and contains occasional to numerous wavy shale partings. Generally, the lower few inches of limestone contain rounded shale inclusions from the underlying Elwren Shale. The limestone has numerous intersecting joints. The Beech Creek Limestone *and* the overlying sandstone of the Big Clifty Formation together represent the middle aquifer at the ABG site.

c. West Baden group (Mississippian).

(1) Elwren Formation. The Elwren averages 20 ft thick and consists of massive to thinly bedded, dark gray-green relatively impervious shale with interzones of red-brown claystone. Field observations indicate that the Elwren serves as an effective aquiclude at the base of the Beech Creek Limestone. The base of the Beech Creek (top of the Elwren) is exposed in several places in the valleys within the ABC study area. Ground water can be seen flowing freely along the top of the Elwren and forms springs at those locations.

(2) Reelsville Formation. The Reelsville averages 10 ft in thickness. The formation consists of an upper 1 to 3 ft of hard sandy limestone that grades laterally into calcareous sandstone, a middle zone of massive to thinly bedded dark gray to gray-green shale, and a lower 1 to 3 ft zone of fine-grained sandstone that is locally calcareous.

(3) Sample Formation. The Sample Formation ranges from 40 to 45 ft thick and consists of dark gray to black, thinly bedded, platey to fissile shale with occasional thin to thick beds of light gray, fine grained, massive, friable sandstone. The sandstone beds generally occur in the lower zone. Approximately 1-1/2 miles north of the ABG site an outcrop of the Sample Formation consists of sandstone in a 25- to 30-ft section.

(4) Beaver Bend Formation. The Beaver Bend ranges from 10 to 12 ft thick and consists of medium gray-brown, medium to coarsely crystalline, fossiliferous. very hard and dense limestone that is occasionally oolitic. The formation has numerous intersecting joints and forms the lower aquifer of the study area. The Beaver Bend comprises the lowest aquifer sampled for this investigation.

(5) Bethel Formation. Only five wells bottomed in the upper portion of the Bethel Formation. The zone penetrated consisted of black thinly bedded shale with occasional light gray sandstone lenses and light gray sandstone with shale lenses.

33. Surface geology. The general distribution of surface racks within the study area is shown on the geologic map presented in Plate 3. The geologic map "as prepared as an overlay to the topographic map of Plate 2. Data to construct the geologic map were obtained from Hutchinson 1967. The outcrop pattern on the geologic map reflects continuing headward erosion of drainage in the area, and is representative of the surface geomorphology. Younger Pennsylvanian sediments of the Raccoon Creek Group cap the ridges, and progressively older Mississippian sediments of the Stephensport and West Baden Groups are exposed downward into the valleys (Figure 5). The contact between the Pennsylvanian and Mississippian sediments is an unconformity, marked by evidence of an extended period of surface erosion prior to Raccoon Creek deposition.

34. The area geologic map (Plate 3) includes structural contours on top of the Beech Creek Limestone. The Beech Creek is the basal formation of the Stephensport Group and is used as a datum for stratigraphic correlations throughout southwestern Indiana. The structure contours show that the regional dip of strata underlying the study area is to the southwest at approximately 50 ft per mile. Where the Beech Creek has been removed by valley downcutting, the structure contours are shown dashed. The general configuration of the Beech Creek structure contours "as obtained from data available in Perry and Smith 1958. The structure contours as shown in Plate 3 are

modified from the original trends in Bulletin No. 12 from elevation data on the Beech Creek that were obtained from borings and outcrops during the ABG investigation.

35. A lineament shown on the area geologic map crosses through the approximate center of the ABG site in a northeast direction (Plate 3). The position of the lineament was transferred directly from Wier et al. 1974. The Vincennes Lineament Map was prepared from remote imagery under contract for the Indiana Geological Survey. Very few field checks were made for verification. The lineaments are believed to represent joints or other fractures in the bedrock and in most cases they agree with mapped joint orientations. A brief survey of local panchromatic aerial photos did not reveal evidence of the lineament through the ABG, nor was there any apparent offset of the strata in borings located to either side of the lineament position.

36. A larger scale, detailed geologic map of the ABG site, constructed from boring data and outcrop examinations is presented as Plate 4. The map depicts the surface formations that underlie the general area of the ABG disposal activities. The Mansfield Formation of the Raccoon Creek Group occupies the higher elevations at the ABG. In the order of increasing geologic age, the Hardinsburg, Golconda/Haney, and the Big Clifty Formations of the Stephensport Group occupy the lower valley slopes and valley floor. The Hardinsburg and portions of the Golconda/Haney Formations have been thinned by pre-Mansfield erosion at the Pennsylvanian-Mississippian unconformity. The Big Clifty Formation is divided into two map units: the upper Indian Springs Shale Member and the lower sandstone member.

37. In the eastern area of the ABG, a number of borings, drilled during several previous study phases, encountered large cavities in the contact zone between the Big Clifty Sandstone and the underlying Beech Creek Limestone. The area of cavity development is shown cross-hatched on the site geologic map (Plate 4). The geologic development and hydrogeologic significance of the cavities are discussed later in this report.

38. The surface formations in the ABG valley floor area are covered by a blanket of alluvial and colluvial soils ranging from less than 1 ft to approximately 15 ft in thickness. The soils predominantly consist of yellow-brown and tan firm silty to sandy clay, with occasional to numerous weathered sandstone fragments, cobbles, and pebbles. The ABG soil zone is illustrated in geologic cross sections AA' and BB'. The locations of the cross sections

are shown in Plate 5. Boring VF-8 on cross-section AA' encountered ground water at a depth of approximately 10.5 ft. The significance of the ground water at this depth (near the Indian Springs Shale) is explained below in the section entitled "Hydrogeology of the ABG Study Area". No zones considered to be more than slightly permeable were encountered in the alluvial materials. Thin residual and colluvial silty clay, generally less than 5 ft thick, covers large areas of the ABG valley slopes. These soils have continually been reworked by dozers during maintenance operations at the ABG (large areas of the valley floor have also been reworked). Windows of underlying rock are exposed at scattered locations around the valley slopes.

39. Subsurface geology. The subsurface geology of the ABG study area is portrayed graphically in a series of geologic cross sections (AA' through QQ'). A plan showing the locations of sections AA' through JJ' is presented in Plate 5. Cross sections AA' through JJ' (Plates 6 through 12) represent geologic conditions beneath the ABG site. A plan of locations of sections KK' through QQ' is presented in Plate 13. Cross sections KK' through QQ' (Plates 14 through 20) are at a smaller scale and represent subsurface geologic conditions related to and extending beyond the ABG site. The cross sections were constructed primarily from boring data, but some include data from examination of outcrops.

40. The geologic cross sections provide a graphic portrayal of the stratigraphic and hydrogeologic factors that control ground-water conditions beneath the ABG study area. The sections include ground-water profiles and the stratigraphic positions of well screens. Borings shown on the cross sections as having two or three well screens located in different stratigraphic horizons represent well cluster sites, where more than one aquifer zone was encountered. Well screens of the cluster wells are numbered beside the respective boring logs to correspond to ground-water levels shown on the cross sections. Detailed analysis of ground-water data is presented under the heading, "Hydrogeology of the ABG Study Area", with reference to the geologic cross sections given where appropriate.

41. Solution cavern passages have developed in the Beech Creek Limestone along major surface drainage ways within the study area. Many of the geologic cross sections intersect and graphically portray the solution features. The geological development of the solution features is discussed in detail in a separate section.

42. A composite of geologic cross sections CC' through FF' was constructed to present a panoramic encompassing view through borings located around the perimeter of the ABG site, Plate 8. The individual sections can be viewed separately, but are connected to show the continuity of the geologic conditions underlying the site in all directions. The composite section begins at boring C16, runs clockwise around the outer portion of the ABG site, and concludes at C16. The individual sections are views looking north. east, south, and west from a point located in the center of the ABG.

43. The geologic conditions underlying the ABG valley floor, from west to east, are presented in cross section GG', Plate 9. The subsurface geologic relationships through the center of the ABG, from southwest to northeast, or along the regional dip, are presented in cross section HH', Plate 10. The location of the former ABG ash pile, which has been removed, is shown in relation to the underlying stratigraphy in section II', Plate 11. The geologic conditions underlying and bordering the Little Sulphur Creek Valley where it turns south out of the ABG are shown in cross section JJ', Plate 12.

44. Refer to Plate 13 for locations of cross sections KK' through QQ'. Geologic cross section KK', Plate 14. runs generally from north to south for a distance of just over 4 miles. The cross section begins in the Sulphur Creek Valley north of the ABG, crosses the center of the ABG site, continues into Little Sulphur Creek Valley *south* of the ABG, and extends across the NWSC boundary. The cross section presents a detailed view of the geologic, stratigraphic, and hydrogeologic conditions that underlie the larger study area in relationship to the ABG site. The relationships of valley incisions that have totally breached the upper and middle aquifers north and south of the ABG, and cut into the lower aquifer north of the ABG, are emphasized on the cross section. Elevations measured on key formations, accompanied by formational thicknesses found in borings at the ABG, were used to project the stratigraphy north of boring C17. Water table elevations for the lower (Beaver Bend) aquifer are plotted on section KK' only beneath the ABG site because borings/wells elsewhere did not extend to the Beaver Bend. Some of the wells placed in the Beech Creek aquifer, such as C-17, C-31 and C-32, were not cluster wells and so do not provide water table elevations for the upper (Golconda- Haney) aquifer.

45. Geologic cross section LL', Plate 15, begins at boring C29, located downdip southwest of the ABG, and runs southeast ending in the valley of

Sulphur Creek. The cross section shows the stratigraphic relationships in the upper reaches of Johnson Hollow, Little Sulphur Creek at Spring "C", and the dip component back into Little Sulphur Creek from Sulphur Creek. Positions of the geologic formations underlying the Beech Creek in section LL' were projected from boring data in the ABG and correlated to the outcrop of Beaver Bend measured in Sulphur Creek.

46. Geologic cross section MM', Plate 16, runs from northwest of the ABG site at boring C19 to the southeast and east through the ABG valley floor region, and then southerly along the valley of Little Sulphur Creek, to the NWSC boundary, a total distance of approximately 2 miles. North of spring "C", the section emphasizes the extent of valley incision through the formations that lie above the Elwren Shale. South of spring "C", Little Sulphur Creek turns slightly southwest and the creek bed remains within the Elwren Shale on past the NWSC boundary. Boring B1, at the NWSC boundary, encountered approximately 8 ft of Elwren Shale underlying the alluvium, and was terminated while still in the Elwren. The cross section graphically displays the solution cavern passages that underlie the valley of Little Sulphur from just east of boring C11 to near spring "C".

47. Geologic cross section NN', Plate 17, runs from boring 19. northwest of the ABG, through the western end of the ABG site and along Johnson Hollow, ending at boring B10 approximately 1-1/2 miles south of the ABG. The cross section shows the solution features in the Beech Creek Limestone underlying and bordering the Johnson Hollow drainage, which are similar to those found in Little Sulphur.

48. Geologic cross sections 00' and PP', Plates 18 and 19, respectively, show the underlying geologic conditions at the ABG and beyond from southwest to northeast for a distance of approximately one-half mile. The cross sections follow the general northeast-southwest dip trend of the strata. Both cross sections terminate on the northeast at borings drilled as part of the ongoing Dye Burial Grounds (DBG) study. Cross section 00' runs through the west and west central area of the ABG and lies north of the headward extent of drainage solution cavern development in Johnson Hollow. Cross section PP' extends from the upper reaches of Johnson Hollow, across the valley of Little Sulphur Creek just southeast of the eastern end of the ABG. Cross section PP' passes several hundred feet north of the zone of Beech Creek solutiming along Johnson Hollow drainage.

49. Geologic cross section QQ', Plate 20, was constructed through the line of soil borings, B1 through B9, and one core boring, B10, that span the valley of Little Sulphur Creek at the NWSC south boundary. The cross section shows alluvial deposits ranging from 10 to 15 ft thick resting on Elwren Shale. The lower 5 to 10 ft of the alluvial deposits across the valley consist of clayey to sandy saturated sandstone gravel with the exception of materials in boring B7. The upper alluvial deposits and the entire section at boring B7 consist of very moist to wet sandy silt with occasional sandstone pebbles. Solution features in the Beech Creek Limestone occur in the valley flanks on either side.

50. Because of its importance as a major aquiclude, as discussed below, the surface geometry of the Elwren underlying the study area has been contoured and is presented in Plate 21. The contours, on a 5-ft interval, were constructed from boring data supplemented with data from outcrops. The contours not only reflect the overall southwest dip trend of the strata, but also reveal local structural irregularities occurring south of the ABG. A structural dome, emphasized by concentric contours on the surface of the Elwren, is centered approximately one-half mile south of the ABG between Little Sulphur Creek and Johnson Hollow. The development of similar isolated domes is an apparently common occurrence in southwestern Indiana and is discussed in the geological literature. The domes are depositional features formed where overlying sediments have draped over older Silurian pinnacle reefs. The reefs formed resistant cores over which softer sediments settled during compaction.

51. Solution cavern passages. The current hydrogeological investigations being conducted in the ABG study area indicate that the following modes of formation of solution cavern passages are in effect in the study area. The cavern passages have formed in the Beech Creek Limestone in the area underlying and bordering the valley of Little Sulphur Creek. The cavern system began in the lower reaches of Little Sulphur Creek and has migrated headward into the ABG as a by-product of the erosional processes that have carved out the present valley of Little Sulphur Creek.

52. Typically, solution in the Beech Creek Limestone begins when the overlying Big Clifty Sandstone is initially exposed to surface waters during valley incision. The Big Clifty Sandstone is highly permeable and accepts nearly all of the water that comes in contact with its surface. Surface water infiltrates rapidly downward through the Big Clifty Sandstone and into the

underlying Beech Creek Limestone. After entering the limestone the ground water can go no deeper because of the aquiclude formed by the underlying Elwren Shale. The increasing ground-water supply entering through the Big Clifty Sandstone is forced to move horizontally through joints in the limestone. Cavern passages develop along the joints and at the top of the limestone by solution resulting from the increasing ground-water flow. The ground water finds outlets through springs issuing from Beech Creek outcrops along the valley flanks farther downstream. Solution has continued to work its way headward to its present position in the ABG in conjunction with incision along the valley of Little Sulphur Creek. Caverns that have developed on top of the Beech Creek Limestone have resulted in the subsequent collapse of overlying blocks and slabs of the Big Clifty Sandstone. Solution caverns are illustrated in geologic cross section MM', which extends along the valley of Little Sulphur Creek from above the ABG to the NWSC south boundary (Plate 16). The width of solution across the Little Sulphur drainage is well defined by borings shown in cross section JJ' and also in cross section DD' (Plates 12 and 8, respectively). Solution features can be seen in an outcrop in the east valley wall just south of spring "C" where Little Sulphur Creek has cut completely through the Beech Creek. The areas south of the ABG underlain by solution features in the Beech Creek along drainage ways have been mapped in general and are shown in Plate 13.

53. Solution caverns have developed in the Beech Creek along other drainage ways both north and south of the ABG, where favorable stratigraphic conditions have evolved similar to those along Little Sulphur Creek. One of the drainage ways lies along Johnson Hollow, located south-southwest of the ABG (Plate 2). Solution features along Johnson Hollow are portrayed in geologic cross section NN' (Plate 17). Solution features are also associated with the drainage in the areas of springs "D", "E" and "F" and Mt. Spring, north of the ABG.

Hydrogeology of the ABG study area

54. Three separate and progressively deeper zones of ground water were identified by borings at the ABG site. The lower ground-water zone is in the Beaver Bend Limestone; the middle ground-water zone is in the Beech Creek Limestone and the overlying Big Clifty Sandstone; the upper ground-water zone is in the Golconda/Haney Limestone. The relative positions of the three aquifer zones have been plotted on the geologic cross sections, Plates 8-12

and 14-20 with the following exceptions: the Beaver Bend (lower) aquifer is not depicted in Plates 12 and 15, the Golconda-Haney (upper) aquifer is not shown in Plates 10.12, or 15, and the alluvial aquifer of Little Sulphur Creek is shown only in Plate 20. Ground water in each zone is primarily contained in rock joints, with storage capacities and flow rates dependent on the joint frequency, size of openings, and interconnection of openings. Table 4 presents ground-water level measurements for the period October 6-December 14, 1987. Ground-water levels are measured from top of casing (T.O.C.).

55. Lower ground-water zone (the Beaver Bend aquifer). Wells set in the Beaver Bend aquifer occur only in the ABG site proper (see Plates 8 through 12). Ground water in the Beaver Bend Limestone is confined by overlying and underlying aquicludes, the Sample and Bethel Shales. The Beaver Bend aquifer produces piezometric levels in monitoring wells that range from SO to 60 ft above the top of the aquifer, or 33 to 47 ft below ground-water levels in the middle (Beech Creek aquifer) zone. Five monitoring wells were set in the Beaver Bend aquifer. The wells were located at the north, south, east, and west ends of the ABG site, with one well located near the center of the site. Water levels measured in the wells over a period of time showed that the piezometric surface of the Beaver Bend aquifer remains about horizontal at approximately 512 ft msl from well 03-C1 to 03-Q beneath the ABG. The depth to the piezometric surface below the ABG valley floor ranges from approximately 112 ft at the west end to 70 ft at the east *end.*

56. Recharge into the Beaver Bend aquifer is from areas of Beaver Bend outcrops located in Sulphur Creek and other favorable drainage valleys, lying updip to the north and northeast of the ABG site. An example of surface drainage in contact with the Beaver Bend is presented in geologic cross section KK' (Plate 14).

57. It *is* doubtful that any significant connection exists between ground water in the Beech Creek and Beaver Bend aquifers at the ABG site. Totaling the combined thickness of the Sample, Reelsville and Elwren Formations, approximately 70 ft of predominantly impervious shales separate the two aquifers and provide an effective aquiclude. The nonconnection between the two aquifers is emphasized by the difference in ground-water surface (piezometric) elevations and the contrasting ground-water surface geometries.

58. Middle ground-water zone (the Beech Creek aquifer). The Beech Creek aquifer is partially open to surface water infiltration within the ABG,

Table 4

Water Level Measurements in ABG Study Area Wells for Period 10-6-87 to 12-14-87

Well No.	Elev. T.O.C.	10-06-87	10-12-87	10-19-87	10-28-87	11-2-87	11-9-87	11-16-87	11-23-87	11-30-87	12-7-87	12-14-87
WES-3-C1	627.50	512.08	511.80	511.94	511.82	511.80	511.76	511.75	511.80	511.93	511.91	512.21
WES-3-C1P2	627.20	557.54	557.06	557.30	557.16	557.12	557.03	557.03	557.09	557.21	557.03	557.23
WES-3-C1P3	627.30	611.20	611.66	611.43	612.08	612.08	611.58	611.60	611.64	612.26	612.24	612.49
WES-3-C2	584.00	511.82	511.88	51L.98	511.83	511.80	511.84	511.84	511.94	512.04	511.94	512.00
WES-3-C2P2	583.60	545.83	545.79	545.91	545.89	545.87	545.84	545.83	**545.89**	546.05	546.01	546.33
WES-3-C3	600.30	511.52	511.92	511.97	**511.99**	512.00	511.65	511.65	**511.78**	511.81	511.75	511.76
WES-3-C3P2	600.20	558.51	550.49	558.68	558.53	558.52	558.45	558.42	558.60	558.75	558.30	558.59
WES-3-C4	624.60	548.45	548.36	548.48	548.52	548.50	548.49	**548.50**	548.64	548.44	548.38	548.60
WES-3-C5	581.80	547.08	547.09	547.05	547.05	574.04	547.07	547.10	546.90	547.07	547.00	547.26
WES-3-C6	625.90	540.73	**548.71**	548.84	540.72	548.72	548.80	548.83	548.90	540.99	548.87	548.92
WES-3-C7	636.80	558.08	557.96	558.10	558.03	558.05	557.92	557.95	558.12	558.00	557.74	557.92
WES-3-C8A	630.80	511.58	511.46	5L1.59	511.50	**511.49**	511.28	511.25	5Ll.47	511.69	511.49	**511.68**
WES-3-C8P2	629.70	556.30	555.26	555.60	555.36	555.36	555.25	555.27	555.51	555.73	555.37	555.62
WES-3-C8AP3	630.80	**613.37**	613.14	613.08	613.09	613.10	613.06	613.05	612.84	613.23	613.38	613.59
WES-3-C9	603.80	512.04	511.09	512.03	511.87	511.86	5LL.86	511.85	511.95	512.15	511.87	512.10
WES-3-C9P2	604.00	559.12	558.47	558.69	558.58	558.55	558.47	558.45	**558.51**	558.22	558.42	558.84
WES-3-C10	608.40	558.57	558.16	558.34	**558.20**	558.19	558.13	558.15	558.25	**558.17**	558.01	558.33
WES-3-C11	592.80	548.58	548.28	548.40	548.26	548.25	548.20	548.21	548.30	548.51	548.27	548.58
WES-3-C12	587.60	545.73	545.69	545.71	545.75	545.74	545.66	545.69	545.81	545.92	545.71	546.04
WES-3-C13	618.20	559.75	559.31	558.55	**558.45**	558.45	558.32	558.35	558.40	558.54	558.57	558.65
WES-3-C14	643.20	**558.31**	557.91	558.11	558.02	558.00	557.92	557.92	558.00	558.05	557.99	558.13
WES-3-C15	621.20	556.92	556.50	556.71	556.53	556.53	556.46	556.46	556.60	556.67	556.35	556.81
WES-3-C15P3	620.70	--	612.66	612.65	613.23	613.26	612.67	612.70	612.82	613.21	613.89	615.57
WES-3-C16	683.80	558.48	558.13	558.31	558.20	558.22	558.15	558.20	558.43	558.69	558.43	558.50
WES-3-C17	696.40	558.47	558.03	558.40	558.23	558.17	558.15	558.10	558.29	558.47	558.19	558.57
WES-3-C18	625.60	619.76	619.91	619.83	619.90	**619.89**	620.09	620.11	620.23	621.57	621.29	622.71
WES-3-C19	650.90	**558.31**	558.42	558.55	558.56	558.56	558.19	558.20	558.28	558.59	558.28	558.57
WES-3-C19P3	650.50	612.68	612.53	612.79	612.68	612.68	612.70	612.73	604.67	605.50	605.84	607.27
WES-3-C20	647.40	**558.00**	557.59	557.79	557.70	551.69	557.57	557.50	557.64	557.81	557.80	557.92
WES-3-C21	642.80	557.80	557.40	557.60	557.55	557.55	557.51	557.52	557.55	557.60	557.68	557.74
WES-3-C21P2	642.50	608.15	**608.14**	608.14	608.15	608.16	608.13	608.16	608.20	608.26	608.15	608.28
WES-3-C22	618.10	607.7,	607.84	607.66	607.64	607.66	607.64	607.68	607.80	610.03	607.95	609.19
WES-3-C23	619.10	**609.11**	609.14	608.54	609.00	609.02	608.50	608.50	608.59	609.09	611.06	611.44
WES-3-C24	553.80	54L.79	531.55	531.51	531.58	**531.57**	531.53	543.38	531.53	532.04	531.83	532.15
WES-3-C25	597.50	550.79	550.47	550.82	550.62	550.60	550.58	550.83	550.89	550.99	550.65	551.17
WES-3-C26	641.10	558.61	558.25	558.54	558.38	558.38	558.24	558.25	558.58	558.59	558.60	558.56
WES-3-C27	604.64	543.50	543.39	543.56	543.51	543.49	543.47	543.44	543.66	543.78	543.49	543.50
WES-3-C28	613.56	546.33	546.29	546.31	**546.18**	546.19	546.28	546.28	546.41	546.09	546.00	546.01
WES-3-C29	798.53	556.53	556.00	556.26	556.25	556.24	556.12	556.14	556.34	556.76	556.90	556.93
WES-3-C30	779.71	556.71	556.50	556.60	556.74	556.72	556.52	556.51	556.66	557.13	557.30	557.34
WES-3-C31	792.93	—	--	--	555.13	555.12	555.14	555.16	555.29	555.73	555.86	555.89
WES-3-C32	711.78	--	--	--			—		556.80	558.16	557.81	558.19
WES-3-C33	786.01	--	--	--					--			551.71 (1-26-88)

has hydraulic connection through solution caverns to springs south of the ABG, and is the most likely aquifer to receive and transport contaminants from the ABG disposal activities. The greater part of the study effort "as applied toward defining the hydrogeologic parameters surrounding the Beech Creek aquifer. The Beech Creek aquifer includes the Beech Creek Limestone and the Big Clifty Sandstone, which are hydraulically connected and total 60 ft in thickness. The Elwren Shale Formation underlies the Beech Creek and provides an aquiclude at the aquifer base and causes the ground water to move laterally through the Beech Creek. A structure contour map of the top of the Elwren is presented in Plate 21.

59. A total of 31 monitoring wells have been set to date in the Beech Creek aquifer during the course of this study. Twenty-one of the wells are within the ABG site, three wells are to the north of the site, and seven wells are to the south of the site. Contours on the piezometric surface of the Beech Creek aquifer at the ABG site were constructed from water levels measured in the 22 monitoring wells on December 14, 1987 (Plate 22). The ground-water map also includes an overlay of ground-water contours on the upper (Golconda/Haney) aquifer where data were made available in the western part of the ABG (discussed below).

60. The ground-water contour map of water levels in the Beech Creek aquifer for the study area for measurements made December 14, 1987 is presented in Plate 23. The data used to construct the study area map include all applicable wells installed during the current ABG study, springs flowing from the Beech Creek, and two wells (02-10C and 02-11C) that are part of the ongoing DBG study. Elevations of the Beech Creek aquifer level in the two DBG wells were obtained on March 18, 1988. The two DBG wells are not part of the ABG study but provided water level data prior to the completion of this report. The Beech Creek ground-water elevations remained reasonably constant in the ABG study area wells measured several times in a 6-week period (Table 3). Therefore, the water levels from the two DBG wells should be compatible with the ABG levels (at the scale of the study area maps) even though they were obtained at a later date.

61. Ground water in the Beech Creek aquifer enters beneath the ABG from the north-northwest. Primary flow out beneath the ABG is to the east and south down the Little Sulphur Creek drainage way. with secondary flow out to the southwest and south down through Johnson Hollow drainage. The flow

patterns are shown as shaded arrows in Plate 23. A low ground-water divide separates the two outflow components along a line centered approximately between borings Cl3 and C14. Recharge into the Beech Creek aquifer probably originates from outcrop areas of Big Clifty Sandstone and Beech Creek Limestone updip and along strike north and northwest of the ABG. Recharge into the Beech Creek also occurs within the ABG through the Big Clifty Sandstone outcrop area shown in Plate 4.

62. Where erosion has not intervened, the top of the Big Clifty-Beech Creek aquifer zone is protected from direct downward seeping water from the Golconda/Haney aquifer by the Indian Springs, a 20-ft-thick shale aquiclude. The areas that are underlain by all or part of the Indian Springs Shale lie along the valley slopes and in the northwestern and western valley floor regions (Plate 4). In the central and eastern regions of the ABG valley floor, erosion has progressed below the Indian Springs and exposed a large area of the Big Clifty Sandstone. The sandstone is highly permeable and is capable of taking most of the water that comes in contact with its surface. The clayey nature of the relatively thin valley alluvium that blankets the sandstone retards the downward flow of surface water, but does not appear to hold water for any great length of time. Once the water reaches the top of the sandstone, it seeps rapidly downward until it reaches the ground-water level in the Beech Creek aquifer and continues out of the ABG to the east.

63. Ground water seeping from the upper (Golconda/Haney) aquifer into the ABG valley flows down the eroded slopes of the Indian Springs Shale at the base of the alluvium and into the Big Clifty Sandstone similarly to surface water conditions (see Plates 9 and 16 and the map on Plate 4). Surface water and ground water from the Golconda/Haney aquifer are prevented from direct downward movement into the Beech Creek aquifer in the western and west central portion of the ABG by the underlying Indian Springs Shale. The surface and Golconda/Haney aquifer waters enter the Beech Creek aquifer east of the Beech Creek drainage divide centered on borings Cl3 and C14, discussed above, and exit the ABG to the southeast through Little Sulphur Creek drainage. Therefore, surface contaminants from ABG activities are much less likely to flow out to the southwest through Johnson Hollow.

64. Surface water enters the Big Clifty Sandstone outcrop area from two sources within the ABG. One source is from rainfall. The other source is from two creek branches that flow into the ABG from the west and the northwest

and represent the headwaters of Little Sulphur Creek. The branch flow is derived from ground water in sandstones and possibly from coal seams in the higher Pennsylvanian strata, and from seeps out of the Golconda/Haney Limestone. The branches join near the center of the ABG and the flow continues out the east end of the site, then south down Little Sulphur Creek Valley. During drier periods and in light to moderate rains, all of the surface water in the branches becomes ground water in the Beech Creek aquifer through the Big Clifty Sandstone outcrop area within the ABG. During periods of heavier rainfall the runoff flows out the east end of the site. All of the surface water that exits the ABG eventually becomes ground water through an outcrop of Big Clifty Sandstone located in the creek bed approximately 300 ft south of the ABG. The one exception is during periods of very heavy rain, when water flows freely along the creek bed for short periods of time.

65. Normally, the Little Sulphur Creek bed remains dry until a point is reached downstream where valley downcutting has progressed to the top of the Elwren Shale. The Elwren Shale is reached approximately 3/4 mile south of the ABG near Spring "C" (Plate 16). Spring "C" issues a moderate volume of ground water from the base of the Beech Creek Limestone, and starts a new source of surface water flowing down Little Sulphur Creek. The creek bed remains in the Elwren Shale past the south boundary of the NWSC, which lies approximately 1-1/2 miles south of the ABG. Springs "A" and "B" (Plates 16 and 13) issue additional discharge from the Beech Creek Limestone to the surface flow before the creek crosses the NWSC boundary.

66. A number of springs are reported to issue from the Beech Creek along the Little Sulphur Creek Valley flanks south of the NWSC boundary. Ground water is also seeping from the Beech Creek into the valley alluvium below the surface as shown near the south end of section K' (Plate 14). Ground water that has seeped from the Beech Creek aquifer into the Little Sulphur Creek alluvium can be seen on profile in geologic cross section QQ' (Plate 20).

67. Ground water that issues from the springs and seeps along Little Sulphur Creek is hydraulically connected through the solution cavern passage system to the Beech Creek aquifer zone at the ABG (Plate 13). These hydrogeologic relationships are illustrated in geologic cross section MM' (Plate 16). The ground water in the Beech Creek aquifer in the eastern half of the ABG

flows practically unrestricted away from the ABG through the cavern passage system.

68. Evidence of the rapid transfer of surface waters through the solution cavern ground-water system was observed during two periods of heavy rainfall. The observations were made at springs "C" and "A", where shortly following the rainfall the volume of outflow had greatly increased above normal. The larger volume of water issuing from the springs had turned murky and light grayish-tan in color. In each case, by the next day the springs had cleared up and returned to their normal flow. Seasonal changes in rainfall also produce a gradual increase and decrease in the total volume of outflow from the springs. However, the springs never seem to run dry.

69. Ground water flowing southwest out of the Beech Creek aquifer in the western half of the ABG is gradually pulled south-southeast, toward conduits in the solution cavern system along Johnson Hollow. Geologic cross section NN' (Plate 17), includes two borings (C24 and C25) in Johnson Hollow and shows the drawdown on the Beech Creek aquifer water surface induced by the free flow provided along the solution passages in Johnson Hollow.

70. Upper ground water zone (the Golconda/Haney aquifer). The upper ground water zone at the ABG is in the Golconda/Haney Limestone and is underlain by the Indian Springs Shale aquiclude. The aquifer is opened or breached in the ABG valley slopes and underlies the extreme western portion of the valley floor. Six monitoring wells were installed in the Golconda/Haney aquifer at the west end of the ABG and one well at the C8 boring site. Contours were constructed on the upper ground-water surface at the west end of the ABG and are shown on the contour map of the Beech Creek aquifer in Plate 22. The western end of the ABG is the lowest zone in relation to the stratigraphic dip at the ABG. Ground water exiting the ABG through the Golconda/Haney aquifer would most likely occur in the western zone. However, the ground-water contours of Plate 22 show that ground water from the Golconda/Haney aquifer is actually flowing into the ABG by seepage along top of rock (see geologic section GG', Plate 9). The available evidence supports the observation that any ground water seeping from the Golconda/Haney aquifer within the ABG eventually ends up in the Beech Creek aquifer zone. There is no evidence that possible contaminants entering the Golconda/Haney aquifer would exit the ABG other than through the Beech Creek aquifer system.

PART V: CONCLUSIONS AND RECOMMENDATIONS

Conclusions

71. The following conclusions are made concerning the geology and hydrogeology of the ABG study area:

a. The topography of the ABG study area consists of steep. narrow ridges and valleys. Approximately two-thirds of the study area surface drainage is to the south through Little Sulphur and Sulphur Creeks. Surface drainage enters the ABG site from the west and northwest and exits the site proper to the east-southeast.

b. Rocks of Pennsylvanian and Mississippian age are present at and beneath the study area. Detailed interpretation of the subsurface stratigraphy and structure of the geologic formations underlying the study area was accomplished through careful examination of surface exposures and rock cores. The rock strata consist of shales, sandstones, and limestones with some claystone. Rock formations in the valley floor of the ABG site are covered by 1 to 15 ft of alluvial and colluvial soils ranging from silty or sandy clay to pebbles, cobbles, and fragments of weathered sandstone. Alluvial deposits in Little Sulphur Creek/Johnson Hollow valley at the NWSC south boundary consist of 5 to 10 ft of saturated sandstone gravels overlain by unsaturated sands and gravels and gravelly silts.

c. The formations of Mississippian age are relatively uniform in thickness throughout the study area and are essentially without structure except for a gentle dip to the southwest. A structural dome is defined by boring data about 1/2 mile south of the ABG site. Valley incision has breached the upper formations down to and partially including the Elwren Shale so that some of the formations encountered in borings under the hills and ridges of the study area are exposed in the valleys.

d. Three aquifers were identified in the study area to depths of interest, all of Mississippian age: an upper aquifer within the Golconda/Haney Formation, which consists of limestone with shale interbeds; a middle aquifer occupying the Big Clifty (predominantly sandstone) and Beech Creek (predominantly limestone) Formations; and a lower aquifer within the Beaver Bend Formation, a limestone. The middle and lower aquifers are separated by relatively impermeable shale strata.

e. Ground-water flow in the aquifers is believed to be primarily through rock joints. Rock joints in the Beech Creek aquifer have been enlarged by solution locally within the study area. Flow through those zones (described as "solution passages") can be rapid. Solution passage ground-water flow is believed to be the principle component of the subsurface hydrology within the ABG study area.

f. The solution passage system exists in the area underlying and bordering Little Sulphur Creek Valley and Johnson Hollow. The system has migrated headward into the east portion of the ABG site proper. The Beech Creek aquifer is partially accessible by surface waters at the ABG site by infiltration through the Big Clifty Sandstone and is the most likely aquifer to receive and transport off-site any contaminants from ABG activities. Primary flow from the ABG site is to the east and south down Little Sulphur Creek, with secondary flow southwest and south through Johnson Hollow. Ground-water issues from springs in the exposed Beech Creek Limestone south of the ABG site in Little Sulphur Creek.

g. ABG site contaminants are much less likely to flow out to the southwest through Johnson Hollow because of the presence of the Indian Springs Shale overlying the Big Clifty Sandstone in the western portion of the site.

h. The Beaver Bend (lower) aquifer is separated from the Beech Creek aquifer by approximately 70 ft of predominantly shale strata. Ground water in the Beaver Bend is artesian with piezometric levels 50 to 60 ft above the top of the aquifer, and 33 to 47 ft below the ground-water levels in the Beech Creek. It is unlikely that hydraulic connection exists between the Beaver Bend and Beech Creek aquifers at or near the ABG site.

Recommendations

72. The following recommendations are made as a result of this investigation:

a. Continue water quality monitoring of the three aquifers. Special attention should be given wells set in the Beech Creek aquifer because of its potential to move ground water rapidly out of the ABG area through limestone solution passages. Wells set in the Little Sulphur Creek valley alluvium (wells B1 through B9) should also be monitored.

b. Sample springs in the valley of Little Sulphur Creek and near the south NWSC boundary near the ABG. Sampling of water emanating from springs should be done at low flow and high flow periods because subsurface flow paths in solution zones may vary with flow quantities. Particular attention should be given springs A, B, and C located in the valley of Little Sulphur Creek as mapped during this study.

c. Emplace two or three additional cored borings and wells in the valley of Little Sulphur Creek south of the ABG and on the east valley wall near Spring C. The wells would further define the water table in that part of the study area and core data would refine stratigraphic and structural interpretation of the important aquifer formations. One well should be located in

the valley on a line connecting well C-31 and Spring C, one well just beyond Spring C on the same line, and a third approximately midway between the outlet of the ABG and Spring C.

d. Give consideration to measuring ground-water flow rate away from the ABG. The analysis presented in this report suggests that the controlling mechanism of ground-water movement is the flow through limestone solution passages with outlet through springs. Flow measurements might best be accomplished at the springs themselves, Consideration should also be given to the use of tracing techniques to verify flow directions and paths at low and high flow periods. Tracing will be complicated by the potential existence of dye materials already in the ABG and adjacent facilities. Surface flow in Little Sulphur Creek and perhaps Johnson Hollow occurs following periods of heavy or sustained rainfall and should be measured at such times to estimate the discharge from the NWSC via surface runoff.

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US Army Corps
of Engineers

TECHNICAL REPORT GL-88-27

GEOLOGY AND HYDROGEOLOGY OF THE AMMUNITION BURNING GROUND CRANE NAVAL WEAPONS SUPPORT CENTER

VOLUME II: PLATES

by
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Geotechnical Laboratory
DEPARTMENT OF THE ARMY
Waterways Experiment Station, Corps of Engineers
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Note: Additional geologic and hydrologic information and revised horizontal and vertical survey data obtained after publication of this report will cause revisions to be made to some of the plates in this folio. Revisions will be published in subsequent report.

October 1988
Final Report

Further dissemination of this document only as directed by Department of the Navy, Northern Division, Naval Facilities Engineering Command, Philadelphia, Pennsylvania 19112-5094, or higher DoD authority; October 1988.

Prepared for Naval Weapons Support Center
Crane, Indiana 47522-5009

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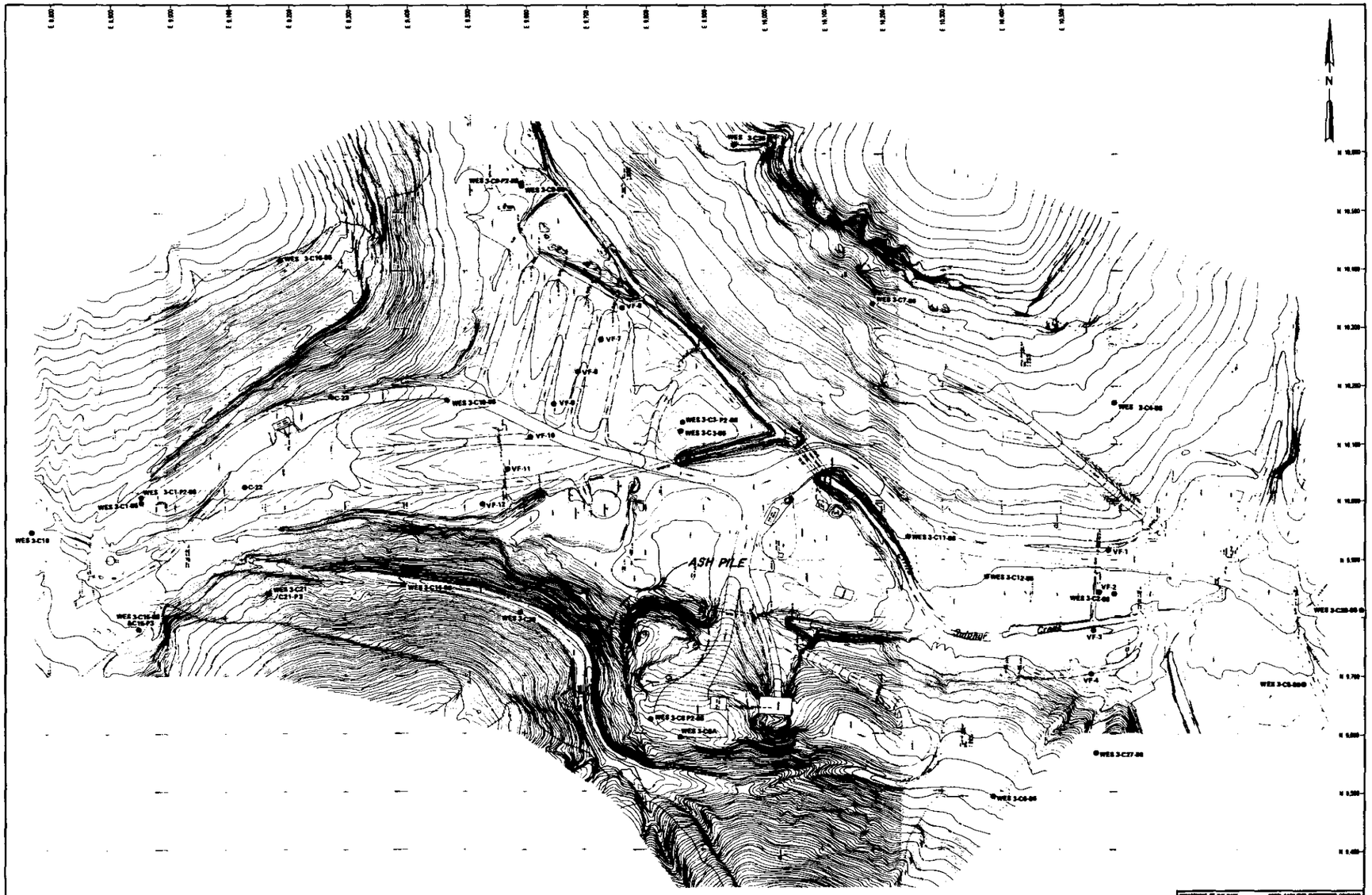

NOTE: CONTOUR INTERVAL 1 FT.

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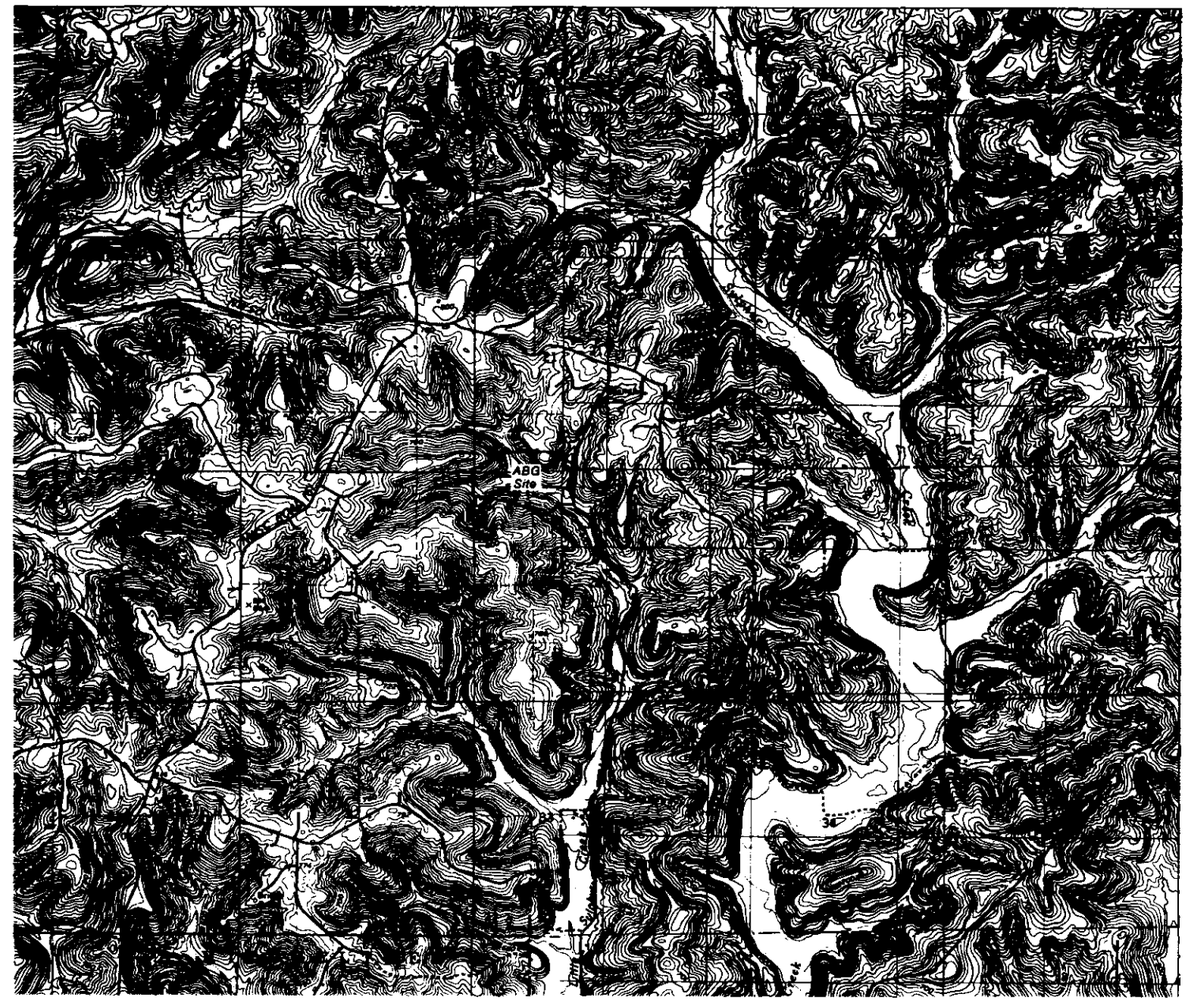
DRAWN BY
CHECKED BY

AMMUNITION BURNING GROUND
Site Topography and Boring/Well Locations

PLATE 1



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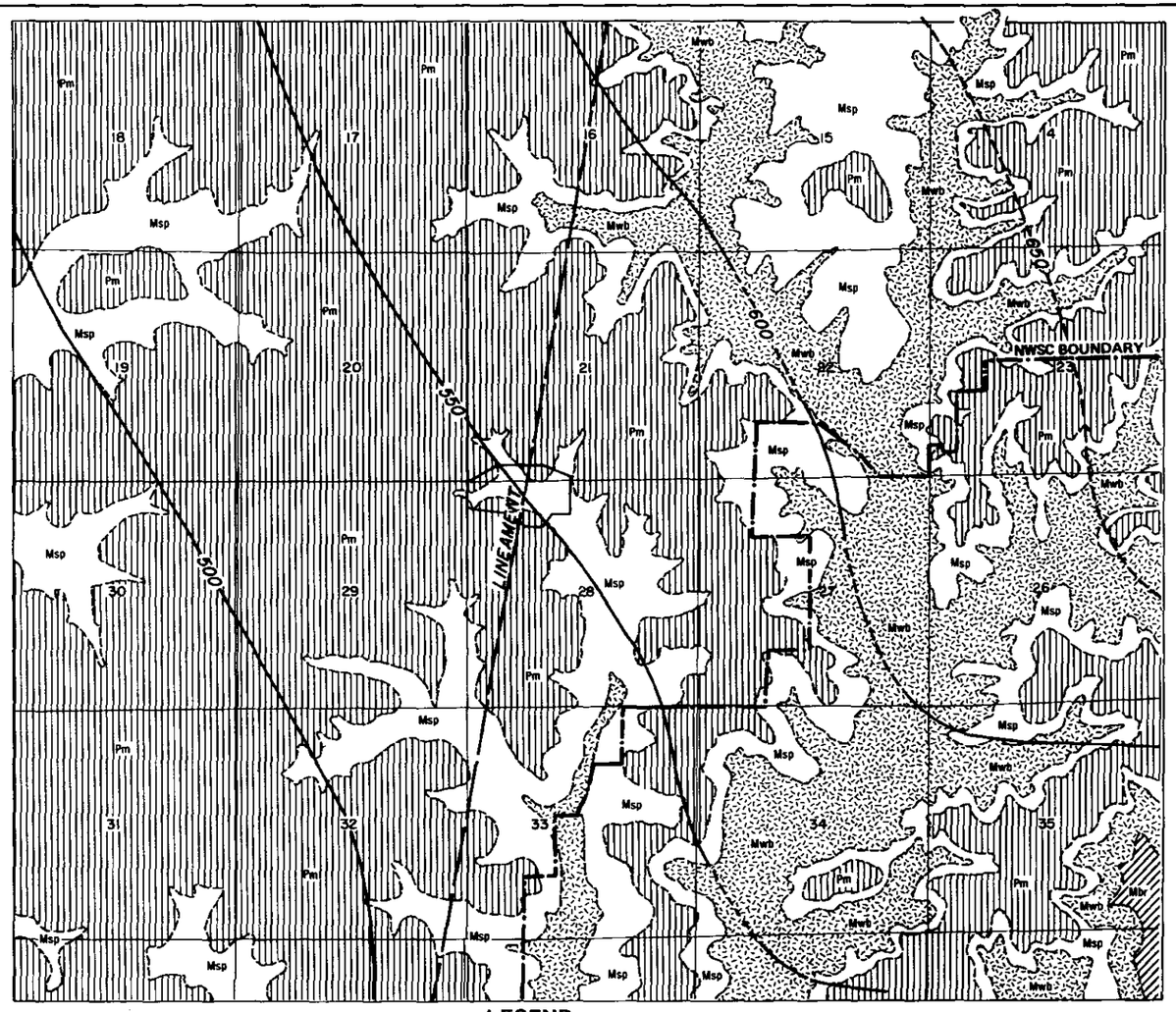
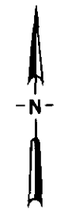
Drawn by S. Nash Checked by W. Murphy	TOPOGRAPHIC MAP ABG Study Area
Scale	PLATE 2





NOTE: CONTOUR INTERVAL 10 FT.
ELEVATIONS IN FT MSL

LEGEND

600 — Structure Contours on Top of Beech Creek Limestone (Lower Formation of Stephensport Group)

Contacts Between Groups

	GROUP	PERIOD
Pm	Raccoon Creek	— Pennsylvanian
Msp	Stephensport	— Mississippian
Mwb	West Baden	
Mbr	Blue River	

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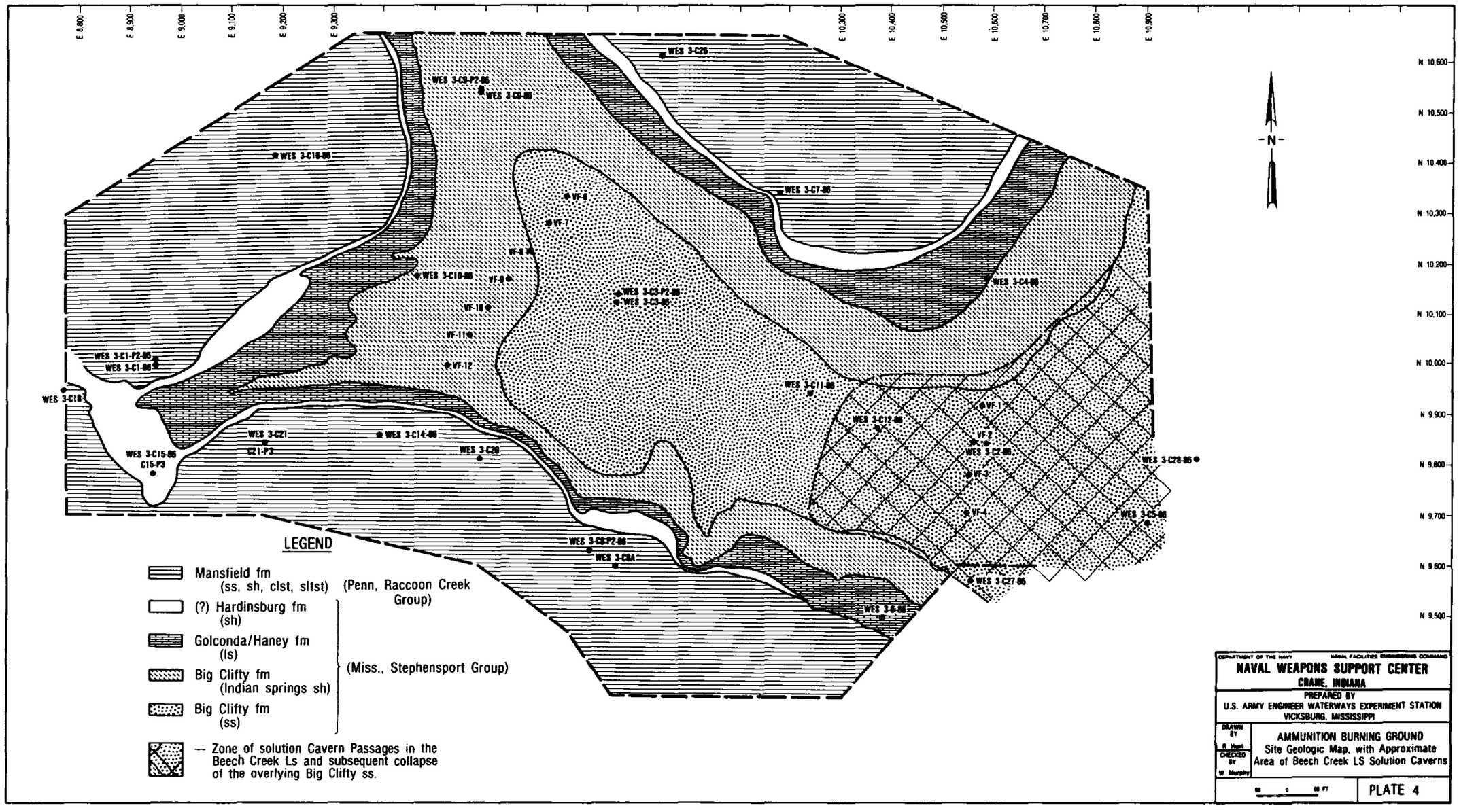
CHECKED BY: W. Murphy

GEOLOGIC MAP
ABG Study Area

1600 0 1600 FT

PLATE 3


E 8,800
E 8,900
E 9,000
E 9,100
E 9,200
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N 10,500
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N 9,900
N 9,800
N 9,700
N 9,600
N 9,500
-N-
WES 3-C26
WES 3-C9-P2-86
WES 3-C9-86
WES 3-C16-86
WES 3-C7-86
VF-6
VF-7
VF-8
WES 3-C10-86
VF-9
WES 3-C3-P2-86
WES 3-C3-86
WES 3-C4-86
VF-10
VF-11
VF-12
WES 3-C1-P2-86
WES 3-C1-86
WES 3-C18
WES 3-C11-86
VF-1
WES 3-C12-86
VF-2
WES 3-C2-86
VF-3
WES 3-C21
C21-P3
WES 3-C14-86
WES 3-C20
WES 3-C15-86
C15-P3
WES 3-C28-86
VF-4
WES 3-C5-86
WES 3-C8-P2-86
WES 3-C8A
WES 3-C27-86
WES 3-6-86
LEGEND
Mansfield fm (ss, sh, clst, sltst) (Penn, Raccoon Creek Group)
(?) Hardinsburg fm (sh)
Golconda/Haney fm (ls)
Big Clifty fm (Indian springs sh)
Big Clifty fm (ss)
(Miss., Stephensport Group)
— Zone of solution Cavern Passages in the Beech Creek Ls and subsequent collapse of the overlying Big Clifty ss.
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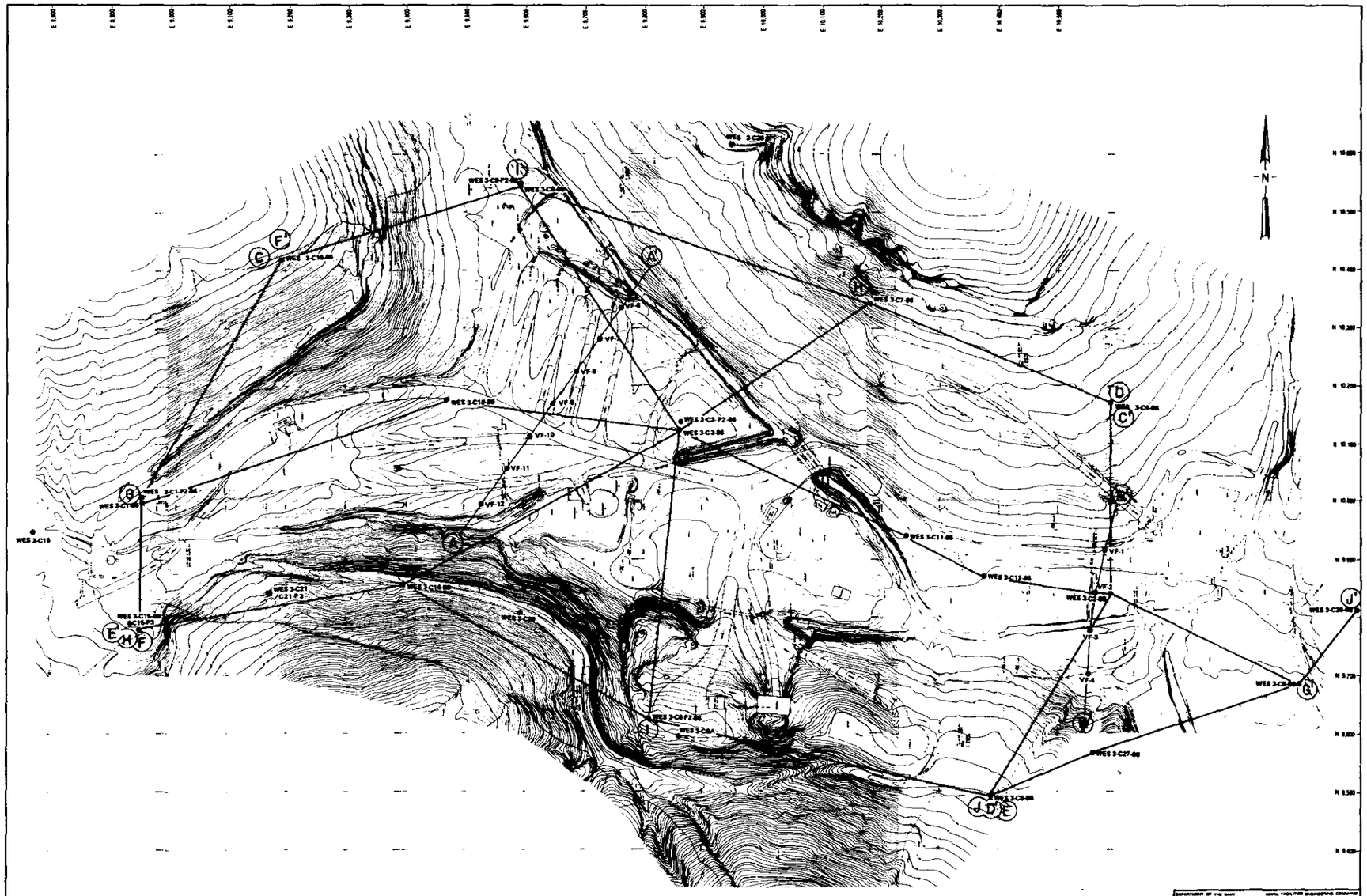
AMMUNITION BURNING GROUND
Site Geologic Map, with Approximate Area of Beech Creek LS Solution Caverns
PLATE 4



NOTE: SECTIONS C-C' THROUGH F'-F', PLATE 8

SECTIONS A-A' B-B' AND G-G' THROUGH J-J', PLATES 6, 7, 9-12 RESPECTIVELY.

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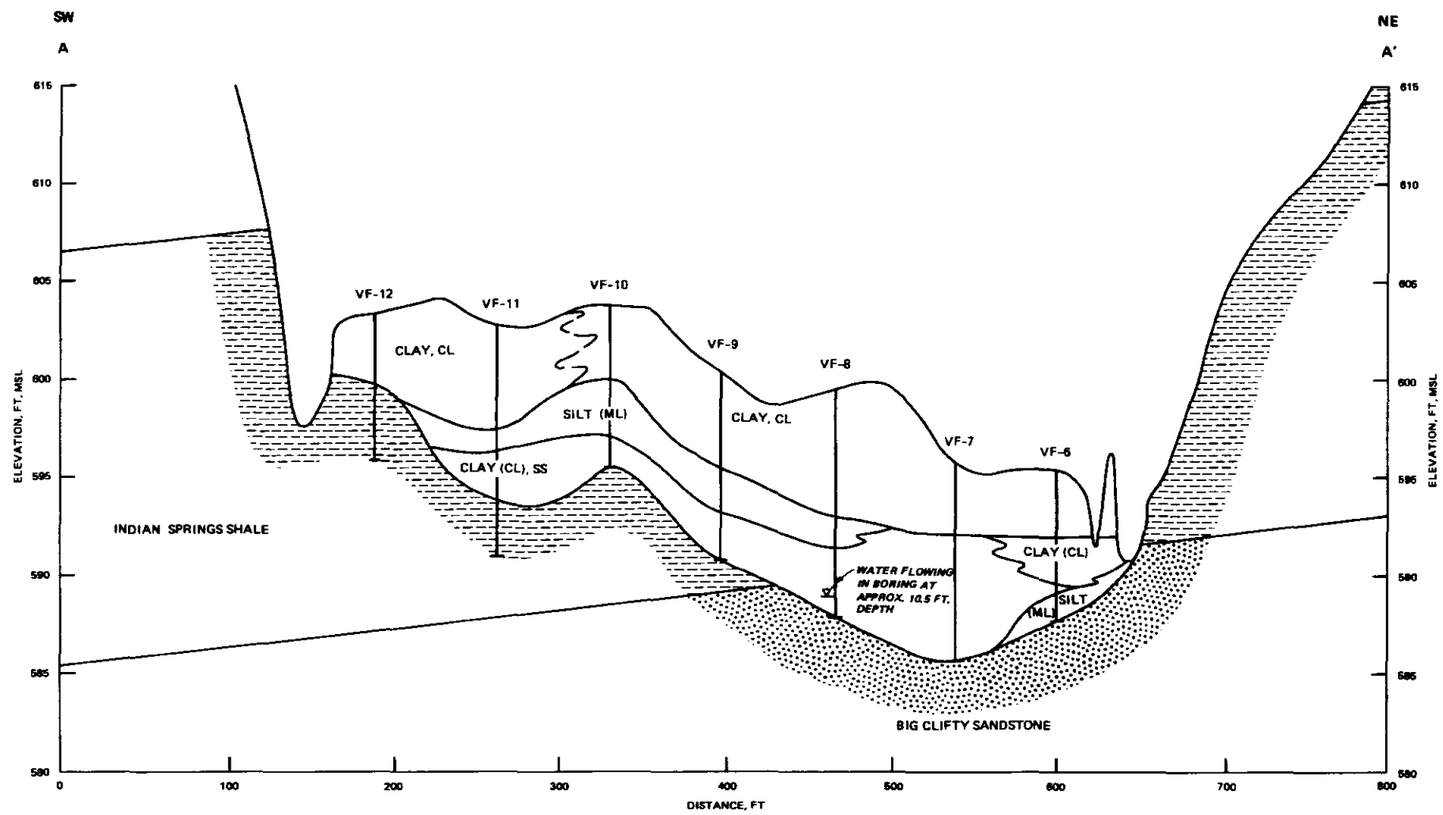
U.S. ARMY ENGINEER WATERWAYS EXPERIMENT STATION
VICKSBURG, MISSISSIPPI

DRAWN BY S. Hall
CHECKED BY W. Murphy

AMMUNITION BURNING GROUND
Site Plan of Geologic Sections

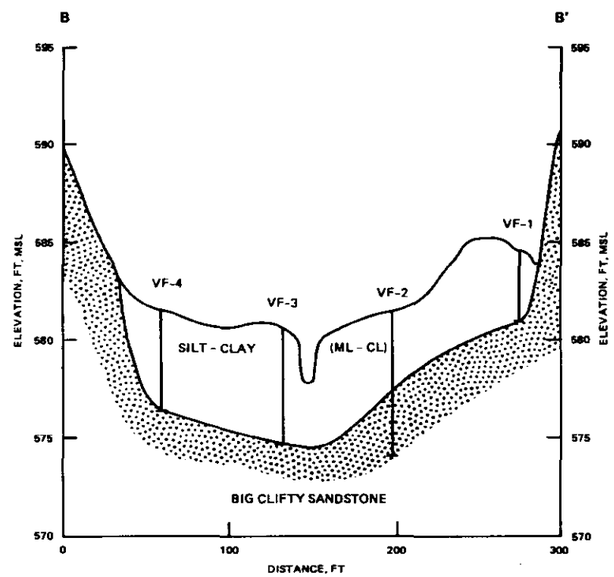
PLATE 5



LEGEND

- UNDIFFERENTIATED
- CLAY SYMBOL
- SHALE AND SANDSTONE
- SANDSTONE
- SHALE
- LIMESTONE

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND NAVAL WEAPONS SUPPORT CENTER CRANE, INDIANA	
PREPARED BY U.S. ARMY ENGINEER WATERWAYS EXPERIMENT STATION VICKSBURG, MISSISSIPPI	
DRAWN BY R. HUNT	GEOLOGIC SECTION A–A' AMMUNITION BURNING GROUND
CHECKED BY W. MURPHY	



LEGEND

- UNDIFFERENTIATED
- CLAY SYMBOL
- SHALE AND SANDSTONE
- SANDSTONE
- SHALE
- LIMESTONE

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

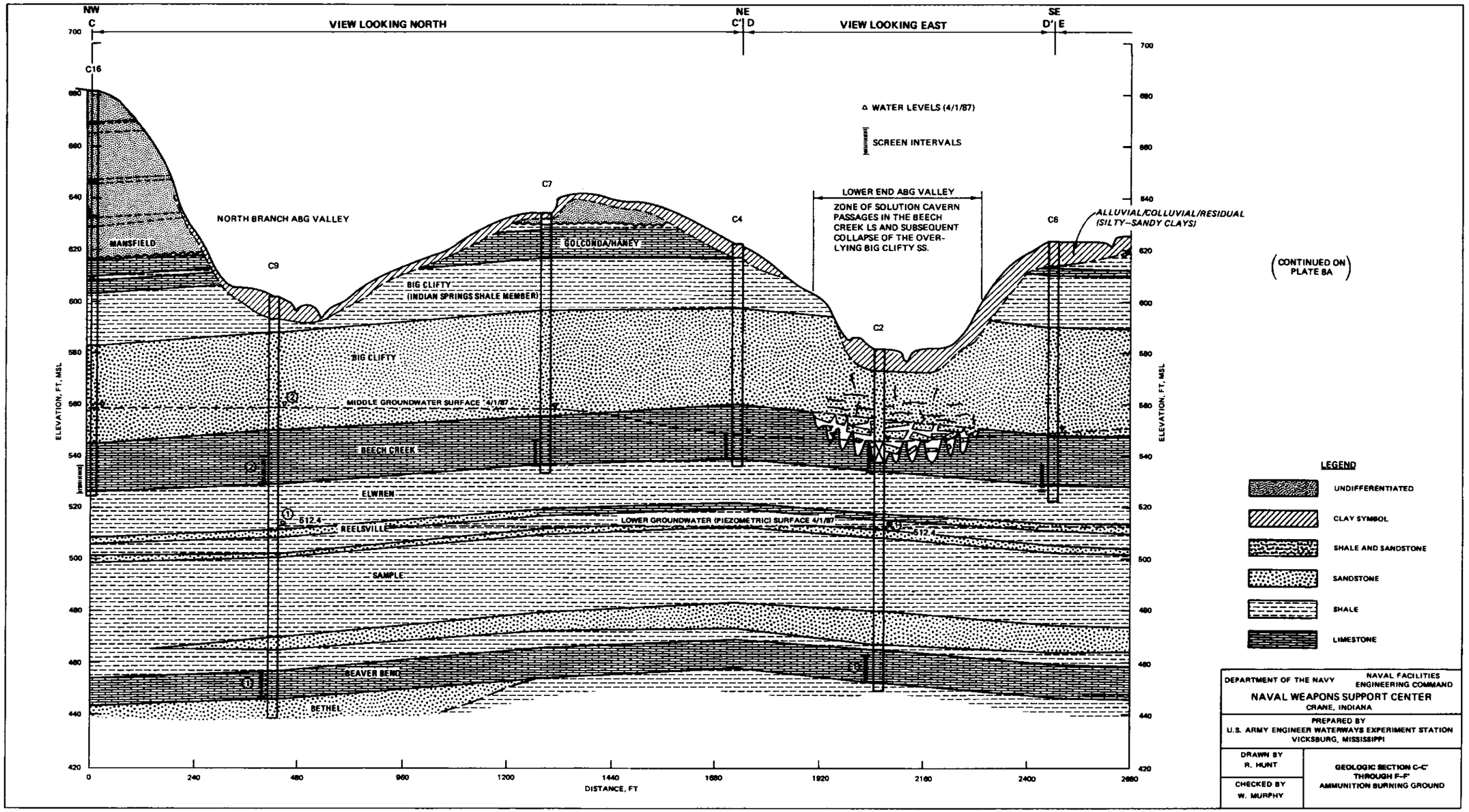
NAVAL WEAPONS SUPPORT CENTER
CRANE, INDIANA

PREPARED BY
U.S. ARMY ENGINEER WATERWAYS EXPERIMENT STATION
VICKSBURG, MISSISSIPPI

DRAWN BY
R. HUNT

CHECKED BY
W. MURPHY

GEOLOGIC SECTION B-B'
AMMUNITION BURNING GROUND



DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

NAVAL WEAPONS SUPPORT CENTER
CRANE, INDIANA

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R. HUNT

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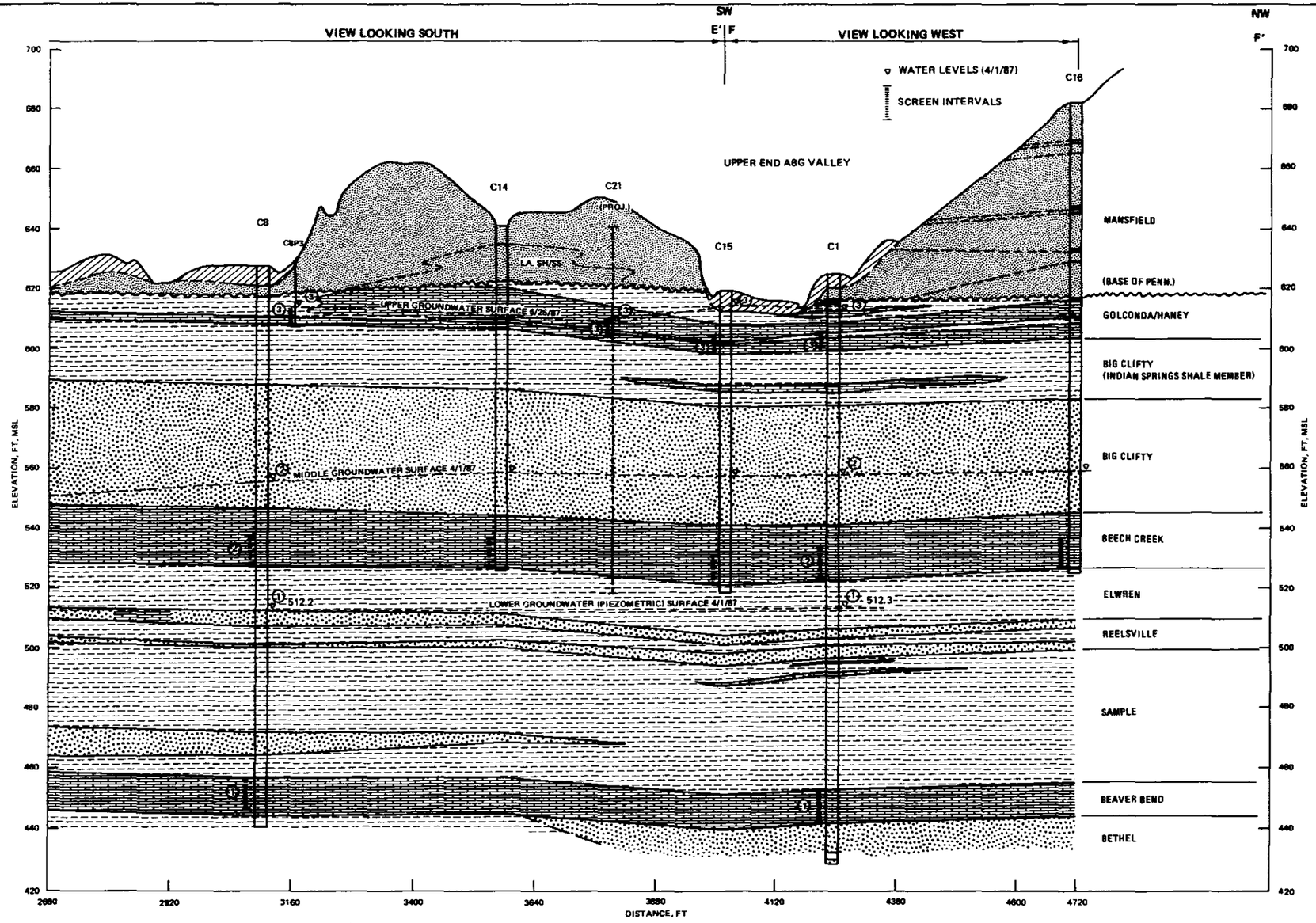
W. MURPHY

GEOLOGIC SECTION C-C' THROUGH F-F'
AMMUNITION BURNING GROUND



LEGEND

- UNDIFFERENTIATED
- CLAY SYMBOL
- SHALE AND SANDSTONE
- SANDSTONE
- SHALE
- LIMESTONE

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

NAVAL WEAPONS SUPPORT CENTER
CRANE, INDIANA

PREPARED BY
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VICKSBURG, MISSISSIPPI

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R. HUNT

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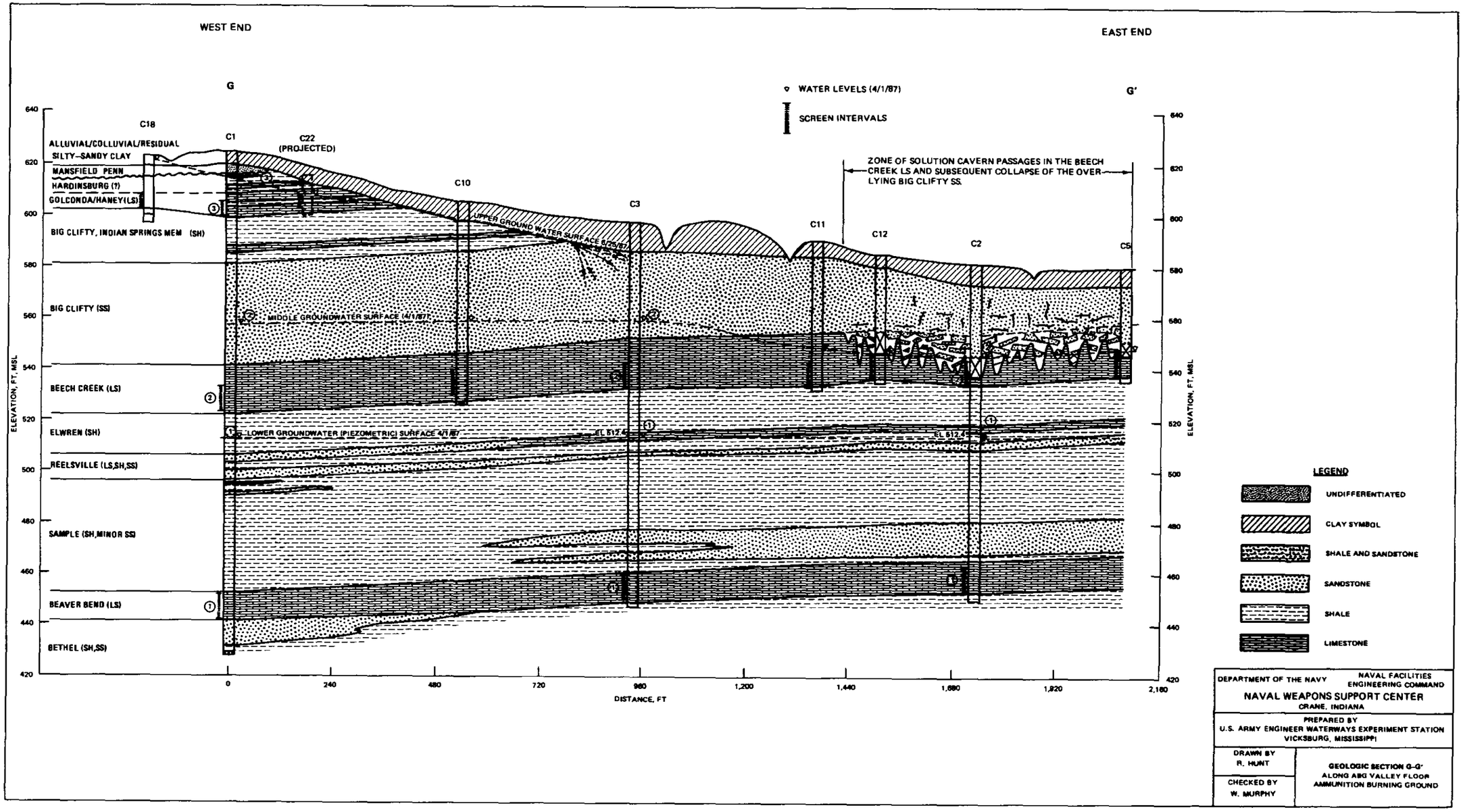
W. MURPHY

GEOLOGIC SECTION C-C' THROUGH F-F'
AMMUNITION BURNING GROUND



DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

NAVAL WEAPONS SUPPORT CENTER
CRANE, INDIANA

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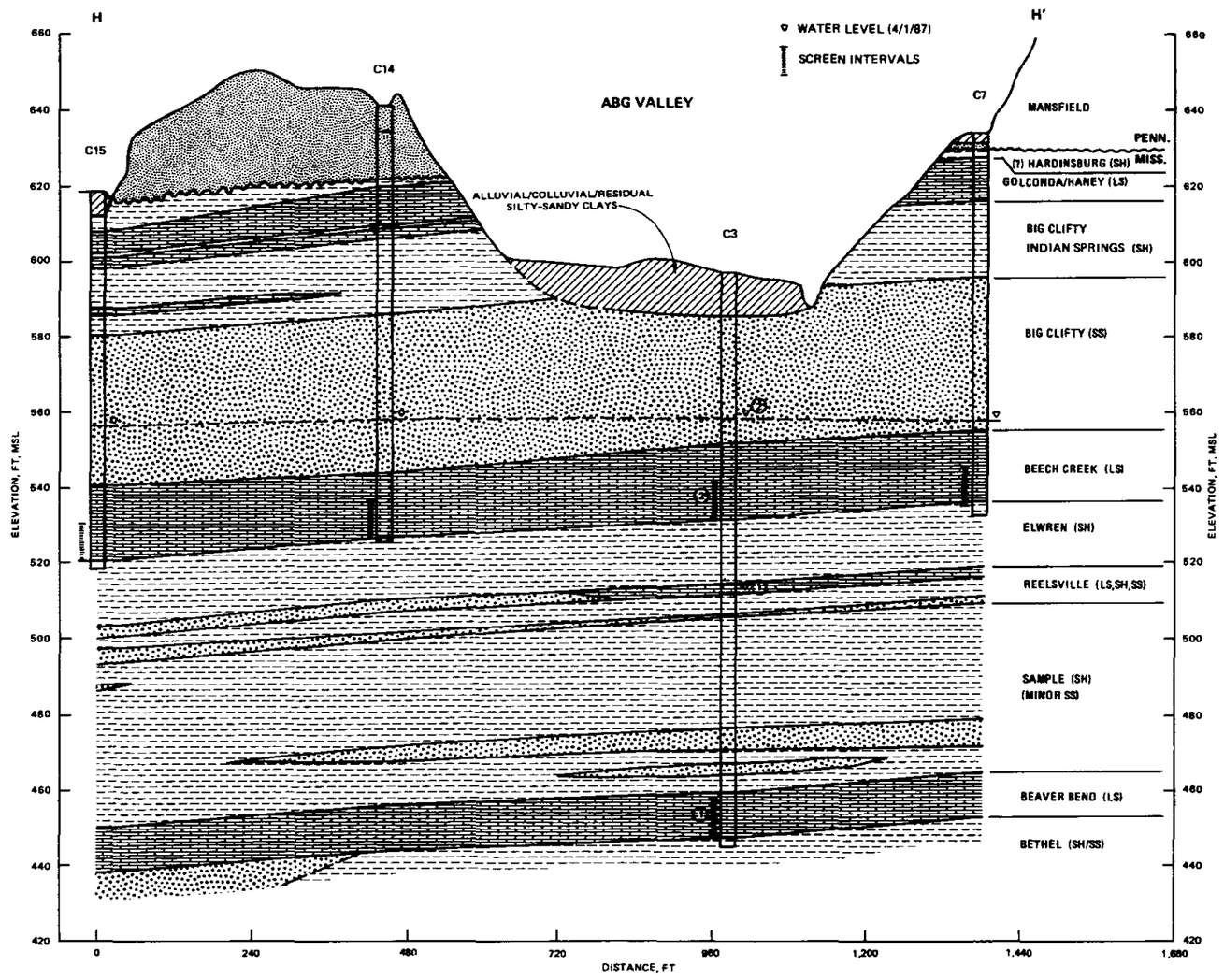
GEOLOGIC SECTION G-G'
ALONG ABG VALLEY FLOOR
AMMUNITION BURNING GROUND



LEGEND

- UNDIFFERENTIATED
- CLAY SYMBOL
- SHALE AND SANDSTONE
- SANDSTONE
- SHALE
- LIMESTONE

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

NAVAL WEAPONS SUPPORT CENTER
CRANE, INDIANA

PREPARED BY
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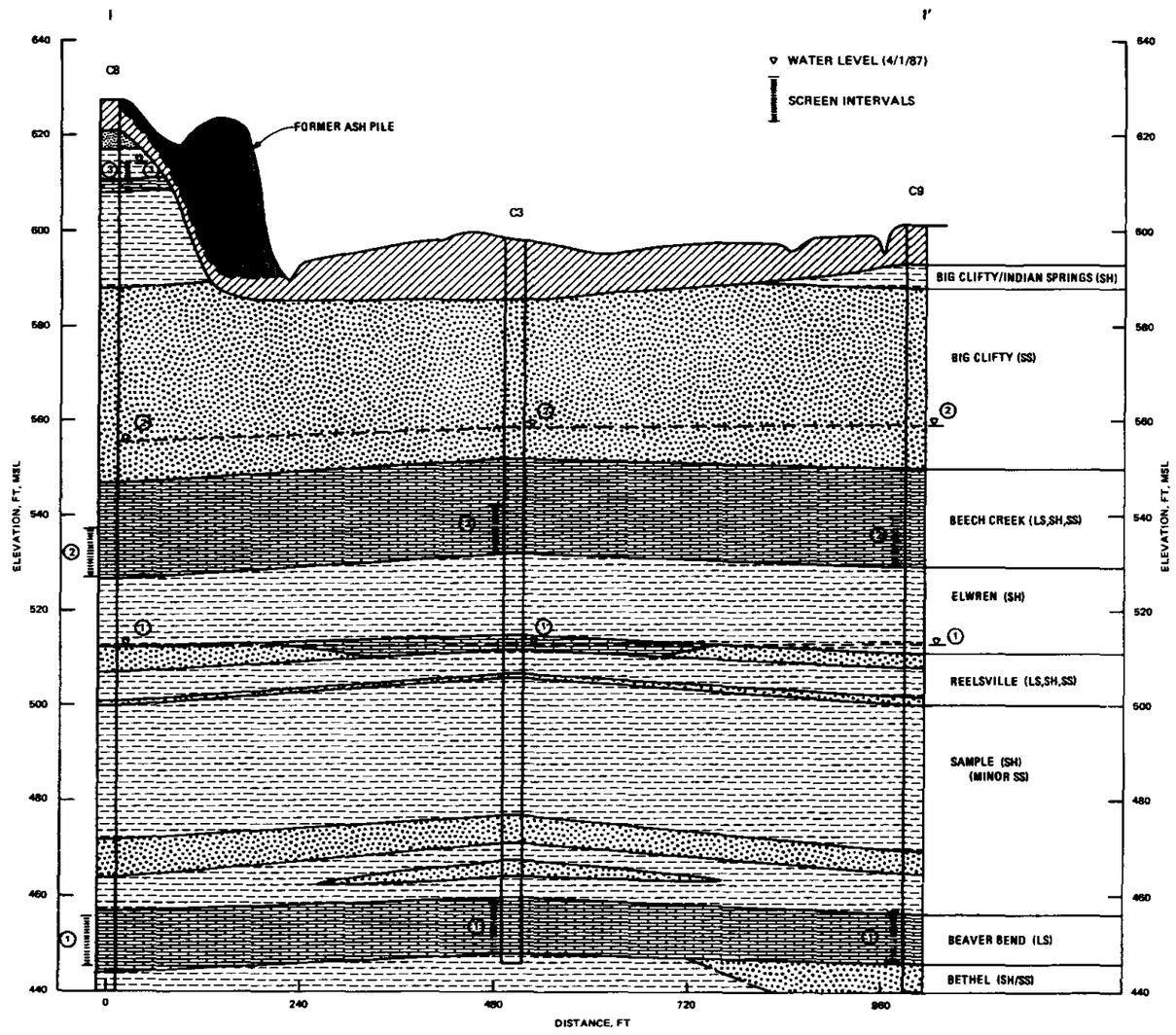
VICKSBURG, MISSISSIPPI

DRAWN BY
R. HUNT

CHECKED BY
W. MURPHY

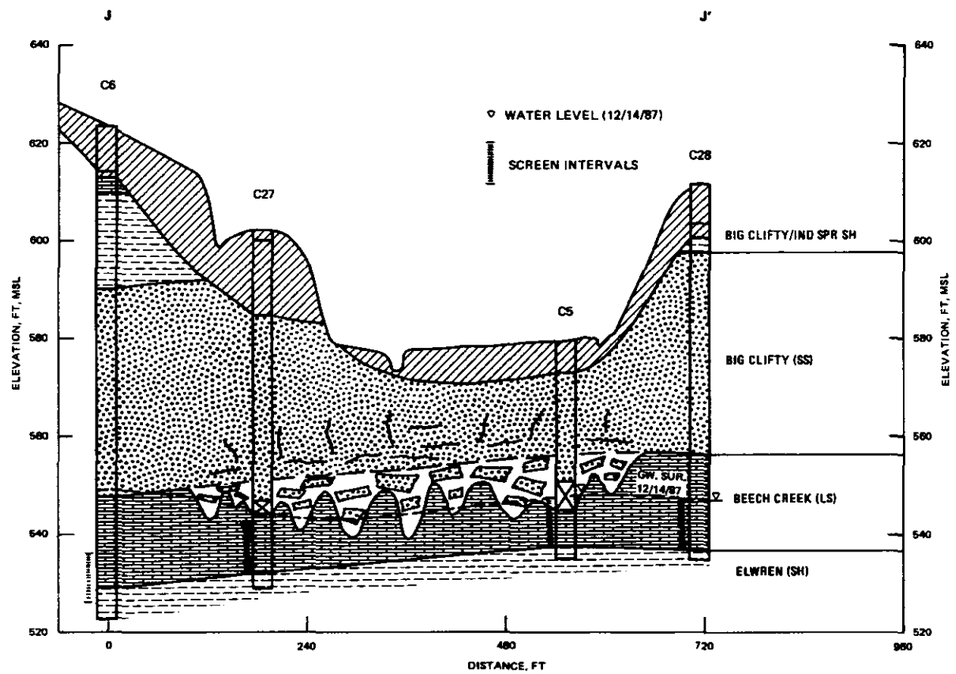
GEOLOGIC SECTION H-H'
AMMUNITION BURNING GROUND



LEGEND

- UNDIFFERENTIATED
- CLAY SYMBOL
- SHALE AND SANDSTONE
- SANDSTONE
- SHALE
- LIMESTONE

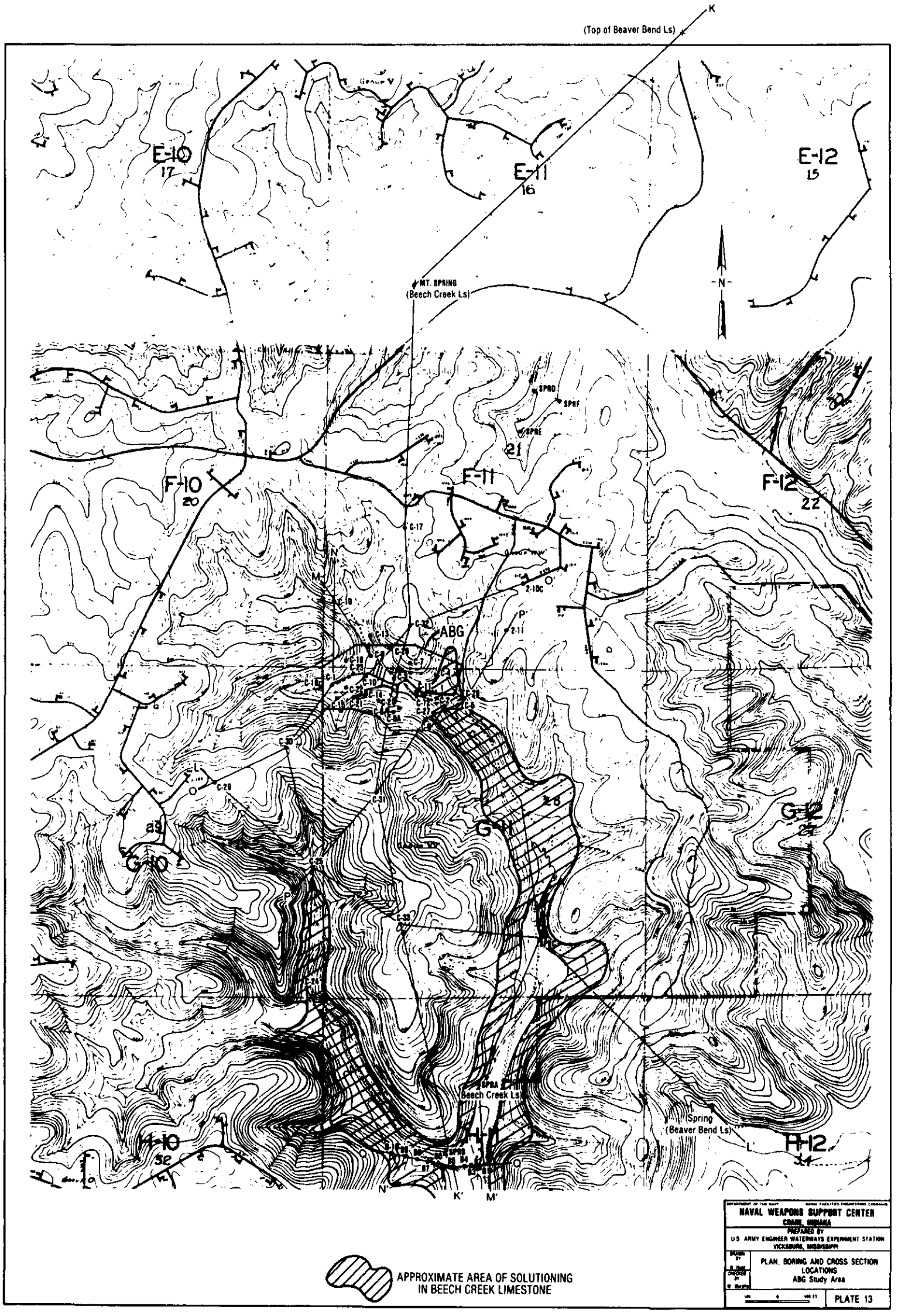
DEPARTMENT OF THE NAVY	NAVAL FACILITIES ENGINEERING COMMAND
NAVAL WEAPONS SUPPORT CENTER CRANE, INDIANA	
PREPARED BY U.S. ARMY ENGINEER WATERWAYS EXPERIMENT STATION VICKSBURG, MISSISSIPPI	
DRAWN BY R. HUNT	GEOLOGIC SECTION I-I' AMMUNITION BURNING GROUND
CHECKED BY W. MURPHY	

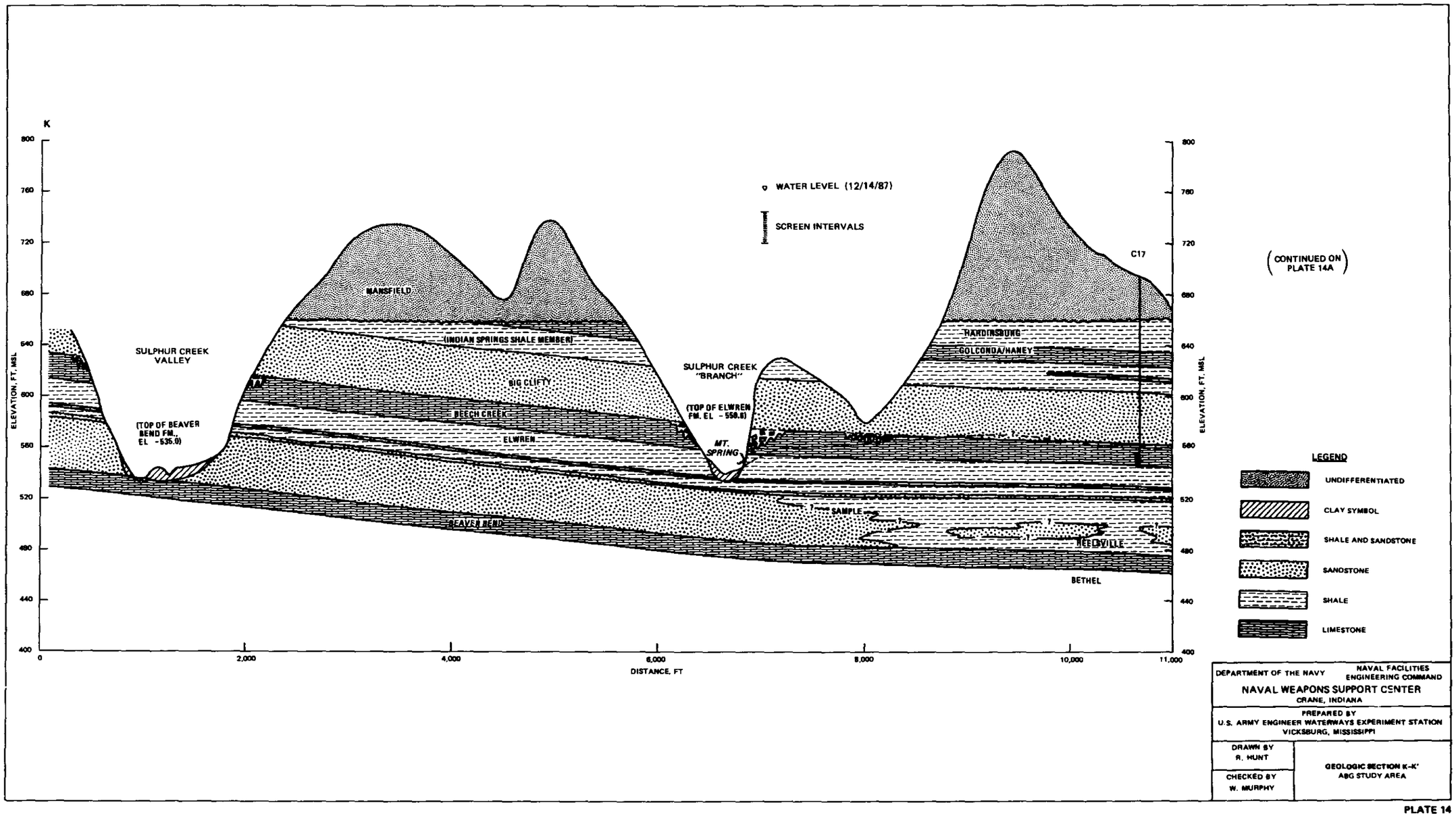


LEGEND

- UNDIFFERENTIATED
- CLAY SYMBOL
- SHALE AND SANDSTONE
- SANDSTONE
- SHALE
- LIMESTONE

DEPARTMENT OF THE NAVY	NAVAL FACILITIES ENGINEERING COMMAND
NAVAL WEAPONS SUPPORT CENTER CRANE, INDIANA	
PREPARED BY U.S. ARMY ENGINEER WATERWAYS EXPERIMENT STATION VICKSBURG, MISSISSIPPI	
DRAWN BY R. HUNT	GEOLOGIC SECTION J–J' AMMUNITION BURNING GROUND
CHECKED BY W. MURPHY	


K
(Top of Beaver Bend Ls)
E-10
17
E-11
16
E-12
15
MT. SPRING
(Beech Creek Ls)
N
F-10
20
F-11
21
F-12
22
ABG
G-10
23
G-11
24
G-12
25
H-10
32
H-11
33
H-12
34
Beech Creek Ls
Spring
(Beaver Bend Ls)
L'
K'
M'
N'
APPROXIMATE AREA OF SOLUTIONING
IN BEECH CREEK LIMESTONE
NAVAL WEAPONS SUPPORT CENTER
CRANE, INDIANA
PREPARED BY
U.S. ARMY ENGINEER WATERWAYS EXPERIMENT STATION
VICKSBURG, MISSISSIPPI
PLAN, BORING AND CROSS SECTION
LOCATIONS
ABG Study Area
PLATE 13



DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

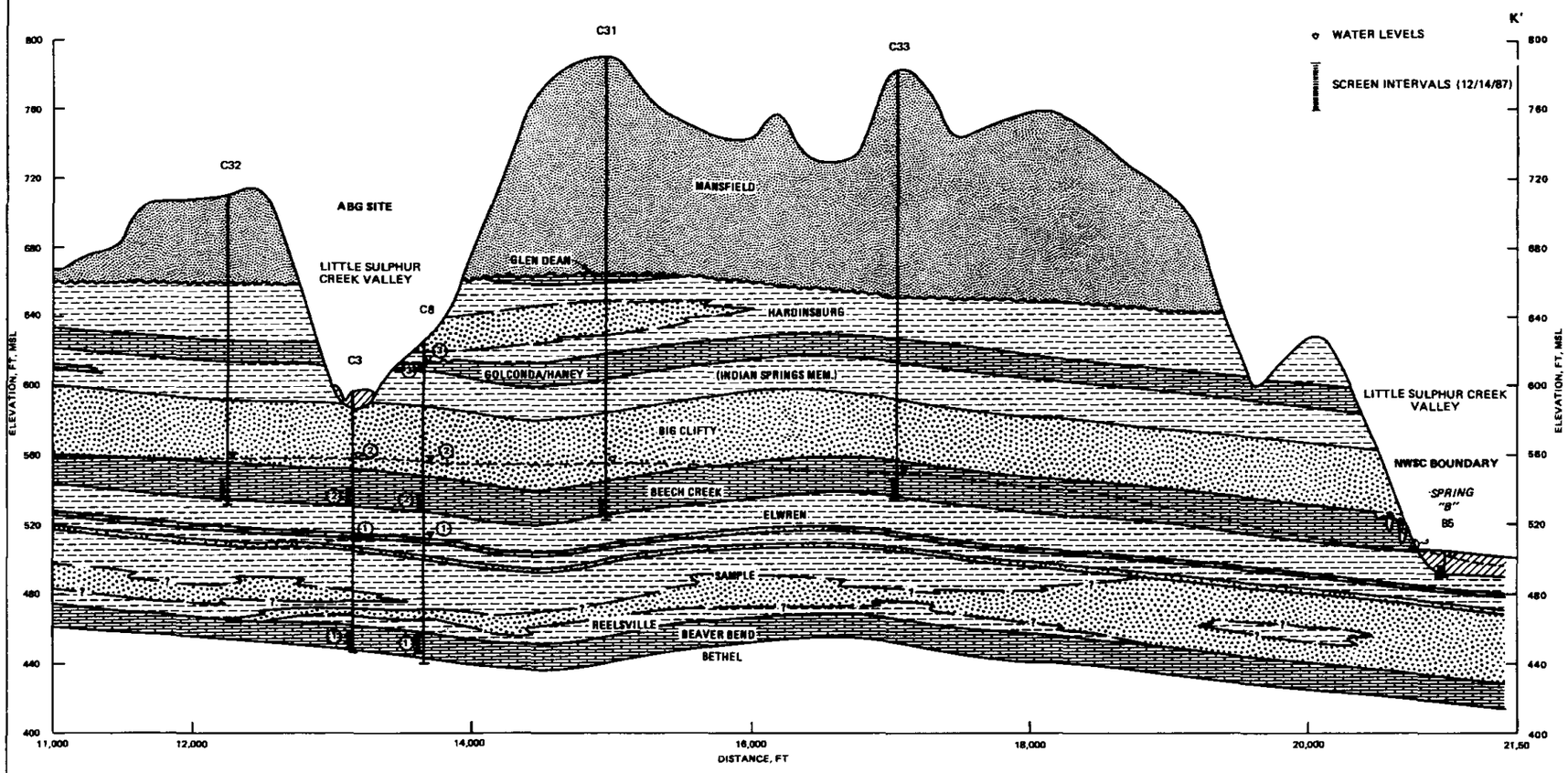
NAVAL WEAPONS SUPPORT CENTER
CRANE, INDIANA

PREPARED BY
U.S. ARMY ENGINEER WATERWAYS EXPERIMENT STATION
VICKSBURG, MISSISSIPPI

DRAWN BY R. HUNT

CHECKED BY W. MURPHY

GEOLOGIC SECTION K-K'
ABG STUDY AREA



LEGEND

- UNDIFFERENTIATED
- CLAY SYMBOL
- SHALE AND SANDSTONE
- SANDSTONE
- SHALE
- LIMESTONE

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

NAVAL WEAPONS SUPPORT CENTER
CRANE, INDIANA

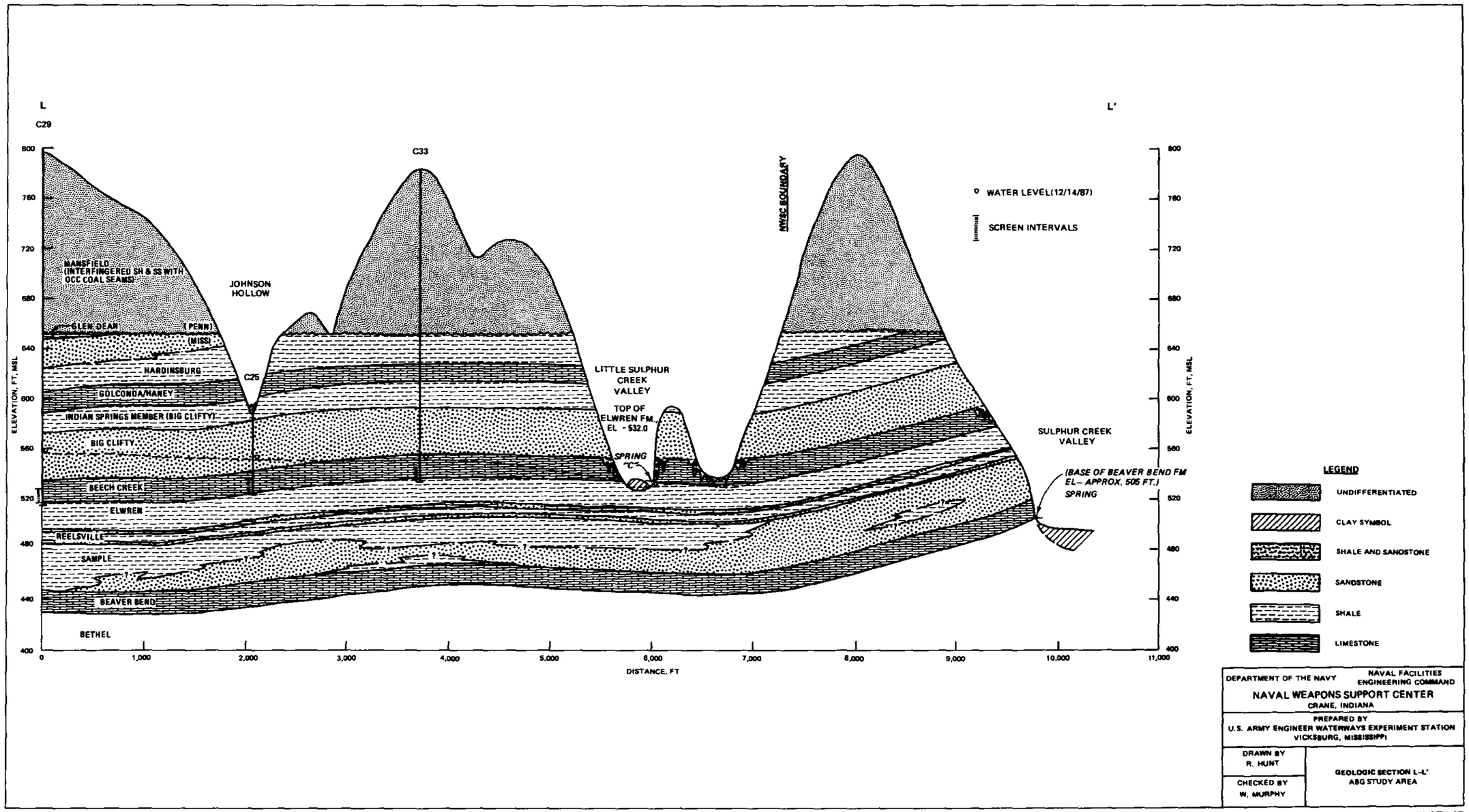
PREPARED BY
U.S. ARMY ENGINEER WATERWAYS EXPERIMENT STATION
VICKSBURG, MISSISSIPPI

DRAWN BY R. HUNT

CHECKED BY W. MURPHY

GEOLOGIC SECTION K-K'
ASG STUDY AREA

PLATE 14A



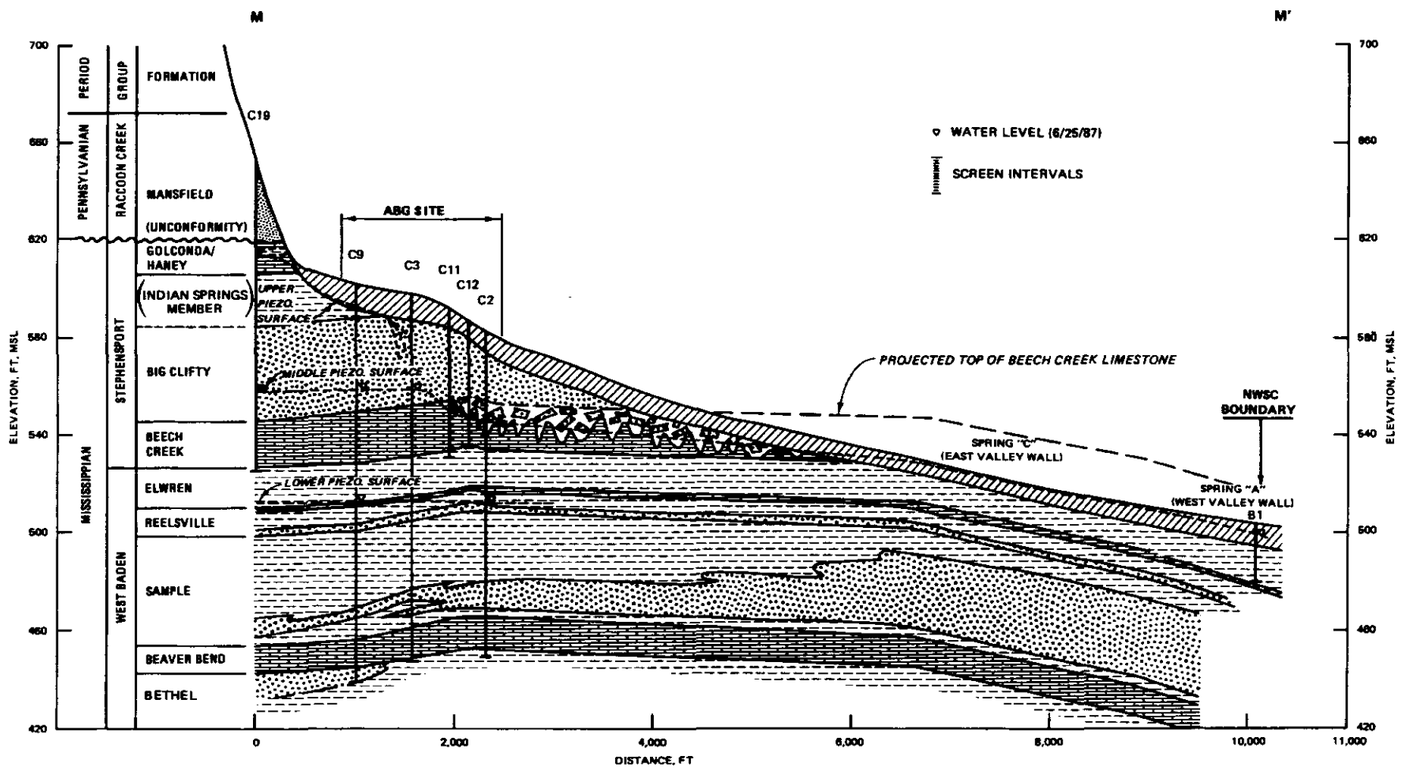
DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

NAVAL WEAPONS SUPPORT CENTER
CRANE, INDIANA

PREPARED BY
U.S. ARMY ENGINEER WATERWAYS EXPERIMENT STATION
VICKSBURG, MISSISSIPPI

DRAWN BY R. HUNT
CHECKED BY W. MURPHY

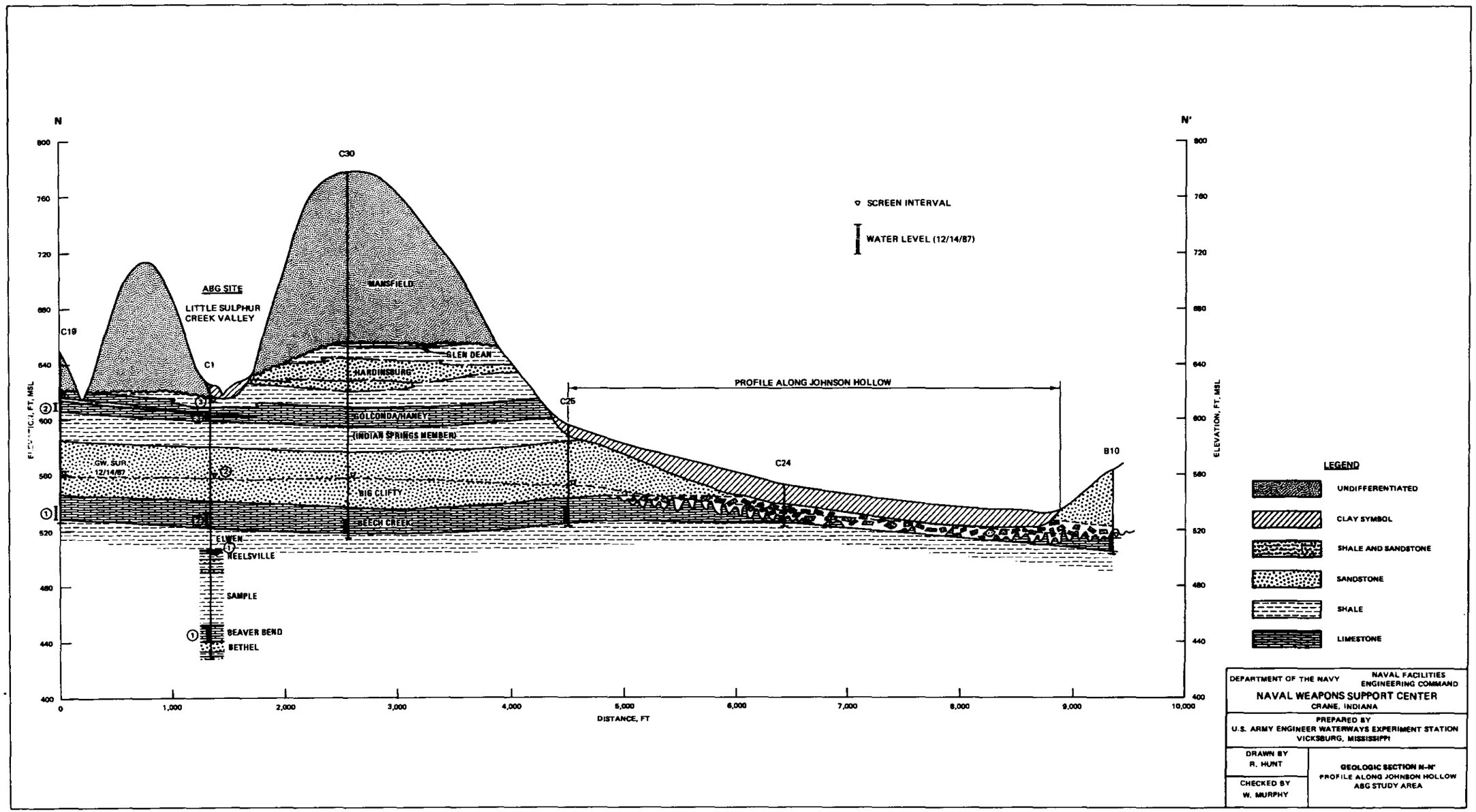
GEOLOGIC SECTION L-L'
ABG STUDY AREA



LEGEND

- UNDIFFERENTIATED
- CLAY SYMBOL
- SHALE AND SANDSTONE
- SANDSTONE
- SHALE
- LIMESTONE

DEPARTMENT OF THE NAVY	NAVAL FACILITIES ENGINEERING COMMAND
NAVAL WEAPONS SUPPORT CENTER CRANE, INDIANA	
PREPARED BY U.S. ARMY ENGINEER WATERWAYS EXPERIMENT STATION VICKSBURG, MISSISSIPPI	
DRAWN BY R. HUNT	GEOLOGIC SECTION M-M' PROFILE ALONG LITTLE SULPHUR CREEK ABG STUDY AREA
CHECKED BY W. MURPHY	


N
N'
C30
C19
C1
C25
C24
B10
ABG SITE
LITTLE SULPHUR CREEK VALLEY
MANSFIELD
GLEN DEAN
HARDINSBURG
GOLCONDA/HANEY
(INDIAN SPRINGS MEMBER)
BIG CLIFTY
BEECH CREEK
GW. SUR. 12/14/87
ELWEN
REELSVILLE
SAMPLE
BEAVER BEND
BETHEL
PROFILE ALONG JOHNSON HOLLOW
SCREEN INTERVAL
WATER LEVEL (12/14/87)
ELEVATION, FT. MSL
DISTANCE, FT
LEGEND
UNDIFFERENTIATED
CLAY SYMBOL
SHALE AND SANDSTONE
SANDSTONE
SHALE
LIMESTONE
DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL WEAPONS SUPPORT CENTER
CRANE, INDIANA
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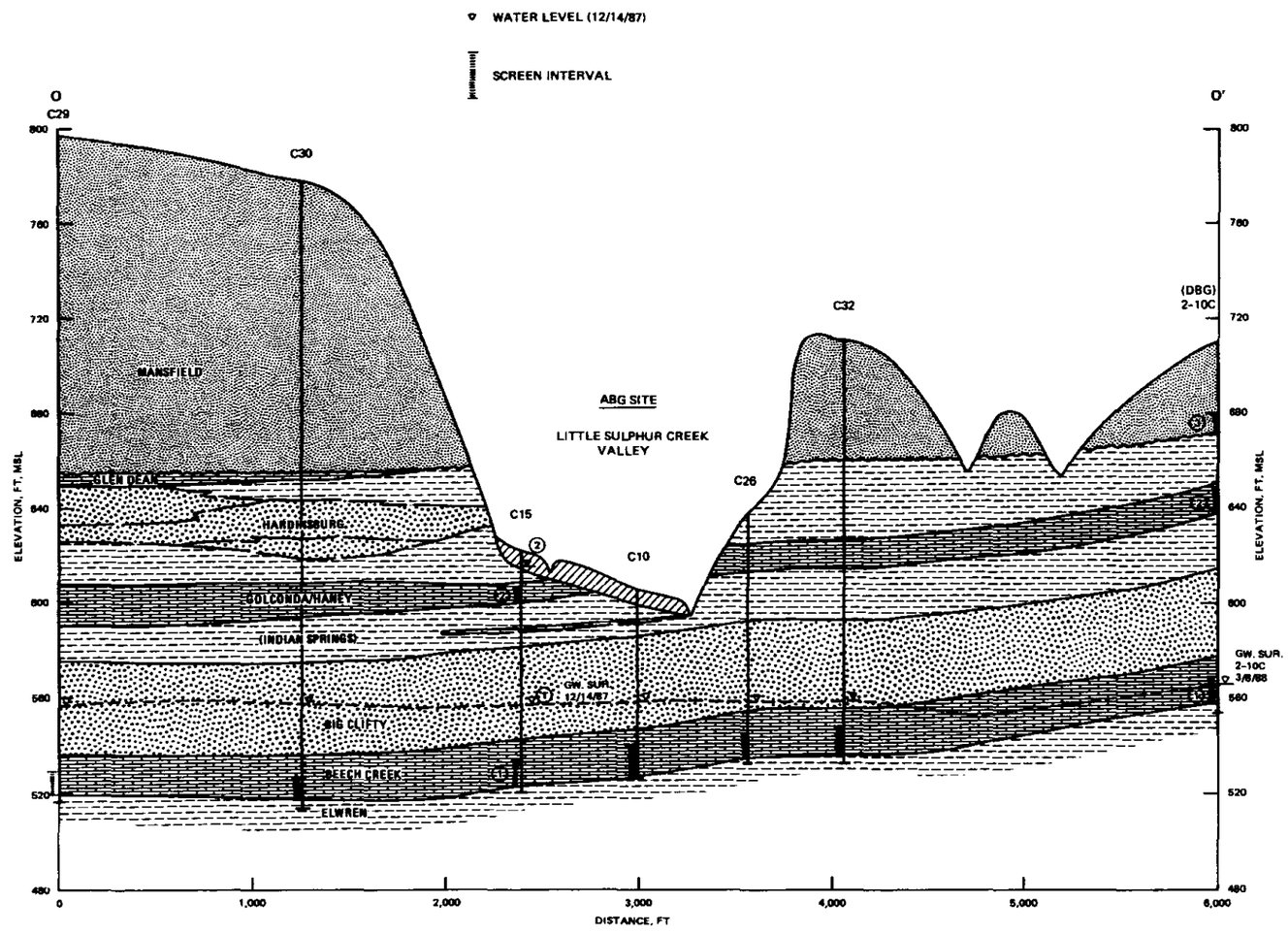
VICKSBURG, MISSISSIPPI
DRAWN BY
R. HUNT
CHECKED BY
W. MURPHY
GEOLOGIC SECTION N-N'
PROFILE ALONG JOHNSON HOLLOW
ABG STUDY AREA

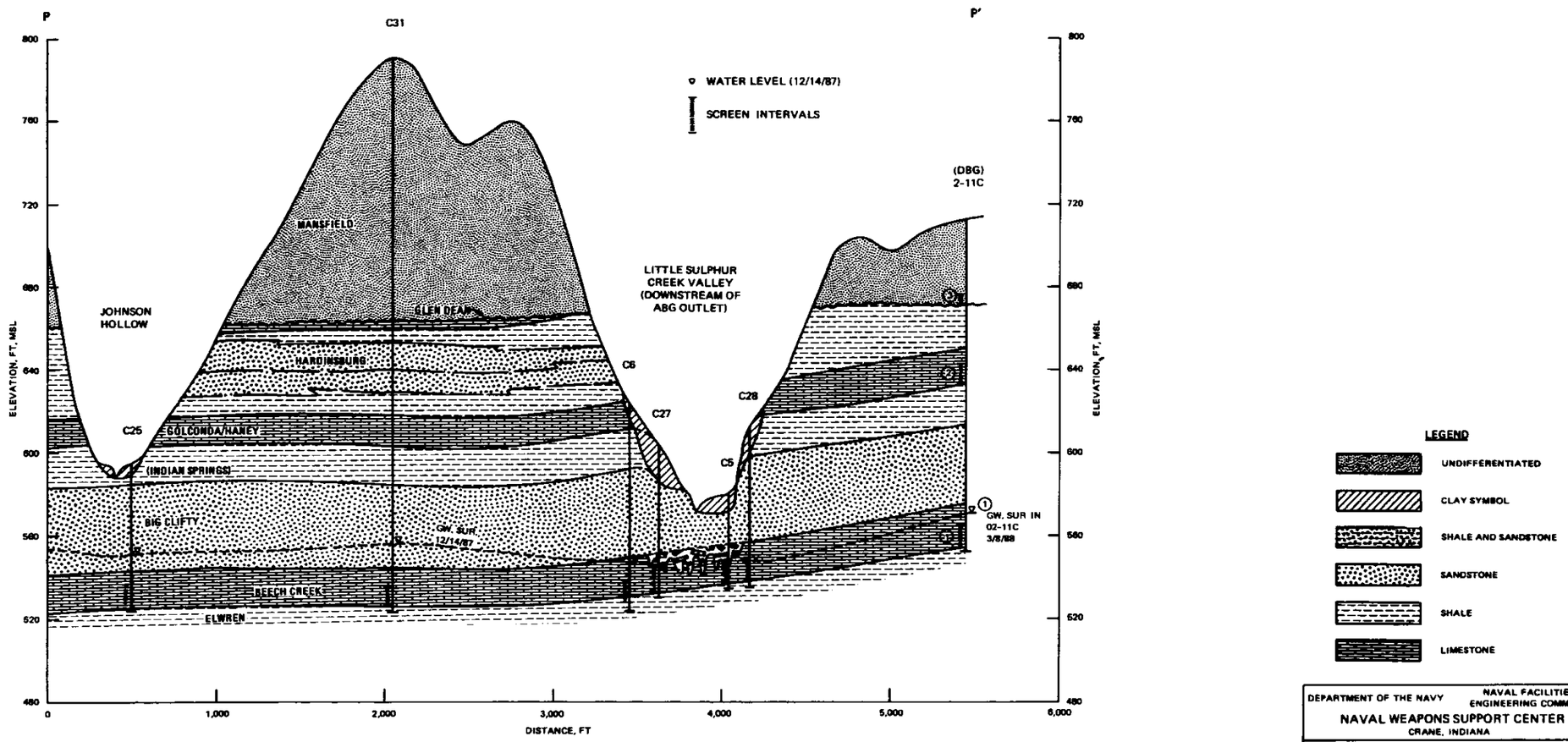
PLATE 17



LEGEND

- UNDIFFERENTIATED
- CLAY SYMBOL
- SHALE AND SANDSTONE
- SANDSTONE
- SHALE
- LIMESTONE

DEPARTMENT OF THE NAVY	NAVAL FACILITIES ENGINEERING COMMAND
NAVAL WEAPONS SUPPORT CENTER CRANE, INDIANA	
PREPARED BY U.S. ARMY ENGINEER WATERWAYS EXPERIMENT STATION VICKSBURG, MISSISSIPPI	
DRAWN BY R. HUNT	GEOLOGIC SECTION O-O' ABG STUDY AREA
CHECKED BY W. MURPHY	



LEGEND

- UNDIFFERENTIATED
- CLAY SYMBOL
- SHALE AND SANDSTONE
- SANDSTONE
- SHALE
- LIMESTONE

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

NAVAL WEAPONS SUPPORT CENTER
CRANE, INDIANA

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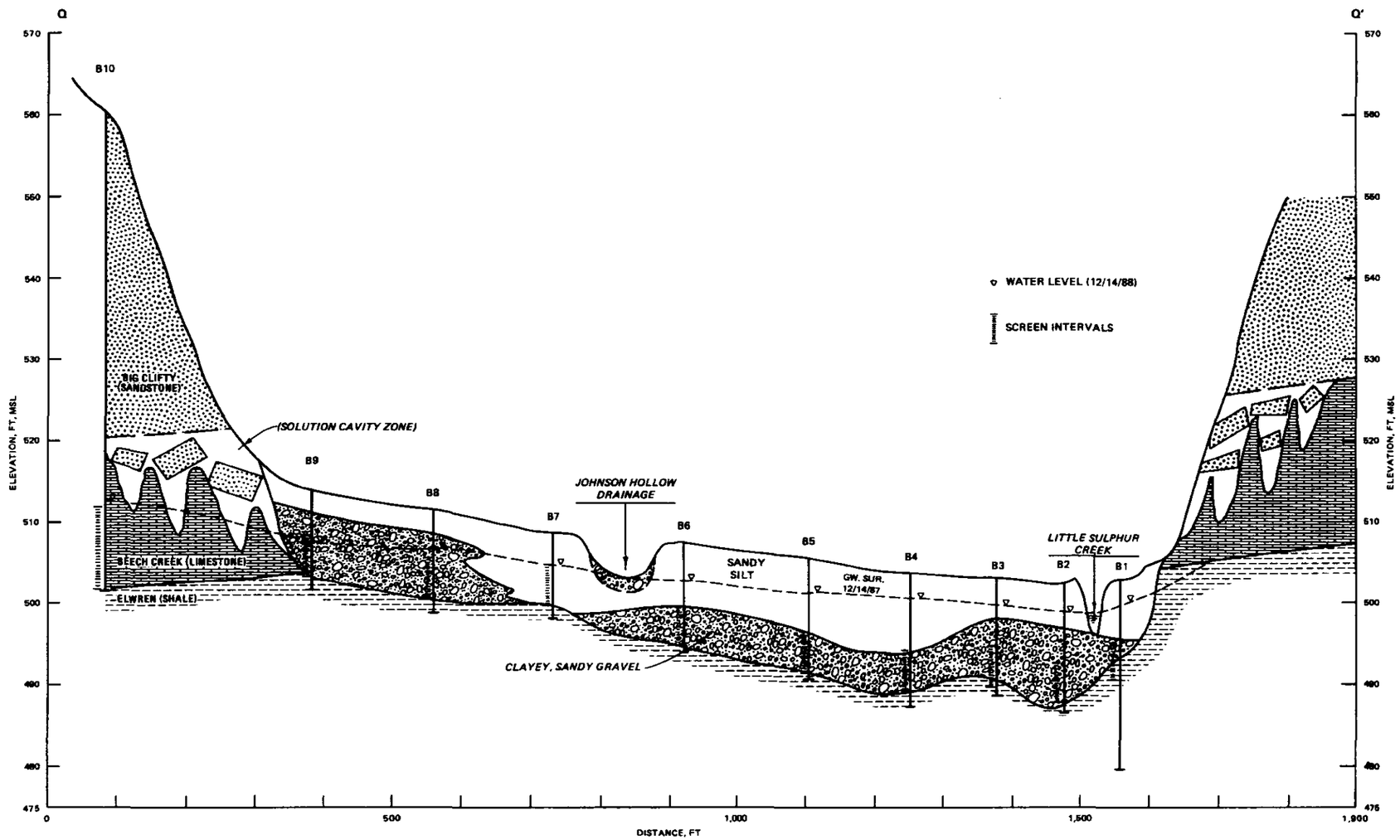
U.S. ARMY ENGINEER WATERWAYS EXPERIMENT STATION
VICKSBURG, MISSISSIPPI

DRAWN BY
R. HUNT

CHECKED BY
W. MURPHY

GEOLOGIC SECTION P-P'
ABG STUDY AREA



LEGEND

- UNDIFFERENTIATED
- CLAY SYMBOL
- SHALE AND SANDSTONE
- SANDSTONE
- SHALE
- LIMESTONE

DEPARTMENT OF THE NAVY	NAVAL FACILITIES ENGINEERING COMMAND
NAVAL WEAPONS SUPPORT CENTER CRANE, INDIANA	
PREPARED BY U.S. ARMY ENGINEER WATERWAYS EXPERIMENT STATION VICKSBURG, MISSISSIPPI	
DRAWN BY R. HUNT	GEOLOGIC SECTION Q–Q' ACROSS LITTLE SULPHUR CREEK AT NWSC SOUTH BOUNDARY ABG STUDY AREA
CHECKED BY W. MURPHY	

NOTE: CONTOUR INTERVAL 5 FT.
ELEVATIONS IN FT MSL

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

NAVAL WEAPONS SUPPORT CENTER
CRANE, INDIANA

PREPARED BY
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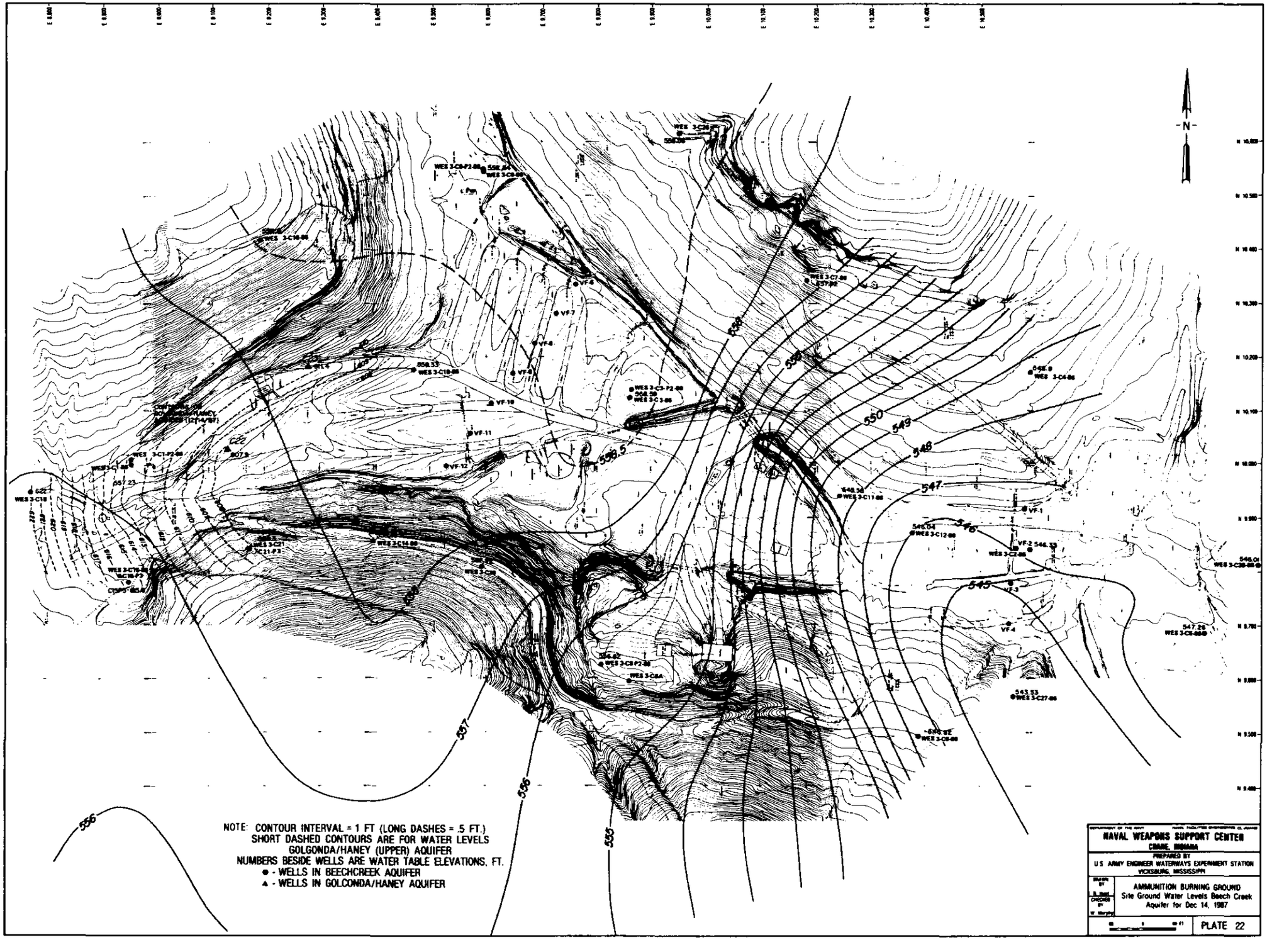
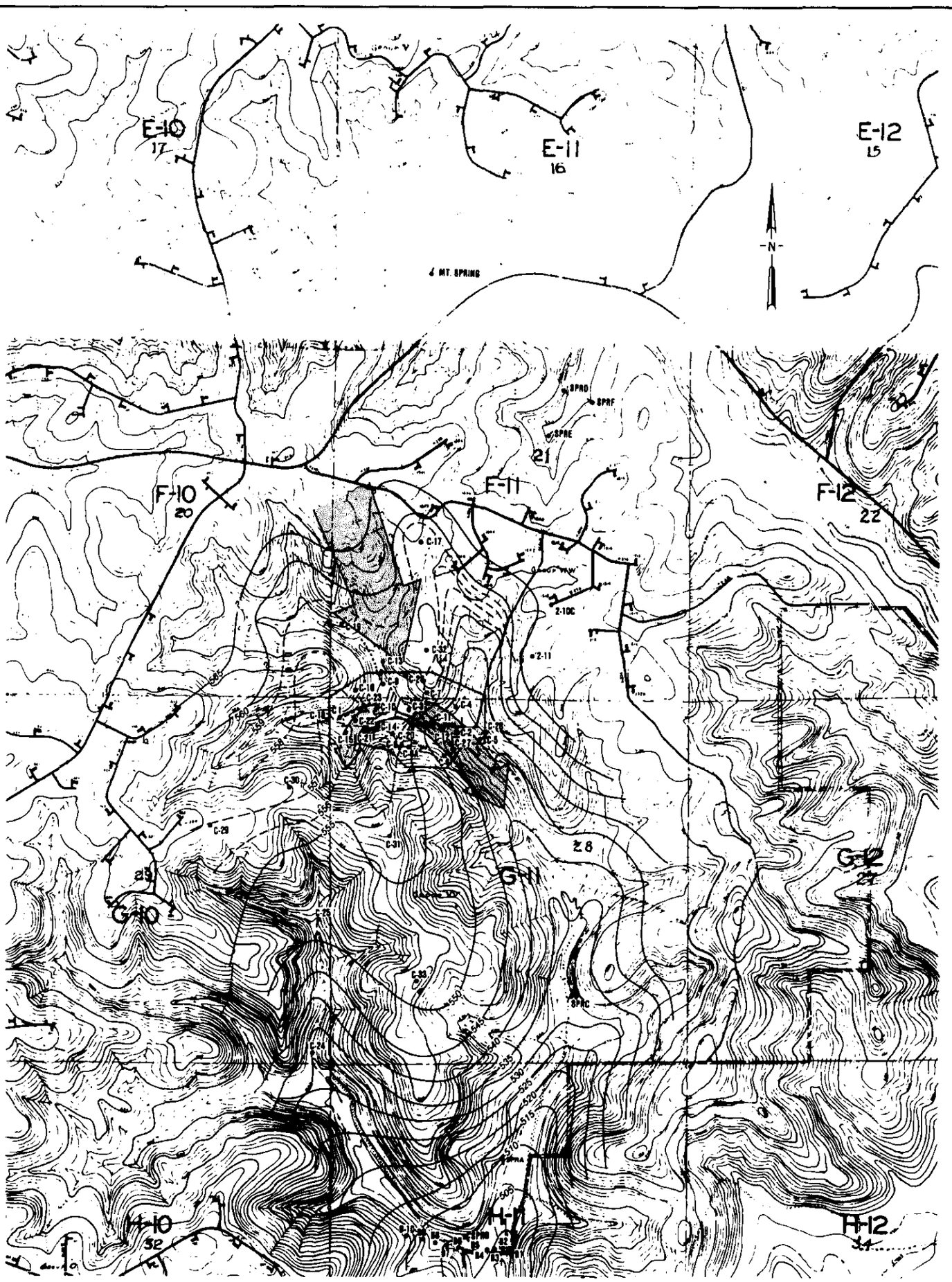
VICKSBURG, MISSISSIPPI

DRAWN BY
CHECKED BY

STRUCTURAL CONTOURS
TOP OF EL WREN SHALE
ABG Study Area

PLATE 21


N
557
556
555
558.5
550
549
548
547
546
545
NOTE: CONTOUR INTERVAL = 1 FT (LONG DASHES = .5 FT.)
SHORT DASHED CONTOURS ARE FOR WATER LEVELS
GOLGONDA/HANEY (UPPER) AQUIFER
NUMBERS BESIDE WELLS ARE WATER TABLE ELEVATIONS, FT.
● - WELLS IN BEECHCREEK AQUIFER
▲ - WELLS IN GOLCONDA/HANEY AQUIFER
NAVAL WEAPONS SUPPORT CENTER
CRANE, INDIANA
PREPARED BY
U.S. ARMY ENGINEER WATERWAYS EXPERIMENT STATION
VICKSBURG, MISSISSIPPI
AMMUNITION BURNING GROUND
Site Ground Water Levels Beech Creek
Aquifer for Dec 14, 1987
PLATE 22



NOTE: ELEVATIONS IN FT MSL

NOTE: ARROWS SHOW PROMINENT FLOW DIRECTIONS THROUGH ABG IN BEECH CREEK AQUIFER.
ARROW WIDTH INDICATES ESTIMATED RELATIVE FLOW VOLUME.
CONTOUR INTERVAL = 5 FT
(1 FT WHERE DASHED)

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

NAVAL WEAPONS SUPPORT CENTER
CRANE, INDIANA

PREPARED BY
U.S. ARMY ENGINEER WATERWAYS EXPERIMENT STATION
VICKSBURG, MISSISSIPPI

DRAWN BY
CHECKED BY

ELEVATION OF TOP OF WATER TABLE
IN BEECH CREEK AQUIFER
ABG Study Area

PLATE 23

US Army Corps
of Engineers

TECHNICAL REPORT GL-88-27

GEOLOGY AND HYDROGEOLOGY OF THE AMMUNITION BURNING GROUND CRANE NAVAL WEAPONS SUPPORT CENTER

VOLUME III: BORING LOGS AND WELL INSTALLATION DIAGRAMS

by

Richard W. Hunt

Geotechnical Laboratory

DEPARTMENT OF THE ARMY
Waterways Experiment Station, Corps of Engineers
PO Box 631, Vicksburg, Mississippi 39181-0631

October 1988

Final Report

Further dissemination of this document only as directed by Department of the Navy, Northern Division. Naval Facilities Engineering Command, Philadelphia, Pennsylvania 19112-5094, or higher DoD authority: October 1988.

Prepared for Naval Weapons Support Center
Crane, Indiana 47522-5009

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Boring Log Legends

LEVATION a	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			ROCK CORE BORING LOGS			
			ROCK SYMBOLS			
			SANDSTONE			
			LIMESTONE			
			SHALE OR CLAYSHALE			
			SHALE W/ CLAYEY LIMESTONE			
			CALCAREOUS SANDSTONE, SANDY LIMESTONE			
			SHALE W/ SANDSTONE LENSES			
			COAL			
			CLAYSTONE			
			SOIL SYMBOLS			
			CRUSHED LIMESTONE ROAD FILL			
			SILT (ML)			
			CLAY (CL OR CH) OR CLAYEY SILT (ML-CL)			
			CLAY (CL) WITH ROCK FRAGMENTS			
			CLAYEY SAND (SC)			
			SILT (ML) WITH ROCK FRAGMENTS			
			JOINT SYMBOLS			
			CLOSED HORIZONTAL JOINT			
		10	CLOSED JOINT DIPPING 10°			
		10	OPEN JOINT DIPPING 10°			
		80	CLOSED OR INCIPIENT JOINT DIPPING 80°			
		35 60	INTERSECTING JOINTS W/ DIPS AS SHOWN			
			STYLOLITES			
			ROUGH, IRREGULAR JOINT			
			CORE LOSS ZONE			

NG FORM MAR 71 836 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

ROJEC

HOLE NO.

(Boringo Log Legelndsu d e d)

LEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	CORE RECOVERY e	DX OF SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			SOIL BORING LOGS			
			CLAYEY SILT W/ SANDSTONE FRAGMENTS			
			CLAYEY SILT (ML) OR SILTY CLAY (CL) W/ SANDSTONE FRAG			
			CLAYEY SILT (ML)			
			SILTY CLAY (CL)			
			WEATHERED SHALE			
					SAMPLE JAR NUMBERS AND DEPTHS	
					3.0	
					1	Sample No. 1 from 0.0 to 1.5 ft depth
					1.5	
					2	Sample No. 2 from 1.5 to 3.0 ft depth
					3.0	
					X	Interval not sampled

NG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

(TRANSLUCENT)

PROJECT

HOLE NO.

Logs of Valley Fill Borings

Hole No. WES-3-VFI-87

DRILLING LOG	DIVISION US Navy	INSTALLATION NWSC, Crane Ind	SHEET 1 OF 1 SHEETS

1. PROJECT Hydrogeologic Studies, ABG	10. SIZE AND TYPE OF BIT 3" Splitspoon + Auger
2. LOCATION (Coordinates or Station) ABG Valley Fill	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) 3-VFI	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER Don Taylor	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN 3.5	16. DATE HOLE — STARTED 6/23/87 — COMPLETED 6/23/87
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE 584.5
9. TOTAL DEPTH OF HOLE 3.5	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF ~~INSPECTOR~~ Geologist R.W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Silt, w/ss frags, grBr, slightly moist		1	Samples put in Qt Jars
	1		Clayey Silt - Silty Clay, rBr-yBr w/ss frags, mod firm, moist		1.0	
	2					
	3				2	
					3.5	
	4		Bot Depth - 3.5' (Refusal on Top of Big Cliffy ss)			

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT [redacted] HOLE NO.

Hole No. WES-3-VFZ-87

DRILLING LOG	DIVISION US Navy	INSTALLATION NWSC	SHEET 1 OF 1 SHEETS

1. PROJECT Hydrogeologic Studies, ABG	10. SIZE AND TYPE OF BIT 3" Splitspoon + Auger
2. LOCATION (Coordinates or Station) ABG Valley Fill	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) 3-VFZ	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE: STARTED 6/23/87 COMPLETED 6/23/87
7. THICKNESS OF OVERBURDEN 7.5	17. ELEVATION TOP OF HOLE 581.5
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 7.5	19. SIGNATURE OF INSPECTOR R.W. Geologist Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0–7.5		Clayey silt, w/ ss pebbles + frags, m-d Br, firm, sl moist - dry		1, 1.5, 2, 3.0, 3, 4.5, 4, 6.0, 5, 7.5	Samples were put in qt Jars
			Increase in ss frags below 3.0', + moist			
			Blk coal? flakes between 4.0 + 4.5			
			weathered Big clifty ss w/ silty clay + clayey silt in eroded open jts, moist			
	7.5–8		Bot. Depth - 7.5' (Refusal on Top of Big clifty ss)			

File No. WES-3-VF3-87

DRILLING LOG

DIVISION	US Navy
INSTALLATION	Nwsc, Crane Ind.
SHEET	1 OF 1 SHEETS
1. PROJECT	Hydrogeologic Studies, ABG
2. LOCATION (Coordinates or Station)	ABG Valley Fill
3. DRILLING AGENCY	WES
4. HOLE NO. (As shown on drawing title and file number)	3-VF3
5. NAME OF DRILLER	Dan Taylor
6. DIRECTION OF HOLE	☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	4.8
8. DEPTH DRILLED INTO ROCK	
9. TOTAL DEPTH OF HOLE	4.8
10. SIZE AND TYPE OF BIT	3" Splitspoon + Auger
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	
12. MANUFACTURER'S DESIGNATION OF DRILL	Failing 1500
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED: ; UNDISTURBED:
14. TOTAL NUMBER CORE BOXES	
15. ELEVATION GROUND WATER	
16. DATE HOLE	STARTED 6/23/87; COMPLETED 6/23/87
17. ELEVATION TOP OF HOLE	580.5
18. TOTAL CORE RECOVERY FOR BORING	%
19. SIGNATURE OF ~~INSPECTOR~~ Geologist	R.W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Clayey silt - silty clay, w/ss frags + pebbles (SS frags increase w/depth), Br-dy-rBr, sli moist-dry		1 (0–1.5)	Samples put in jars
	1				2 (1.5–3.0)	
	2				3 (3.0–4.5)	
	3					
	4					
	5		Bot. Depth - 4.8' (Refusal on Top of Big clifty SS)			

NC FOR 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT [redacted] HOLE NO.

Hole No. WES-3-VF4-87

DRILLING LOG	DIVISION US Navy	INSTALLATION NWSC, Crane, Ind	SHEET 1 OF 1 SHEETS

1. PROJECT Hydrogeologic Studies, ABG	10. SIZE AND TYPE OF BIT 3" split spoon + Auger
2. LOCATION (Coordinates or Station) ABG Valley Fill	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) 4-VF4	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE: STARTED 6/23/87 COMPLETED 6/23/87
7. THICKNESS OF OVERBURDEN 5.2	17. ELEVATION TOP OF HOLE 581.5
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 5.2	19. SIGNATURE OF ~~INSPECTOR~~ Geologist R. W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Clayey silt-silty clay, w/ss frags increasing w/depth, Br-yBr, mod firm, moist		1 (0–1.5)	Samples put in qt jars
	1				2 (1.5–3.0)	
	2				3 (3.0–4.5)	
	3				4 (4.5–5.2)	
	4					
	5					
	6		Bot. Depth - 5.2' (Refusal on Top of Big Clifty SS)			

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT [redacted] HOLE NO.

Hole No. WES-3-VF5-87

DRILLING LOG	DIVISION US Navy	INSTALLATION Nwse, Crane Ind.	SHEET 1 OF 1 SHEETS

1. PROJECT Hydrogeologic Studies, ABG	10. SIZE AND TYPE OF BIT 3" Splitspoon + Auger
2. LOCATION (Coordinates or Station) ABG Valley fill	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) 3-VF5	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED 6/23/87 — COMPLETED 6/23/87
7. THICKNESS OF OVERBURDEN 9.8	17. ELEVATION TOP OF HOLE 591.4
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 9.8	19. SIGNATURE OF ~~INSPECTOR~~ Geologist R. W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Silty Clay, Br-yBr w/Gr mottling, firm, sli moist, w/occ SS frags & pebbles, Blk Carbonaceous (coal flakes) inclus.		1 (0–1.5)	Samples put in qt jars
	1	Δ				
	2				2 (1.5–3.0)	
	3	Δ			3 (3.0–4.5)	
	4				4 (4.5–6.0)	
	5	Δ			5 (6.0–7.5)	
	6				6 (7.5–9.0)	
	7					
	8					
	9	Δ	Increase in SS frags in bot ft.		7 (9.0–9.8)	(Refusal on top of Big Clifty SS)
		Δ				
		Δ				
	10		Bot Depth - 9.8'			

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT [redacted] HOLE NO.

Hole No. WES-3-VF6-87

DRILLING LOG	DIVISION US Navy	INSTALLATION Nuse, Crane, Ind	SHEET 1 OF 1 SHEETS

1. PROJECT Hydrogeologic Studies, ABG	10. SIZE AND TYPE OF BIT 3" Split spoon + Auger
2. LOCATION (Coordinates or Station) ABG, Valley fill	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) 3-VF6	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED 6/24/87 — COMPLETED 6/24/87
7. THICKNESS OF OVERBURDEN 7.8'	17. ELEVATION TOP OF HOLE 595.5
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 7.8'	19. SIGNATURE OF ~~INSPECTOR~~ Geologist Richard W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0–3.0		Silty clay w/num ss frags + pebbles, Br-yBr, firm-vfirm, sli moist		1 (0–1.5), 2 (1.5–3.0)	Samples put in qt jars.
	3.0–6.0		Silty clay-clayey silt dGr, w/ss frags + pebbles, rootlets, soft, v moist, num ss frags mixed in clay		3 (3.0–4.5), 4 (4.5–6.0)	
	6.0–7.8		Silt, clayey-sandy, th bd, yTan, Br + olive, limonite along bd, firm, moist (wea Rock)		5 (6.0–7.5)	
	8		Bot. Depth - 7.8' (Refusal on Top of Big clifty ss)			

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT [redacted] HOLE NO.

Hole No. WES-3-VF7-87

DRILLING LOG	DIVISION US Navy	INSTALLATION NWSC, Crane, Ind	SHEET 1 OF 1 SHEETS

1. PROJECT	Hydrogeologic Studies, ABG
2. LOCATION (Coordinates or Station)	ABG Valley Fill
3. DRILLING AGENCY	WES
4. HOLE NO. (As shown on drawing title and file number)	3-VF7
5. NAME OF DRILLER	Dan Taylor
6. DIRECTION OF HOLE	☑ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	10.0
8. DEPTH DRILLED INTO ROCK	
9. TOTAL DEPTH OF HOLE	10.0
10. SIZE AND TYPE OF BIT	3" Splitspoon + Auger
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	
12. MANUFACTURER'S DESIGNATION OF DRILL	Failing 1500
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED: ; UNDISTURBED:
14. TOTAL NUMBER CORE BOXES	
15. ELEVATION GROUND WATER	
16. DATE HOLE	STARTED 6/24/87 ; COMPLETED 6/24/87
17. ELEVATION TOP OF HOLE	596.3
18. TOTAL CORE RECOVERY FOR BORING	%
19. SIGNATURE OF ~~INSPECTOR~~ Geologist	Richard W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0–3.0		silty clay, yBr-Br, w/ss frags + pebbles, v firm, sli moist, occ dGr shale inclus.	1; 1.5; 2; 3.0		Samples put in Jars
	3–10.0		silty clay + ss frags, Br, yBr + Gr, mod firm, moist; more sandy ↓, v moist in bot 1½'.	3; 4.5; 4; 6.0; 5; 7.5; 6; 9.0; 10.0		Refusal at 10.0' on Top of Big Clifty SS.
	10		Bot. Depth - 10.0			

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT [redacted] HOLE NO.

Hole No. WES-3-VF8-87

DRILLING LOG	DIVISION U.S. Navy	INSTALLATION NWSC Crane Ind	SHEET 1 OF 2 SHEETS

1. PROJECT Hydrogeologic Studies, ABG	10. SIZE AND TYPE OF BIT 3" Split Spoon + Auger
2. LOCATION (Coordinates or Station) ABG, Valley fill	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) 3-VF8	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED 6/24/87 — COMPLETED 6/24/87
7. THICKNESS OF OVERBURDEN 11.7	17. ELEVATION TOP OF HOLE 599.5
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 11.7	19. SIGNATURE OF ~~INSPECTOR~~ Geologist R.W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0–6		Silty clay, Br-yBr + Gr, w/ss frags, firm, sli moist		1 (0–1.5)	Samples put in qt jars
			Becomes soft and v moist below 2.0'		2 (1.5–3.0)	
					3 (3.0–4.5)	
					4 (4.5–6.0)	
	6–7.5		Silty clay - clayey silt, d Gr, w/ss frags, mod firm - soft, moist		5 (6.0–7.5)	
	7.5–11.7		Silty clay + SS frags, Br-yBr, firm - mod firm, moist - v moist		6 (7.5–9.0)	
					7 (9.0–11.7)	

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-VF8-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 2 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 3-VF8	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10		Note: Water flowing into boring at ~10.5' (Come up in Boring to ~8.0'	10.5		
	11			8		
				11.7'		
	12		Bot. Depth - 11.7' Refusal on Top of Big Clifty SS; (near Indian Springs Sh Contact)?			

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT [redacted] HOLE NO.

Hole No. WES-3-VF9-87

DRILLING LOG	DIVISION US NAVY	INSTALLATION NWSC, Crane, Ind.	SHEET 1 OF 1 SHEETS

1. PROJECT Hydrogeologic Studies, ABG	10. SIZE AND TYPE OF BIT 3" Splitspoon + Auger
2. LOCATION (Coordinates or Station) ABG Valley Fill	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) 3-VF9	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE: STARTED 6/25/87 COMPLETED 6/25/87
7. THICKNESS OF OVERBURDEN 9.6	17. ELEVATION TOP OF HOLE 600.4
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 9.6	19. SIGNATURE OF ~~INSPECTOR~~ Geologist R.W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0–5		Silty Clay, yBr-Br+ Gr, w/ss frags, firm, sli moist in top foot becoming more moist w/depth		1 (1.5), 2 (3.0), 3 (4.5)	Samples put in qt Jars
			Soft + moist in Bot zone			
	5–7		Clayey silt, dGr, ss frags, organics, soft, sli moist-moist		4 (6.0), 5 (7.5)	
			olive Br toward bot.			
	7–9.6		Silty Clay + ss frags, soft-firm, moist		6 (9.0), 7 (9.6)	Refusal on Top of shale
	10		Bot. Depth - 9.6'			

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

File No. WES-3-VF10-87

DRILLING LOG	DIVISION US Navy	INSTALLATION NWSC, Crane Ind.	SHEET 1 OF SHEETS

1. PROJECT Hydrogeologic Studies, ABG	10. SIZE AND TYPE OF BIT 3" Splitspoon + Auger
2. LOCATION (Coordinates or Station) ABG Valley Fill	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) 3-VF10	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE: STARTED 6/25/87 COMPLETED 6/25/87
7. THICKNESS OF OVERBURDEN 8.3	17. ELEVATION TOP OF HOLE 603.7
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 8.3	19. SIGNATURE OF ~~INSPECTOR~~ Geologist R.W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0–3		Silty clay, yBr, v firm, sli moist-dry, w/ss frags + dGr sh inclus.		1, 1.5, 2, 3.0	Samples put in qt jars
	3–7.5		Clayey silt, dGr-Br, w/organics, changing to silty clay w/ss frags w/depth, soft-mod firm, sli moist-moist		3, 4.5, 4, 6.0, 5, 7.5	
	7.5–8.3		Silty clay + ss frags, yBr, firm, sli moist		6, 8.3	
	9		Bot. Depth - 8.3 (Refusal on Top of shale)			

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-VF11-87

DRILLING LOG	DIVISION US Navy	INSTALLATION Nwsc, Crane Ind.	SHEET 1 OF 2 SHEETS

1. PROJECT Hydrogeologic Studies, ABG	10. SIZE AND TYPE OF BIT 3" Split spoon + Auger
2. LOCATION (Coordinates or Station) ABG Valley Fill	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) 3-VF11	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED 6/25/87 — COMPLETED 6/25/87
7. THICKNESS OF OVERBURDEN 9.0	17. ELEVATION TOP OF HOLE 602.8
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 11.8	19. SIGNATURE OF ~~INSPECTOR~~ Geologist R. W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0–3		Silty Clay, dgr Br, w/sh frags + occ ss frags, firm, sli moist		1; 3.0	Samples put in Qt jars
	3–6		Silty Clay, olive gr Br, w/ ss frags + sh inclus, firm, sli moist		2; 4.5; 3; 6.0	
	6–7		Clayey Silt, d Gr, moist, firm-soft			
	7–9		Silty Clay + SS frags, y Br, firm, moist		4; 7.5; 5; 9.0	
	9–10		Shale, wea, (Indian springs mem)		6	

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Iole No. WES-3-VF11-87

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 2 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 3-VF11	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10				10.5	
	11				7	
					11.8	
	12		Bot Depth - 11.8'			

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

Iole No. WES-3-VF12-86

DRILLING LOG	DIVISION US Navy	INSTALLATION NWSC, Crane Ind	SHEET 1 OF 1 SHEETS

1. PROJECT Hydrogeologic Studies, ABG	10. SIZE AND TYPE OF BIT 3" Splitspoon + Auger
2. LOCATION (Coordinates or Station) ABG Valley Fill.	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) 3-VF12	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED 6/25/87 — COMPLETED 6/25/87
7. THICKNESS OF OVERBURDEN 3.5	17. ELEVATION TOP OF HOLE 603.3
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 7.5	19. SIGNATURE OF ~~INSPECTOR~~ Geologist R. W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		silty clay, d olive Br, w/rock frags, sli moist, firm		1 (0–1.5)	Samples put in qt jars
	1					
	2				2 (1.5–3.0)	
	3					
	4		Weathered Shale, d olive Gr, firm. (Indian springs mem)		3 (3.0–4.5)	
	5				4 (4.5–6.0)	
	6					
	7				5 (6.0–7.5)	
	8		Bot. Depth - 7.5 (Boring bottomed in Indian springs Sh)			

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Logs of Little Sulphur Creek Valley Borings

Hole No. WES-3-81-86

DRILLING LOG	DIVISION US Navy	INSTALLATION NWSC-Crane In	SHEET 1 OF 3 SHEETS

1. PROJECT Hydrogeologic Studies	10. SIZE AND TYPE OF BIT Folding Auger + HQ wireline
2. LOCATION (Coordinates or Station) ABG Little Sulphur Creek Valley / NWSC Bdy	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) WES-3-81-86	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED 6/19/87 — COMPLETED 6/19/87
7. THICKNESS OF OVERBURDEN 9.6	17. ELEVATION TOP OF HOLE 502.87
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 23.3'	19. SIGNATURE OF INSPECTOR Geologist Richard W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Sandy Silt (ML), dBr-rBr, w/ss pebbles + cobbles, mod firm to soft, moist in top wet below 5.0'	Jar spl's 1		Drilled + sampled w/ 7" Folding Auger, from 0.0 to 9.9'
	1					
	2			2.0		
				2		
	3			3.0		
				3		
	4			4.0		
				4		
	5			5.0		
				5		
	6			6.0		
				6		
	7			7.0		
			Silty Sand + ss pebbles w/ ss cobbles sm, olive Br, soft, saturated	7		
	8			8.0		
				8		
	9			9.0		
			clayey in bot few Tenths of foot.	9		
			Elwren Shale	9.0		- refusal
	10					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

ole No. WES-3-B1-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 5 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED: — COMPLETED:
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10		Shale, dGr w/dRed mottling, mass-thbd, fissile, firm-hard	0.3 / 2.1		Started coring at 9.9'
	11			-1.8		
				12.0		
	12					
	13					
	14					
	15			6.0 / 8.4		
	16			-2.4		
	17					
	18					
	19					
	20					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-81-06

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 3 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	20		Shale (cont)	20.3		Full Depth
				20.4		
			- sh w/alter ss lenses			
	21					
				3.2 / 2.9		
	22			+6.3		
	23					
			Bottom Depth - 23.3			
	24					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT HOLE NO.

Hole No. WES-3-B2-86

DRILLING LOG	DIVISION U.S Navy	INSTALLATION NWSC, Crane Ind.	SHEET OF SHEETS

1. PROJECT Hydrogeologic Studies, A86	10. SIZE AND TYPE OF BIT 2" Split Spoon
2. LOCATION (Coordinates or Station) NWSC Boundry, Little Sulphur Creek	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) 3-B2	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED 6/27/87 — COMPLETED 6/27/87
7. THICKNESS OF OVERBURDEN 14.6'	17. ELEVATION TOP OF HOLE 502.15
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 15.8'	19. SIGNATURE OF ~~INSPECTOR~~ Geologist R. W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0–3.0		Clayey-Sdy silt w/ occ SS pebbles + cobbles, d Br, moist		1 (0–1.0), 2 (1.0–3.0)	Samples were taken w/a 2" dia split spoon by pushing w/hydra. Cleaned hole w/ 8" dia flight auger. Samples were put in Qt mason jars.
	3.0–4.5		Below 3' cobr is y Br, increase in SS pebbles + wet		3 (3.0–4.5)	
	4.5–6.0		Gravelly silty sand to silty sandy Gravel, Br, Gravel is friable SS, subrounded + oxidized. Zone is saturated.		4 (4.5–6.0)	
	6.0–7.5				5 (6.0–7.5)	
	7.5–7.8				6 (7.5–7.8)	
	7.8–15.8				7 (7.8–15.8)	No 7-8+9 Spls taken w/ folding auger.

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-B2-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 3-B2	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10			10.3		
	11			8		
	12			12.3		
	13			9		
	14			14.3		
				10		
				14.6		
	15		(Elwren fm) Shale, rBr & Gr Shale.	11		
	16		Bot Depth - 15.8			

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

File No. WES-3-B3-86

DRILLING LOG	DIVISION US Navy	INSTALLATION NWSC, Crane Ind	SHEET 1 OF 2 SHEETS

1. PROJECT Hydrogeologic Studies, ABG	10. SIZE AND TYPE OF BIT 2" split spoon + Auger
2. LOCATION (Coordinates or Station) NWSC Boundry, Little Sulphur Creek	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) 3-B3	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED 6/29/87 — COMPLETED 6/29/87
7. THICKNESS OF OVERBURDEN 13.5'	17. ELEVATION TOP OF HOLE 503.03
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 14.5'	19. SIGNATURE OF ~~INSPECTOR~~ Geologist R.W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0–5		Clayey-sandy silt w/ SS pebbles and cobbles, d Br, scattered organics, mod firm, moist		1 (0–1.5), 2 (1.5–3.0), 3 (3.0–4.5)	Samples were taken w/a 2" split spoon by pushing or w/ 8" folding auger where spoon would not penetrate. Samples were put in qt jars.
	5–10		Silty-sandy Gravel and Gravelly silty sand, d Br, saturated; gravel is subrounded-rounded, friable, oxidized SS ranging from pea size to cobble size.		4 (4.5–6.0), 5 (6.0–7.5), 6 (7.5–9.0), 7 (9.0–10)	

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-B3-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 2 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 3-B3	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10				10.5	
	11				8	
					11.5	
	12				9	
					13.0	
	13		(Base of Alluvium)			
	14		(Elwren fm) Shale, gr Gn w/r Br mottling.		10	
					14.5	
	15		Bot Depth- 14.5'			

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-B4

DRILLING LOG	DIVISION US Navy	INSTALLATION NWSC Crane Ind.	SHEET 1 OF 2 SHEETS

1. PROJECT: Hydrogeologic Studies, ABG
2. LOCATION (Coordinates or Station): NWSC Boundry, Little Sulphur Creek
3. DRILLING AGENCY:
4. HOLE NO. (As shown on drawing title and file number): 3-B4
5. NAME OF DRILLER: Dan Taylor
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 14.5
8. DEPTH DRILLED INTO ROCK:
9. TOTAL DEPTH OF HOLE: 16.5
10. SIZE AND TYPE OF BIT: 2" Split spoon + Auger
11. DATUM FOR ELEVATION SHOWN (TBM or MSL):
12. MANUFACTURER'S DESIGNATION OF DRILL: Failing 1500
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED: UNDISTURBED:
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED 6/30/87 COMPLETED 6/30/87
17. ELEVATION TOP OF HOLE: 503.77
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: R. W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0–5.5		Sandy silt w/ ss pebbles + cobbles, dBr, loose to mod firm, moist, becomes more sdy w/depth + more wet (below ~4')	1; 1.5; 2; 3.0; 3; 4.5; 4		Samples were taken w/a 2" splitspoon or w/ 8" folding auger where spoon would not penetrate. Samples were put in qt jars.
	5.5–9.0		Sandy silt, drBr, w/ss grit + pebbles, soft, v moist to wet.	6.0; 5; 7.5; 6; 9.0		
	9.0–10		Silty sand Gravel to gravelly silty sand	7		

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-84-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 2 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 3-84	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10		Saturated; gravel is subrounded to rounded, friable, oxidized SS, ranging from pea size to Cobble size, dy Br.		10.5	
	11				8	
	12				12.0	
					9	
	13				13.5	
	14		(Base of Alluvium)		10	
			(Elwren fm) Shale, dr Br + Gn, dry to sli moist (at top)		15.0	
	15				11	
	16				16.5	
	17		Bot. Depth - 16.5'			

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-B5-86

DRILLING LOG	DIVISION US Navy	INSTALLATION NWSC, Crane Ind.	SHEET 1 OF 2 SHEETS

1. PROJECT Hydrogeologic Studies, ABG	10. SIZE AND TYPE OF BIT 2" Split spoon + auger
2. LOCATION (Coordinates or Station) NWSC Boundry, Little Sulphur Creek	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) 3-B5	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED 7/1/87 — COMPLETED 7/1/87
7. THICKNESS OF OVERBURDEN 14.0	17. ELEVATION TOP OF HOLE 505.51
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 15.0	19. SIGNATURE OF ~~INSPECTOR~~ Geologist R.W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0–5		Sandy silt, d Br w/ss grit and pebbles, mod firm, moist becomes more pebbley w/depth		1 (0–1.5), 2 (1.5–3.0), 3 (3.0–4.5)	Samples were taken w/ 2" split-spoon or w/8" folding auger where spoon would not penetrate. Samples were put in qt jars.
	5–9		Sandy silt, dr Br, w/ss pebbles, soft, v moist–wet, occ Cobbles. Changes to dy Br w/ depth		4 (4.5–6.0), 5 (6.0–7.5), 6 (7.5–9.0)	
	9–10		silty gravelly sand to silty sandy gravel, dy Br, Saturated		7 (9.0–10)	

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-B5-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 2 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 3-B5	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10		Gravel is subrounded to rounded friable, oxidized SS, ranging from pea size to Cobble size		10.5	
	11				8	
					12.0	
	12				9	
	13				13.5	
	14		(Base of Alluvium)			
			(Elwren fm) Shale, dr Br, moist to dry.		10	
					15.0	
	15		Bot. Depth - 15.0'			

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT [redacted] HOLE NO.

Hole No. WES-3-86-86

DRILLING LOG	DIVISION US Navy	INSTALLATION NWSC, Crane, Ind.	SHEET 1 OF 2 SHEETS

1. PROJECT: Hydrogeologic Studies, ABG
2. LOCATION (Coordinates or Station): NWSC Boundry, Little Sulphur Creek
3. DRILLING AGENCY: WES
4. HOLE NO. (As shown on drawing title and file number): 3-86
5. NAME OF DRILLER: Dan Taylor
6. DIRECTION OF HOLE: ☑ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 13.0
8. DEPTH DRILLED INTO ROCK:
9. TOTAL DEPTH OF HOLE: 13.5
10. SIZE AND TYPE OF BIT: 2" split spoon + Auger
11. DATUM FOR ELEVATION SHOWN (TBM or MSL):
12. MANUFACTURER'S DESIGNATION OF DRILL: Failing 1500
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED: ; UNDISTURBED:
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED 7/2/86; COMPLETED 7/2/86
17. ELEVATION TOP OF HOLE: 507.37
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF ~~INSPECTOR~~ Geologist: R. W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Sandy-pebbley silt, w/occ ss cobbles, dBr-yBr, loose, moist.		1 (0–1.5)	Samples were taken w/2" split spoon or w/8" folding auger where spoon would not penetrate. Samples were put in qt jars.
	1				2 (1.5–3.0)	
	2				3 (3.0–4.5)	
	3				4 (4.5–6.0)	
	4		V moist to wet below 4.5'		5 (6.0–7.5)	
	5				6 (7.5–9.0)	
	6				7	
	7		Silty-gravelly sand, w/ ss cobbles, dyBr, Saturated, Gravel is subrounded to rounded, friable, oxidized SS, ranging from pea size to cobble size.			
	8					
	9					
	10					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

DRILLING LOG

DIVISION	
INSTALLATION	
SHEET 2 OF 2 SHEETS	
1. PROJECT	
2. LOCATION (Coordinates or Station)	
3. DRILLING AGENCY	
4. HOLE NO. (As shown on drawing title and file number)	3-B6
5. NAME OF DRILLER	
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	
7. THICKNESS OF OVERBURDEN	
8. DEPTH DRILLED INTO ROCK	
9. TOTAL DEPTH OF HOLE	
10. SIZE AND TYPE OF BIT	
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	
12. MANUFACTURER'S DESIGNATION OF DRILL	
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED / UNDISTURBED
14. TOTAL NUMBER CORE BOXES	
15. ELEVATION GROUND WATER	
16. DATE HOLE	STARTED / COMPLETED
17. ELEVATION TOP OF HOLE	
18. TOTAL CORE RECOVERY FOR BORING	%
19. SIGNATURE OF INSPECTOR	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10				10.5	
	11				8	
	12				12.0	
			(Base of Alluvium)		9	
	13		(Elwren fm) Shale, drBr + Gn		13.5	
			Bot. Depth - 13.5			
	14					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT

HOLE NO.

Hole No. WES-3-87-86

DRILLING LOG	DIVISION US Navy	INSTALLATION NWSC, Crane Ind	SHEET 1 OF 1 SHEETS

1. PROJECT Hydrogeologic Studies, ABG	10. SIZE AND TYPE OF BIT 2" Split Spoon + Auger
2. LOCATION (Coordinates or Station) NWSC Boundry, Little Sulphur Creek	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) 3-B7	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN 9.0	16. DATE HOLE — STARTED Aug 4, 87 — COMPLETED Aug 4, 87
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE 508.65
9. TOTAL DEPTH OF HOLE 10.5	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF ~~INSPECTOR~~ Geologist R.W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Sandy-pebbley silt w/ss cobbles, dBr to yBr, moist in Top to wet at bot. (Not Saturated)		1 (0–1.5)	Samples were put in Qt Jars
	1				2 (1.5–3.0)	
	2				3 (3.0–4.5)	
	3				4 (4.5–6.0)	
	4				5 (6.0–7.0)	
	5				6 (7.0–9.0)	
	6				7 (9.0–10.5)	
	7					
	8					
	9		(Base of Alluvium) (Elwren fm) Shale, dgnGr, mass sli moist-dry			
	10					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

WES-3-BB-B

DRILLING LOG	DIVISION US Navy	INSTALLATION Nwsc, Crane, Ind	SHEET 1 OF 2 SHEETS

1. PROJECT Hydrogeologic Studies, ABG	10. SIZE AND TYPE OF BIT 2" split spoon + Auger
2. LOCATION (Coordinates or Station) Nwsc Boundry, Little Sulphur Creek	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) 3-BB	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED Aug 5, 87 — COMPLETED Aug 5, 87
7. THICKNESS OF OVERBURDEN 11.0	17. ELEVATION TOP OF HOLE 511.42
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 12.5	19. SIGNATURE OF ~~INSPECTOR~~ Geologist R. W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Sandy silt w/ss pebbles, d Br - dy Br, moist		1	Samples were put in qt Jars
	1				1.5	
	2				2	
	3		Silty-Sandy Gravel, d-y Br, v moist - wet. Gravel is rounded to subrounded friable oxidized SS, ranging from pea size to cobbles.		3.0	
	4				3	
	5				4.5	
	6				4	
	7				6.0	
	8				5	
	9				7.5	
	10				6	
					9.0	
					7	
					9.8	

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

WES-3-88-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 2 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 3-B8	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE: STARTED / COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10				8	
					10.5	
			Base of Alluvium			
	11		(Elwren fm)		9	
			Shale, m-d Gr, mass		11.5	
			hd, sli moist-dry			
	12				10	
					12.5	
			Bot. Depth - 12.5'			
	13					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

Hole No. WES-3-B9-86

DRILLING LOG	DIVISION US Navy	INSTALLATION Nwse, Crane Ind	SHEET 1 OF 2 SHEETS

1. PROJECT Hydrogeologic Studies, ABG	10. SIZE AND TYPE OF BIT 2" splitspoon + Auger
2. LOCATION (Coordinates or Station) NWSC, Boundry, Little Sulphur Creek	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) 3-B9	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED Aug 7, 87 — COMPLETED Aug 7, 87
7. THICKNESS OF OVERBURDEN 10.5	17. ELEVATION TOP OF HOLE 513.84
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 12.0	19. SIGNATURE OF ~~INSPECTOR~~ Geologist R.W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0–2		Sandy silt w/ SS pebbles, dBr, moist		1; 1.5; 2	Samples were put in qt Jars
	2–12		Silty-Sandy Gravel, d to y Br, moist to v moist w/depth. Gravel is rounded to subrounded, friable, oxidized SS, ranging from pea size to cobbles		3.0; 3; 4.5; 4; 6.0; 5; 7.3; 6; 9.0; 7	

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-89-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 2 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 3-89	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10		More wet at bottom			
			(Base of Alluvium)		10.5	
			(Eluren fm)			
	11		Shale, m-dGr, mass,		8 11.3	
			hard, dry			
					9 12.0	
	12		Bot. Depth - 12.0'			

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT [redacted] HOLE NO.

DRILLING LOG	DIVISION U.S Navy	INSTALLATION NWSC	SHEET 1 OF 6 SHEETS

1. PROJECT: Hydrogeologic Studies, ABG
2. LOCATION (Coordinates or Station): Little Sulphur Creek Valley at NWSC Crane
3. DRILLING AGENCY: WES
4. HOLE NO. (As shown on drawing title and file number): WES-3-B10-86
5. NAME OF DRILLER: Dan Taylor
6. DIRECTION OF HOLE: ☑ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE: 58.7'
10. SIZE AND TYPE OF BIT: HQ wireline Core
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL: Failing 1500
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE: STARTED Oct 20/87 COMPLETED Oct. 21/87
17. ELEVATION TOP OF HOLE: 560.17
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR: Geologist Richard W. Hurst

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0–5.5		Silty-Sandy clay w/ SS frags, y Br			Ran R.R. Bit to 9.8' and set 6" dia PVC Casing to 5.5'. Started Coring w/ HQ wireline at 9.8'.
	5.5–10		Sandstone (Big Clifty Fm), olive-y Tan, v fine, oxidized, hd, friable, shallow ripples. Red & rBr clay along Jts, Limonite staining also.			
	10			9.8' Run 1		

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT) PROJECT

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 6 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10	50/5	Sandstone (cont.)			
	11					
	12					
	13			5.8/6.0		
	14			-0.2		
	15					
	16	50 60 0		15.8 Run 2		
	17	40 30				
	18					
	19	5		6.9/7.4		
	20			-0.5		

PROJECT | HOLE NO.

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

(TRANSLUCENT)

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 6 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	20		Sandstone (cont.)			
	21					
	22					
				22.7		Pull Depth
	23	5, 60, 10	1/2-1" clay in st	23.2		
				Run 3		
		0	clay in st			
	24					
		0				
	25					
	26					
				10.4 / 9.9		
	27	0	clay in st			
		0		+0.5		
	28	20				
		10, 40, 15	highly oxidized + Lim stn			— Lost all water return at ≈ 28.5'
	29					
	30	5	clay in st			

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 4 OF 4 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30		Sandstone (cont.)			
	31	0	stn			
		5	clay in it			
		45	stn			
	32	30	— 0.1' clay in jt.			
	33		Tan clay	33.1		
				Run 4		
		70				
	34	10				
		70				
		5				
	35					
		0				
	36	15				
		0				
	37			6.8		
				9.4		
	38	0		-2.6		
		0				
	39	Highly f.ac.				
	40					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 5 OF 6 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	40					
	41					
	42			42.2		Pull Depth (core overrun)
			(Beech Creek fm - 42.2')	42.5		
				Run 5		
		Tan clay	Limestone, Gr-dGr, f-m crystaline, fossiliferous, occ stylolites + shaley pts (toward bot.), highly jt'd.			
	43	34	solution			
		30	solution			
	44			4.3 / 4.4		
		0	solution			
	45	0	solution			
				0.1		
	46					
		0		46.9		
				Run 6		
	47					
	48	0				
		2				
		0				Core rounded by over drilling spl that dropped out of core 61.
	49	0		1.8 / 4.5		
				2.7		
	50					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 6 OF 6 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	50					
	51			51.4' Run 7		
	52		Lim stn along Jts			
	53					
	54		2.0' of Core loss			
	55		Clay and air filled solution cavities along Jts.	53/7.3 -2.0		
	56		Base of oxidation 56.7'			
	57		Rounded dGn Elwren sh inclus in bot 0.4'			
	58		Base of Beech Creek - 58.3' Top of Elwren shale dGn, mass hd	58.7		
	59		Bot. Depth - 58.7'			
	60					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT | HOLE NO.

Logs of Core Borings

Hole No. WES-3-C1-86

DRILLING LOG	DIVISION US Navy	INSTALLATION Crane, In	SHEET 1 OF 20 SHEETS

1. PROJECT NWSC Groundwater Study	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station) ABG Geologic Studies	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) WES-3-C1-86	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED: Aug 2, 1986 — COMPLETED: Sept 29, 1986
7. THICKNESS OF OVERBURDEN 4.2'	17. ELEVATION TOP OF HOLE ~~624.5~~ 624.8'
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 197.2	19. SIGNATURE OF ~~INSPECTOR~~ Geologist Richard W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Ls rk surface (work area)			Started Sampling w/an 8" dia Folding Auger
	1		clayey Silt, (ML-CL) yBr - rBr, w/rk frags, firm - v firm,			
	2					
	3					Set 6" dia. casing to 4.3' (steel)
	4					
	5		Sandstone, yBr & lGr, fine grained, cross bedded, wea & oxidized, occ soft clay lens, numerous random fractures that are tight to partially open and coated w/ limonite, few frac. have a clay filling. Frac are rough & irregular. (Fractures are shown in legend) w/ amount of dip	Run 1		Started coring w/ 4 x 5½" dia. Core bbl at 4.2'
	6			4.6/5.0		SS is either Hardinburg or (Penn) — Core Recovery — Run length
	7		sdy clay, gn Gr	-0.4		core loss (or go...)
			clay, gn Gr, Carbonized inclus			
	8		clay lens			
	9		Shale, olive Gr + yBr, thbd, flakey, wea (mostly ground away)	9.2		Contact 8.7' Golconda Fm
				Run 2 0.4/1.2		
	10		Limestone brGr, v hard Crystalline, Fossils	-0.8		Core bbl blocked ground away core

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-C1-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 20 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) WES-C1-86	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10	Core Loss; RRB 2.7	Shale, Blk th bd, w/ latter mGr shaley limestone lenses ranging from ½" to 2" thick, fossiliferous, hard, platey, beds dip ~10°	10.4; RRB+ 10.6; Run 3		Reamed hole to 10.6' + extended casing to 10.6' (6" steel)
	11					
	12			4.0 / 5.0		
	13	20	Limestone, mGr, vf granular sugary texture, massive, hard, contains small fossil frags.	-1.0 +0.9 -0.1		
	14	10°				
			Shale, Blk, th bd, Platey, fossiliferous, hard.	14.7		Pull depth
	15			15.6; Run 4		
	16	5	Limestone, l-m Gr, th-thick bd, vf granular to crystalline, fossiliferous (highly fossiliferous in Top 1.2') v hard, beds dip ~10°			
		09				
	17		sh pt 85° Jt is rough, irregular + stained w/ Fe (Open Jt)	4.6 / 4.1		
			sh pt.			
	18			+0.5 +0.4 / 5.0		
	19			19.3		Pull depth
			Shale, dGr-Blk, th bd (dip ~10°) fossiliferous, hard, platey	19.7; Run 5		8/4/86 water level - 13.0'
	20					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-C1-80

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 20 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	20		shaley Ls (20.0-20.6') fossiliferous, shale (as above			
	21		Limestone, lbr Gr, m-c crystalline, mass, fossiliferous, v hard	3.5 / 3.1 +0.4		
	22					
		80	- v Tight (fresh surface)	22.8' Run 6		- Flange
	23	10	— bed Jt partially open - tight, (?) non fresh sur			
	24					
		0	Base of Golconda - 24.7	3.9 / 4.3		
	25	30	Shale, Blk, thbd (dip 0-5°) platey-blocky, hard, occ pyrite nodules, occ small carbonized plant frags. (Fossils are not apparent)	~~-0.4~~ -0.2		
	26		(Big Clifty fm Indian springs Shale member)	26.9 / 27.1 Run 7		- Pull Depth
	27					
	28					
	29			3.2 / 3.9 -0.7 +0.9 / +0.2		
	30					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT | HOLE NO.

Hole No. WES- C1-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 4 OF 20 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) WES- C1- 86	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30		Blk shale (cont.)	30.1		- Pull depth
						Cleaned the mud pan + hole w/ clean water + started back caring w/ fresh water.
				31.0'		
	31			Run 8 31.3	1.3/1.0 +0.2	- Pull depth
						Pulled 6" steel casing, reamed hole to 11.8' + grouted in 7" O.D. PVC Casing.
				32.0		
	32			Run 9		8/5/86 - water level 4.0'
						Shale was packed in Core bbl in run 9 and was badly broken during removal from Core bbl.
	33					
				4.7/4.0		
	34					Before Run 9, ran a 5 5/8" dia. RR Bit to 32' to clean out hole (grout that had seep in at base of casing etc)
				+0.7		
	35					
	36		Limestone, lbr. Gr, th bd (dip 8°) w/ num shaley partings, m-c crystalline, fossils present, v hard.	36.0 Run 10		
	37					
	38			3.7/4.5		
				-0.8		
	39		Shale, Blk, th bd, platey-blocky, fossiliferous, hard.			
	40					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT | HOLE NO.

Hole No. WES-C1-46

DRILLING LOG	DIVISION	INSTALLATION	SHEET 5 OF 20 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	40		~~Base of Golconda fm.~~ ~~Top of Big Clifty fm.~~	40.5 Run 11		8/6/86 - water level 1.8'.
	41		Shale, dblGr, mass, blocky, num carbonized plant frags especially in top, num s'sides, hard. Small pyrite nodules near base + in top of SS below. No fossils	2.1/2.5 ~~-0.4~~ -0.3		
	42		s'sides along tight frac. dip ~ 35°	42.8		Pull depth
	43		Sandstone, lolive Tan to lyel Tan w/oxidized rBr zones, vF grained (uniform rounded qtz sd) w/ shallow cross bd + ripples, occ grGr shaley pts + swirls down to ~49'. Below 49' SS is sli coaser (vF-f), occ small rounded to elongate Fe inclus, mod oxd throughout w/oxd concentrated along some jts + bd planes, mod hard + friable	43.0 Run 12		
	44			3.6/4.0		num of spin marks on ends of core account for core loss
	45			-0.4		
	46		open jt(?) limonite stn	46.7		Pull depth 0.3' stickup (overrun shown on pull 13)
	47		(Big clifty SS)	47.0 Run 13		Cleaned mud pan + started back w/ clean water
	48					
	49		open jt(?) Lim stn	3.5/4.0 ~~-0.5~~ -0.4		Losing portion of drilling water at ~ 49.5'
	50					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT HOLE NO.

Hole No. WES-C1-00

DRILLING LOG	DIVISION	INSTALLATION	SHEET 6 OF 20 SHEETS

1. PROJECT
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number)
5. NAME OF DRILLER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE
10. SIZE AND TYPE OF BIT
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE — STARTED — COMPLETED
17. ELEVATION TOP OF HOLE
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	50		Sandstone (cont.)			
				50.6		Pull depth
				51.0 / Run 14		
	51					
	52	30	Tight			
	53	60	Tight	3.7 / 4.7		
		20	Tight	-1.0 -0.4		marked increase in drilling water loss at ~54'.
	54	35	open, lim stn			
			Below ~54' num Blk specks of Fe min grains occur	54.7		Pull depth
	55	20				
		35	Jts have light stain, tight	55.7 / Run 15		Taped hole to be 54.7'
	56	35				No water return at start of Run 15; using approx 12 gal/min while drilling
		10				
	57			4.0 / 4.0		
	58					
				58.7		Pull depth
	59	20				
		55	1 stn, tight	59.7' / Run 16		
	60					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT | HOLE NO.

Hole No. WES-C1-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 7 OF 20 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) WES-C1-86	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	60		Sandstone (Cont.)			
			spins			
				3.5 / 2.9 +0.6		
	61					
		55	Lim stn, open Jt, rgh planar			
	62					Pull depth 8/7/86 - No water in hole.
				62.2		
				62.6 Run 17		8/8/86 "
	63	20	spin Lim stn			
			Blk Fe specks are absent below 63.8'			
	64		Also Fe inclus are absent			
				4.8 / 4.9		
	65	5	spin, Lim stn	-0.1		
		5	spin, Lim stn			
	66		Base of major oxidation			
		85	Color Changes, to 16r below ~ 66.1'			
		90	-1/16" wide, healed			
	67			67.1		Pull
				67.5 Run 18		Tapel 67.1
			open in bot; Lim stn			
	68	40	-open, lim stn - Core lim stn ~ 3-4" above + below Jt.	100%		
	69		Joints are rgh + planar	4.4 / 4.8 -0.4 +0.4		
	70					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT | HOLE NO.

Hole No. WES-C1-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 8 OF 20 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) WES-C1-86	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	70	35, 60°	Sandstone (Cont.) 1-m Gr - Jts sl. stn, core olive ~2" either side of Jts			
	71			71.5		Pull depth
	72			72.3' Run 19		Taped 71.5'
	73		Gray SS, no Jts (as above)			
				100%		
	74			4.7 4.2		
	75			~~+0.5~~ ~~+0.8~~		
	76			76.2' 76.5 Run 20		Pull depth Taped 76.2'
	77					
	78		mech. breaks w/ splits along bd. (Num blk shaley pts?)	3.9 3.8		Started Coring 78.5' in New hole (see next sheet) 8/21/86
	79			~~+0.1~~ -0.2		
	80					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT | HOLE NO.

Hole No. WES-CI-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 9 OF 20 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	80		SS (cont.)	80.2 / 80.3 Run21	started coring 78.5' new hole	No water [illegible] Taped 80.2' 8/21/86 Hung core bbl in hole at 80.3' when making return to start Run 21. All attempts to remove core bbl failed. Started a new hole 4.5' west of orig hole. Ran a RR Bit in new hole to 78.5'. Started new hole coring at 78.5'. Set ~10' surface casing.
	81		(No Sts)	100% 4.6/5.0		
	82			~0.4		
	83		Base of Big Clifty clean abrupt contact 0-3° d.p 83.4'	83.1		Pull depth
		80°	Top of Beech Creek Limestone, lbr Gr, m-c crystalline, mass, v hard, dense, occ fossil, occ stylolites. Num pyrite nodules in top foot ~ 1/8" dia.	83.5 Run22		Top of Beech Creek Ls - 83.4'
	84	110				
	85			100% 4.6/4.5		getting ~50% water return
	86		stylolites at core breaks are shown in st column	~0.1		
	87			87.7		Pull depth
	88	10°	open - stylolites	88.0 Run23		
	89			100% 5.0/4.7		

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT | HOLE NO.

Hole No. WES-C1-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 10 OF 20 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: ✓ — UNDISTURBED:
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED: — COMPLETED:
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	90		Ls (Cont.)	+0.3		
	91		~5° dip			
	92	20'	Limestone, d Gr finely crystalline, mass, v hard, dense, fossiliferous, occ to num wavey shaly pts, + stylolites.			
		90		92.7 / Run 24		Pull depth
	93					
			most core breaks are along stylolites and are probably tight in situ. Very few to no jts.			
	94					
				4.9 / 5.0		
	95			-0.1		
	96					
	97					
			Ls, v d Gr (as above)	97.6 — 97.7 / Run 25		Pull
	98					Water Return Comes + goes.
	99			4.6 / 4.6		
	100					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT | HOLE NO.

Hole No. WES-C1-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 11 OF 20 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	100		Ls (Cont.)			
	101					
	102		Ls contains dk green sh inclus in bot 0.2'.	-0.1		
			Top of Elwren fm 102.1	102.2 / 102.3		Pull depth 8/22/81 water depth - 68.8'
			Shale, dgrGn, mass-th bd, hard, blocky-platey.	Run 26		
	103		(102.1 - 105.2') highly fractured w/num short intersecting random frac, num s'sides			
	104			3.2 / 4.4		
	105		Shale, drBr w/alter dgrGn layering, th bd, platey, v hard (No fractures)	~~-1.2~~ -0.1		No water return below ≈ 105'
				105.6		-Pull depth
	106		Sdy lens toward bot.			
				106.7		striations on top of Run 27 indicated a 1.1' core stick-up left from Run 26
				Run 27		
	107					
	108		SS, limey, mod hard, Gn			
			Shale, drBr, silty-vf sandy, mass, blocky, num random healed frac, hard, minor grGn mottling.	3.9 / 3.8		water return [illegible] & goes
	109					109.3 -Top of Run 28 / Run 28 (started in 3rd hole 9/25/86
	110					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

Hole No. WES-C1-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 12 OF 20 SHEETS

1. PROJECT
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number)
5. NAME OF DRILLER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE
10. SIZE AND TYPE OF BIT
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN | DISTURBED | UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE | STARTED | COMPLETED
17. ELEVATION TOP OF HOLE
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	110		Shale, dr Br (cont.)	110.5 / ~~Run 28~~		(8/22/81) Stuck core bbl at ~114.0' move off to WES-C2-86 will come back to WES-C1-86 later. (8/29/86)
	111					
	112					
	113					(Sept 16, 1986) Started Drilling w/ diamond shoe on 6" dia. steel casing in effort to over-shoot core bbl hung at ~114.0'. Hit on top of bbl at ~106'. Had to abandon hole. Pulled 6" casing. (Sept 23, 1986) Set a well screen between 92.0' & 102.0' (No trap). (See well plan for details) well screen is set in same hole w/ drill stem & core bbl.
	114					
	115		Shale, m-dgr Gn, th bd, platey, occ irregular sub-angular calc SS inclus, occ silty pts, increasing to num silty to vf ss pts in lower zone. hard	10.0 / 10.0		(Sept 23, 1986) Started Drilling w/a 5 5/8 RR bit in 3rd well at site of WES-C1-86, located 5' west of 2nd hole. Drilled to 109.0' and set 4" PVC Casing + grouted to surface. (Seal is in Elwren Shale).
	116					
	117					
	118					
	119		Base of Elwren	119.3		(Sept 25, 1986) Started Coring in 3rd well to complete WES-C1-86 at 109.3' (Top of Run 28)
			Top of Reelsville - 119.3' (Gradational contact) (cont.)	Run 29		
	120					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT | HOLE NO.

Hole No. WES-3-1-~~2~~

DRILLING LOG	DIVISION	INSTALLATION	SHEET 13 OF 20 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE: STARTED / COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	120		Calc Sandstone/sdy Limestone, m br Gr, th bd, w/num dgr Gn wavey silty shale pts, shallow ripples, num small pyrite nodules, hard-v hard brittle, vf grained.			
	121					
	122		conglomeritic, v hard			
	123		Shale, Blk-dGr, mass, blocky, hard brittle.			
	124			9.8/9.8		
	125		Calc Sandstone, (similar to above) m br Gr, v fine, laminated w/dgr Gn wavey shale pts, shallow ripples, occ small pyrite nodules, v hard, brittle.	100%		
	126					
	127					
	128					
	129		Base Fo Rockville	129.1		Flange
			Top of Sample fm - 129.1	Run 30		
	130		(Cont.)			

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT | HOLE NO.

Hole No. WES-3-C1-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 14 OF 20 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	130		Shale, Blk, w/num lGr, calc ss pts and discont thin lens, th bd, hard platey.			
	131					
	132		calc ss/sdy Ls, lGr, w/ wavey Blk shale pts, v hard, brittle.			
	133					
	134			100%		
	135			10.1/10.2		
				-0'		
	136		Shale, Blk, th bd, hard, platey, (blocky to fissile in some zones) occ v minor thin discont lGr ss lens.			
	137					
	138		sdy Ls, lGr. v hard.			
	139			139.1/139.2 Run 31		Pull out
	140					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

Hole No. WES-3-C1-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 15 OF 20 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	140		Shale (cont)			
			(num pyrite inclus generally parallel to bedding.)			
	141					
	142		Note Drill water return in this shale zone is leaving a blk. earthy oil film on top of water in pan.	100%		
	143			7.5 7.6		
				-x1		
	144					
	145					
	146		From ~ 146 to ~ 157' there are numerous ~ planar hairline fractures dipping 30-40° and healed w/calcite(?).	146.6 146.8 Run 32		Pull Depth
	147					
	148					
	149					
	150					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT | HOLE NO.

Hole No. WES-3-1986

DRILLING LOG	DIVISION	INSTALLATION	SHEET 16 OF 20 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	150		Shale (Cont.)			
	151					
	152					
				100%		
	153			9.8/10.0		
	154			~~0~~ 2		
	155					
	156			156.4		Pull Depth
				156.8 Run33		
	157					
	158					
	159					
	160					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

(TRANSLUCENT)

Hole No. WES-3-C1-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 17 OF 20 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	160		Shale (Cont.)			
	161					
	162					
	163			10.3 / 9.9		
	164			+0.4		
	165					
	166			166.7 / Run 34		- Flange
	167					
	168					
	169					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT | HOLE NO.

Hole No. WES-3-C1-80

DRILLING LOG	DIVISION	INSTALLATION	SHEET 18 OF 80 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	170		Shale (cont.)			
	171					
	172					
	173		Base of Sample Fm	10.2 / 10.2		
			Top of Beaver Bend Limestone - 173.4'			
	174		Limestone, mbrGr, m-c crystaline, v hard, v dense, fossiliferous, occ stylolites, Rock is unjointed except probable thin openings along bedding jts (as shown)	100%		
	175					
	176					
	177			176.9 Run 35		
	178					
	179		fresh			

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT | HOLE NO.

Hole No. 4E 3-1-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 19 OF 20 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	180		Limestone (cont.)			
	181					
	182					
	183					
				10.1 / 10.2		
	184		Base of Beaver Bend			
			Top of Bethel Fm 184.1			
			Sandstone, m brGr, vf grained w/num wavey dGr-Blk shale pts, hard brittle, calc(?), occ pyrite nodules.	100%		
	185					
	186					
				187.0 / 187.1		Pull Depth
	187					
	188					
	189					
	190					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT | HOLE NO.

Hole No. WES-3-21-82

DRILLING LOG	DIVISION	INSTALLATION	SHEET 20 OF 20 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	190		SS (cont.)			
	191					
	192					
	193			10.2 / 10.1		
	194			+0.1		
			shale, Blk, thbd, w/num 1 Gr ss lens, hard, platey	100%		
	195					
	196					
			sandstone (as above)			
	197			197.2		
			Bot. Hole - 197.2'			
	198					

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PROJECT | HOLE NO.

Hole No. WES-C2-86

DRILLING LOG	DIVISION US Navy	INSTALLATION Grane In.	SHEET 1 OF 14 SHEETS

1. PROJECT NWSC Groundwater Study	10. SIZE AND TYPE OF BIT HQ wireline
2. LOCATION (Coordinates or Station) (ABG) Burning Grounds), Geologic Study	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) WES-C2-86	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES 10
6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE: STARTED Aug 28, 1986 / COMPLETED Sept 4, 1986
7. THICKNESS OF OVERBURDEN 8.5'	17. ELEVATION TOP OF HOLE ~ 581.5'
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 132.7'	19. SIGNATURE OF INSPECTOR Geologist Richard W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Silt (ML) dBr, clayey, w/ small ss frags, becomes sdy w/ depth, firm, moist in upper 1½' becoming sli-moist w/ depth.			Drilled from 0.0 to 10.2' with an 8" dia. folding auger.
	1					
	2					
	3					
	4					
	5		Silt (ML), drBr + yBr, sdy, num ss frags w/ Fe crusting (rounded-angular), firm, sli-moist-dry.			
	6					
	7					
	8					
	9		Silty Sand, (soft ss) (Big clifty ss), ly Tan, vf, firm, oxidized weathered			
	10					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. CJES-C2-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 14 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10		Grades to SS			Set Temporary Surface Casing to ~10.0'.
		20	Sandstone, lt Tan w/lt Gr lens, vf uniform grain, th bd w/shallow cross bd'ing + ripples, (bed dip 8-10°), oxidized, mod hard, friable, Blk min stain + Limonite along jts.	Run 1		Started coring w/ HQ wireline bbl at 10.2' w/clean water.
	11	45				Lost all water return at ~11.5'
	12			4.8 / 5.3	Rec. / Run	
	13	40		(-0.5)		
	14					
		40				
	15	30		15.5		
		30		Run 2		
	16	45				
	17	80	Concentration of Blk Fe grains.			
		30		8.2 / 8.9		
	18	20	Thin clay lens			
		10				
		10	drBr, highly oxidized zone (Limonite concentration) soft rk.	(-0.7)		
	19	15				
		45				
	20	30				

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-C2-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 4 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	20		SS, (cont)			
		35	(20.3 - 22.2') slightly coaser, 1 Br, oxidized num Fe grains. (vf-m)			
	21					
		5 / 45	Joints have Blk min stain + limonite coating, generally rough + planar to sli irregular.			
	22	20				
		10	Color becomes 1 tan-Gr below 22.2 - 25.0'			
	23	10				
	24			24.4 / Run 3		
		18				
	25		(25.0 - 26.4') slightly Coaser (vf-m) 1-d Br num oxidized Fe grains, 1 Br + d Br			
		40 / 18				
	26					
	27	10				
			Color 1 tan-Gr below 26.4' to ~32.5'	8.1 / 9.1		
	28	10 / 10 / 15		(-1.0')		~27 to 28' Projected Top of Beech Creek Ls prior to Solutioning processes. Big Cliffy SS below ~28' has settled into Solution Cavities in upper Beech Creek Ls
	29	60 / 10				
	30					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-P2-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 4 OF 14 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30	90 20 20	SS, (cont) (Big cliffy)			
	31	80	Blk min stn along Jts.			
	32	40 50				
	33		open (clay filled?)			
		40	(33.5-36.5')	33.5' Run 4		
	34	0 50 50 40	SS is dBr + lBr, vf-m grain w/ minor coarse grains, num oxidized Fe grains + small Fe nodules up to ~ 1/4" size.			
	35		Lim + Blk min stn along Jts.			
	36	33 60 30				
	37		Note: The Core Loss zone represents solutioning in the upper Beech creek Ls. The overlying Big Cliffy SS has dropped down, or settled into the cavities created by the solutioning. Joints and bedding planes in the lower Big Cliffy SS have opened in proportion to the degree of settlement.	3.0/8.0' (-5.0)		
	38					
	39					
	40					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-CZ-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 5 OF 14 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	40					
	41			41.5 Run 5		8/29/86 water level ~36.0'
	42					
	43					
	44			3.0/6.0'		
		0	Solution surface ?			
	45		Limestone (Beech Cr.-Lower zone) m br Gr + wea in top 1½', vdGr + unwea in bot 1½', f-m crystalline, v hard, fossiliferous, slightly shaley w/ pyrite inclus at contact w/ underlying Elwren shale. Joints are coated w/ white calcareous + lim stn.	(~3.0')		~ Beech Creek Ls. (Lower zone)
	46					
	47		Pyrite crystals at contact ?	47.5 Run 6		Top Elwren fm 47.5'
	48		Shale (Elwren fm) dgr Gn, mass-th bd, mod hard, crumbly-flakey, occ s'sides			
	49			3.1/4.7 (~1.6)		
	50					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT | HOLE NO.

Hole No. WES-C2-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 6 OF 14 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	50		Shale (cont.)			In an effort to set 4" casing - ran a 5 3/4" RR Bit to ~ 45.0'. Rods broke off at top of 10' Guide above bit. Retrived tools from hole and went back in with a 6 3/4" RR Bit. Bit was "grabbing" so bad in cavity zone that the possibility of breaking off in hole over-shadowed continuing w/RR Bit. Using a diamond shoe on end of 6" casing - reamed hole to 54.8' and set 4" PVC casing to 54.8'. Sealed casing in the Elkuren sh w/ Grout. 9/3/86 - Started back coring w/HQ wireline bbl
	51					
	52		Shale, dgrGn w/alter drBr layering, thbd, platey, hard	52.2' Run 7		
	53			2.1 / 2.6		
	54		num drBr veinlets (like healed frac's) in Gn Sh.	-0.5		
	55		Claystone, drBr, mass, hd, blocky, s'sides dip ~5°.	54.8' Run 8		
	56		Shale, dgrGn, mass, highly frac w/ occ angular GnGr Ls(?) and drBr claystone inclus, hard, blocky, (zone has somewhat of a brecciated appearance)			Getting most of water return thr. 4" casing.
	57		mottled w/ drBr clst.	7.9 / 8.3		
	58			-0.4		
	59					
	60		See next sheet.			

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. CWES-C2-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 7 OF 14 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	60		Shale dGnGr, w/alter lens + partings of mGr, vf silty sandstone (v thinly laminated sh + SS), hard			
	61					
	62					
				62.7		Pull depth
	63			63.1		
				Run 9		
			Top Reelsville fm 63.8'			Top Reelsville fm 63.8'
	64		Limestone, v hard, brittle olive grBr, sdy, ferruginous, lGr, vf granular-crystalline sdy(?)			
	65		alter olive grBr + lGr Ls (as above), cross bedding (Breaks appear fresh)			
	66		lGr Ls (as above)	10.4 / 10.0		
			(66.4-70.0) Shale dGr laminated w/m Gr silty SS/Ls, (Similar to above), small angular Ls frags are included in the top 0.3'.	+0.4		
	67					
	68					
	69					
	70					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-CZ-B6

DRILLING LOG	DIVISION	INSTALLATION	SHEET 8 OF 14 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	70	3	(70.0 - 73.1) Sandstone, mgr Br, fine grained, mass w/num grGn shale partings & flattened inclusions, v hard, brittle (Jt's are rgh, irreg, part filled w/Gr clay			
	71	65				
			Ls, lGr, w/occ Gn sh pts, v hard, brittle			
	72		Ls (as above)			
	73		← Top of Sample fm	73.1		Top of Sample fm 73.1'
			Shale, dGr, th bd w/ num to occ lGr, v fine thin SS / Ls lens, hard, platey - flakey	Run 10		
	74					
	75					
	76			10.0 / 10.0		
	77					
	78					
	79					
			Ls, lGr, v fine, granular, brittle, v hard, occ Sh pts.			
	80					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

Hole No. WES-C2-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 9 OF 14 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE: STARTED / COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	80		Shale (Cont.)			
	81					
	82					
	83			83.1 Run 11		Full 9/4/86
	84					
	85		Ls, olive Gr, v hd, v Fine.			
	86					
	87			8.8'/10.0		
	88			100%		
	89					
	90					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

Hole No. WES-C2-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 10 OF 14 SHEETS

1. PROJECT
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number)
5. NAME OF DRILLER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE
10. SIZE AND TYPE OF BIT
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE — STARTED — COMPLETED
17. ELEVATION TOP OF HOLE
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	90		Shale (cont.)			
	91					
				91.9'		Pull depth
	92					
	93			93.1		
				Run 12		
	94					
	95			100%		
	96			10.1 / 9.4		
				(+0.7'		
	97			+0.5		
				(+1.2')		
	98					
	99					
	100					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-CZ-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 11 OF 14 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	100		Shale (cont)			
	101		Sandstone, mGr, fine grained (uniform rounded qtz sd grains), mum vdGr-Blk wavey shale partings, hard, sli friable. (101.0-114.5')	102.0		Pull depth
	102			102.5 / Run 13		
	103	S S				Good water Ret.
	104	60	It's rough, irregular, fresh (v tight insitu)	100%		
	105	80				
	106		lighter Gr + less friable ss than above and below, calcareous (sdy Ls?)	10.4 / 10.3		
	107			(+0.1) +0.4 / (+0.5)		
	108					
	109	70				
	110					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-C2-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 12 OF 14 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	110		Sandstone (Cont.)			
	111	Gs	Fresh			
	112			112.4		Pull depth
				112.8		
				Run 14		
	113	Gs	Fresh			
	114					
			Shale, dGr, thbd, mod hard, "earthy"			
	115					
				100%		
	116			10.4 / 10.0		
			Alter. Ls lens up to 1" thick			
			- clay, vlGr, soft	+0.4		- Top of Beaver Bend Ls - 117.0'
	117		Limestone, l-m grBr, Coarse grained oolitic (?) v hard, brittle.			
	118					
			- dGr Sh lens			
			Limestone, Gr-brGr, fine-med grained-crystalline, oolitic (?), v hard, brittle, occ well developed stylolites			
	119					
	120					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

Hole No. CVES-C2-26

DRILLING LOG	DIVISION	INSTALLATION	SHEET 13 OF 14 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	120		Ls (cont.)			
						Loosing 50% of drill water
	121					
	122	90 80	partially open, light stn along Jts.			
				122.8 Run 15		Flange
	123					
	124					
	125	50°	- Lost all drilling water that was remaining at this depth			— Lost all drill water.
	126					
	127	15				
	128					
	129		Top of Bethel Fm			Top of Bethel Fm. 129.5'
	130		Shale, dGr th bd w/ num vf ss pts + thin			

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-CZ-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 14 OF 14 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED — COMPLETED 9/4/86
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	130		disc shaped lens, hard, platey.			
	131					
	132					
	133		Bottom of hole 132.7'			water level 9/5/86 68.7' (water in Beaver Bend Ls)
	134					
	135					
	136					
	137					
	138					
	139					
	140					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

Hole No. WES-C3-86

DRILLING LOG	DIVISION US Navy	INSTALLATION Crane, In	SHEET 1 OF 15 SHEETS

1. PROJECT NWSC Groundwater Study	10. SIZE AND TYPE OF BIT HQ wirline Core Bbl
2. LOCATION (Coordinates or Station) (ABG) (Burning Grounds), Geologic Stud.	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) WES-C3-86	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES 11
6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED 9/5/86 — COMPLETED 9/13/86
7. THICKNESS OF OVERBURDEN 14.0'	17. ELEVATION TOP OF HOLE ~ 598.5 (Topo map)
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 150.7'	19. SIGNATURE OF INSPECTOR Geologist Richard W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Clayey Silt (ML), Tan, w/small to large rk frags, v firm, moist			Drilled from 0.0 to ~8.0' w/ 8" folding auger; 8.0 to 17.2 w/ pitcher sampler using water; 17.2 to 18.5 w/ 6" RR bit; + 18.5 to Bot. w/ HQ wire line core bbl using water. (Bot Depth 150.7')
	1					
	2					
	3		Silty Clay (CL) olive Br - Br, w/rk frags, v firm, moist			
	4					
	5					
	6					
	7		Silty Clay (CL), rBr, v firm, moist			
	8		Clay (CL) rusty Br, w/ abundant rk frags (mostly sub-rounded to angular wea SS frags), v firm, moist.			
	9					
	10					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

File No. WES-C3-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 15 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10		Clay w/rk frags (cont.)			
			← Base of stream cut			
	11		Clayey Sand (SC) rusty Br & lGr (mottled) mass, firm, moist, highly wea SS frags occur w/depth. (Zone is wea residual on top of Big clifty sandstone)			
	12					
	13					
	14		Sand to soft sandstone, (highly wea SS) w/ mod hd SS frags, oxidized, vf-f, moist, yBr,			
	15		Big clifty SS			
	16					
	17		← Top of True Rk (17.2')			
			Sandstone, lyBr, vf-f, uniform grained rounded qtz sd, thin bd, hard, friable, oxidized, shallow cross bedding + ripples. (weak sandstone)	Run 1		Set 6" dia PVC surface casing to 18.5'. 9/8/86 started coring w/ HQ wire line 661, using water.
	18					
	19		Big clifty SS			
	20					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-C3-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 15 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	20		SS (cont.)			
	21					
	22					
		40		9.5 / 9.5	Rec. / Run	
		45				
	23		Jts are tight, lightly stn sli rough, planar			
		20				
		20				
	24	15				
		20				
	25					
	26					
	27					
	28			28.0 / Run 2		
	29		← Br. highly oxidized + lim stn, occ Fe nodules, softer than above & below			← Zone should correlate w/ 18.2-19.3' in WES-C2-86
	30					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-C3-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 4 OF 15 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30		SS (cont)			
	31					good water return
	32	15, 20, 30				
	33			33.2 / Run 3		
	34	10, 10, 30				
	35		35.7' probable high ground water level in zone confined above the Elwren Shale fm.			
	36		(35.7-42.5') SS is pale Br + less oxidized than above	10.2 / 10.2		
	37					
	38					
	39					
	40					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-C3-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 5 OF 15 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	40		SS (Cont.)			
	41	0				
	42	0				
	43	0				Flange
	44	60	d Br coarser grained oxidized num small oxidized Fe grains (Base of Big Clifty SS) 45.1'	Run 4/		
	45	5°	dGr shale lam slight solutioning at Ls contact. (open Jt)			- Top of Beech Creek Ls. - 45.1'
	46		Limestone (Beech Cr) l-m grBr m-coarse crystalline, mass, fossiliferous, v hard, v dense, Brittle,			
	47	0 3	Open jts along bedding have tan-yBr clay coating or stainins (oxidized)	10.0 / 10.0		Loosing slight amount of drill water
	48	70 5	Tight			
	49	70	Tight			

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-13-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 6 OF 15 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	50		Ls (cont.)			
		0	Tan clay stn			
	51					
	52					
	53	0	Tan clay along Jt.			
		0	53.4' – probable low ground water level (?) in zone above the Elwren shale fm. No oxidation along Jts below 54.4'	53.4 / Run 5		good water Return
	54					
		5	Limestone Below 53.1' is dGr, fm crystalline, mass, fossiliferous w/ occ to num Blk wavey shaley pts and or poorly to well formed styolites (similar to above otherwise)			
	55					
	56			9.9 / 10.0		
				-0.1		
	57					
	58					
	59					
	60					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-C3-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 7 OF 15 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	60	0	Ls (Cont.)			
		3				
	61					
	62					
		6				
	63			63.3 / 65.4		Pull Depth
				Run 6		
	64					
		5				Good water Return
	65		Num dgrGn sh inclus in bot 0.5'.			
			Base Beech Creek Ls (65.5') Elwren fm (Top)			Top Elwren fm - 65.5'
	66		Shale dgrGn, thbd, mod hd, highly frac. (random) w/ s'sides.			
	67			10.1 / 10.6		
	68		drBr + grGn mottled			
	69					
	70		Shale or Claystone drBr mass, hard			

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-C3-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 9 OF 15 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	70		Blocky - Flakey, num random frac. w/s'sides			
			Shale (cont)			
	71					Reamed hole w/6" RR Bit to 71.5' + set 4" PVC Casing Grouted the Casing w/ seal set 6' into the Elwren Sh.
	72					
	73					
				73.4 / Run 7		Flange 9/11/86
	74					
	75					Good water Return
	76					
	77		Shale, d gr Gn, mass at top w/occ sub-rounded to sub-angular Gr LS (?) inclus ranging From 3/4" to >2" in size. Grades into th bd w/depth, mod hard-hard,	9.7/10.0 -0.3 -0.1		
	78					
	79		Thinly laminated w/silty sand pts + lens below ~79', shallow cross bd + ripples.			
	80					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-C3-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 9 OF 15 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	80		Shale (cont)			
	81		Sandstone, mgr Br, vf grained, w/gr Gn shaley pts, hard, cross bd, shallow ripples.			
	82		Base of Elwren			Top of Reelsville - 82.3'
			Top Reelsville fm 82.3' Limestone, lgr Br, sdy, f granular - crystalline, v hard, brittle, cross bd (?)			
	83			83.2' / 83.4 Run 8		Full depth
	84		num wavey Gn shaley pts.			
	85		conglomeratic - fossiliferous (?)			good water return.
	86		Shale, vd gn Gr, mass - th bd, blocky-flakey, occ ls inclus up to ~3/4" size, num random frac w/s'sides, hd - mod hd.	10.2/10.0		Note from 85.4 to 85.9' frac's are coated w/ Blk Crude oil.
	87		laminated w/lGr ss lens.			
	88		Laminated w/lGr ss lens			
	89		Sandstone, m Gr, v f grained, w/num d Gr			
	90					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-C3-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 10 OF 15 SHEETS

1. PROJECT
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number)
5. NAME OF DRILLER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE
10. SIZE AND TYPE OF BIT
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN | DISTURBED | UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE | STARTED | COMPLETED
17. ELEVATION TOP OF HOLE
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	90		wavey shale pts, shallow cross bd, hard, brittle			
	91		Base of Reelsville			Top of Sample fm - 91.4'
			Top Sample Fm (91.4')			
	92		Shale, vdGr-Blk, th bd, w/occ to num thin lGr ss lens and pts (from 91.4 to 99.0'), hard platey-blocky, occ pyrite inclus.	93.4 Run 9		
	93					
	94		- Ls len			
						Good water Return
	95					
	96			9.7/10.0		
	97			-0.3		
	98					
	99		From 99.0' to 110.2' occ thin ss lens,			
	100					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

Hole No. WES-03-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 11 OF 15 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	100		Shale (Cont.)			
	101					
	102					
	103			103.1		Full depth
				103.4		
				Run 10		9/12/86
	104					
						Good water Return
	105					
	106					
	107			10.3 / 10.0		
				+0.3		
	108					
	109					
	110					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

Hole No. WES-C3-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 12 OF 15 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	110		Sh (Cont) (110.2 to 111.3) - num SS/Ls lens			
			-Ls lens			
	111					
	112					
	113			113.4		
				Run 11		
	114		(113.5 to 120.5') num 1Gr SS lens + pts.			
	115					
	116					
	117			10.2 / 10.2		
	118					
	119					
	120					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

Hole No. WES-C3-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 13 OF 15 SHEETS

1. PROJECT
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number)
5. NAME OF DRILLER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE
10. SIZE AND TYPE OF BIT
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN | DISTURBED | UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE | STARTED | COMPLETED
17. ELEVATION TOP OF HOLE
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	120		Shale (Cont.)			
	121		Sandstone, 1-m grBr, vf-f grained, w/num vd Gr wavey Shaley pts, Cross bd, hd sli friable - brittle.			
	122		calc ss / sdy Ls, v hd, brittle, occ fossils, lgrBr.			
	123			123.6 / Run 12		
	124					
	125					
	126		Shale, Blk, th bd w/ lGr ss lens + pts, occ pyrite inclus, hd, platey - flakey.			
	127			9.7 / 10.0		
	128			~~-0.3~~ -0.1		0.1' core ground away in shale
	129					
	130		see Next sheet			

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

Hole No. WES-C3-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 14 OF 15 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	130		Sandstone, 1-m gr Br, (as above)			
	131					
	132					
	133		Shale, dGr-Blk, th bd, hd, platey, flakey	133.4 / 133.6		Full Depth
	134					water return left a Blk "earthy", "flat" film on water in mud pan; noticed in lower zone of shale; possibly near top of Ls.
	135					
	136			10.2 / 10.0		
	137		Base of Sample fm			Top of Beaver Bend Ls – 137.2'
	138		Limestone (Beaver Bend fm), m gr Br, f-m granular-crystalline, fossiliferous, occ stylolites, v hard, v dense, Brittle, joints along bdlng as shown are most probably open.	+0.2		loosing ~25% of drill water.
	139					Lost all drill water at ~139.5'
	140					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

Hole No. WES-C3-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 15 OF 15 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	140		Limestone (Cont.)			
	141					
	142	o				
		o				
	143	o				
				143.6		
				Run 14		
	144					
	145			3.7/3.7		
	146					
	147		Ls has num shaley pts/or num stylolites containing insoluable residue (Blk)	147.3		Blocked
				Run 15		
	148	o		1.7/1.7		
	149		Bot of Beaver Bend.	149.0		Blocked Top of Bethel Fm - 149.0'
			1 Gr soft clay	Run 16		
			Shale, v dgn Gr, sdy in top 0.5', mass, num random frac, hd, blocky-flaky	1.7/1.7		Bot. Depth - 150.7'
	150			150.7		

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-C4-86

DRILLING LOG	DIVISION US Navy	INSTALLATION Crane In	SHEET 1 OF 7 SHEETS

1. PROJECT NWSC Groundwater / Geologic studies	10. SIZE AND TYPE OF BIT HQ Wire line core
2. LOCATION (Coordinates or Station) 48G	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) WES-C4-86	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN 3.7'	16. DATE HOLE — STARTED 9/30/86 — COMPLETED 10/3/86
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE ~623.0'
9. TOTAL DEPTH OF HOLE 85.3'	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR Geologist Richard W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Silt (mL) dBr, w/occ ss frags, mod firm, sli moist			Sampled w/8" dia Folding auger to 11.2'. Set Tempo. Casing to that depth. Cored from 11.2 to 21.8' w/ HQ wireline using clean water. Core recovery was poor so went back from 11.2' to 21.8' w/ an 8" folding auger
	1		Silt (mL), yBr-rBr, sdy in part, occ ss frags, firm, sli moist.			
	2					
	3		Silty clay (CL), yBr, w/occ ss frags, vfirm, sli moist.			
	4		Shale, d olive-gr olive, th bd, v firm, weak, blocky-flakey. num s'sides.			← ~ Base of Golconda fm(?) (determined from stratagraphic projection)
	5		(Big Clifty fm)			
	6					
	7					
	8					
	9		Color grades to dGr at ~9' to 13.5'			
	10					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT | HOLE NO.

Hole No. WES-C4-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 9 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10		Shale (Cont.)			
	11			11.2 / Run 1		Started Drill at 11.2' w/ H.Q. Wireline; ground most of shale away.
	12					
	13					Note: Ls frags w/ Solution surfaces in "float" down slope, indicate Ls interbeds are possibly dissolved out of the shale near the valley side. The Ls beds were incountered in boring WES-C1-86, and are also present elsewhere in the valley walls.
			Shale d olive, wea (as above)			
	14					
	15			2.8/10.0		
	16					
	17					
	18					
	19					
	20					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WE-[illegible]

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 9 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	20		Shale (Cont.)			
	21			21.2		Ran 9" auger (folding) to 21.8')
				21.8		
	22			22.4		Pushed 2" split spoon
						cleaned hole to 23.2' w/ 4" R.R.C.-4
	23			23.2		Pushed 6" PVC casing to 23.2'.
				24.1		Started back w/ HQ wireline coring 0 – 23.2'.
	24		high [illegible]			
			Top of [illegible] Sandstone			
	25		Sandstone, l olive tan, th bd, w/shallow ripples, v fine grained (uniform qtz), hard, friable, occ Fe inclus (small)			
	26			9.9/10.1		(grey [illegible]) healed [illegible]
	27			0.2		
	28		[illegible]			
	29					
	30					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. [illegible] 04-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 4 OF 9 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30		Sandstone (cont.)			
	31					
	32					
	33			33.1 / 33.3 / [illegible]		- Pull Cap
	34					
	35		1in stn, pr Br			
	36			9.8 / 9.6 / +0.2	RaC / RHn	
	37					
	38					
	39		1in stn [illegible]			

Hole No. WES-C486

DRILLING LOG	DIVISION	INSTALLATION	SHEET 5 OF 9 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	40	2, 0, 5	Lt s-h SS, (cont.)			
	41					
	42					
				42.9 / Run 4		
	43					
						Losing 25-50% water return.
	44					
	45					
	46			10.2 / 10.2		
	47					
	48	40, 26	Lim s-h			
	49	5	highly Lim s-h, but is similar to above below in hardness (no data pick)			
	50					

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PROJECT | HOLE NO.

Hole No. WES-C4-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 6 OF 9 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	50		55, (Cont.)			
		45	limestone w/ th clayey coating			
		50				
	51					
	52					
	53			53.1 / Run 5		Losing ~ 25-50% water return
			light stn, tight			
	54					
	55					
	56					
	57			9.9 / 10.0		
			light stn 1/16" clayey filling			
	58					
	59					
	60					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT | HOLE NO.

Hole No. WES-C4-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 7 OF 9 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	60		SS, (Cont.)			
	61	5	lim stn			
	62		v hard calc ss			
			Base of Big Clifty ss-62.4'			
			Top of Beech Creek Ls.			
			ox dized			
	63	6	clay along jt ox dized	63.0 / 63.1		Full Depth
				Run 6		
	64		Limestone, l br Gr, mass, m-c crystaline, fossiliferous, v hard + dense, occ stylolites lim stn along jts to a depth of 73.3'			Losing ~75% water return
	65	3	lim stn			
		3	highly oxidized rusty br, still v hd.	10.3 / 10.2		
	66	3		+0.1		
	67					
	68	2				
	69		Ls changes to dk Gr color at 68.8, fm crystaline, fossiliferous, increase in stylolites + blk wavy shaley pts.			
		5	lim stn			
	70					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

Hole No. WES-C4-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 8 OF 9 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	70		Ls (Cont.)			
	71					
	72	S	Lim stn, tan clay filling (S)			Losing ~ 75% water Return.
		S	stn			
	73					
			Lim stn (Base of oxidation) 73.3' open	73.3 / Run 7		
	74					
	75					
			dk & stn (open)			
	76	S				
	77		Num stylolites & occ to num Blk wavy shaley pts. below ~ 76'.	10.1 / 10.1		
	78					
	79					
			-sh Lens, Blk			
	EL					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-C4-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 9 OF 9 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED 10/3/86
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	80		Ls (cont.)			
	81	5	slight open ?			Losing ~ 75% water return
			vd Gr below ~80'			
	82					
			small grGn shale inclus in bot 0.1'.			
	83		Base of Beech Creek Ls	83.4		
		0	Top of Elkveen Sh - 83.4'	Run 8		
	84		Shale, dgrGn, mass, hard, blocky num random 5' sides.	1.9/1.9		
	85			85.3		
			Bot. Depth - 85.3'			
	86					
	87					
	88					
	89					

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PROJECT | HOLE NO.

Hole No. WES-CS-86

DRILLING LOG	DIVISION US Navy	INSTALLATION Crane In	SHEET 1 OF 5 SHEETS

1. PROJECT: NWSC Groundwater Study, Geologic Study
2. LOCATION (Coordinates or Station): ABG
3. DRILLING AGENCY: WES
4. HOLE NO. (As shown on drawing title and file number): WES-CS-86
5. NAME OF DRILLER: Dan Taylor
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 6.5'
8. DEPTH DRILLED INTO ROCK:
9. TOTAL DEPTH OF HOLE: 44.0'
10. SIZE AND TYPE OF BIT: H, Q Wireline Core
11. DATUM FOR ELEVATION SHOWN (TBM or MSL):
12. MANUFACTURER'S DESIGNATION OF DRILL: Failing 1500
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED: UNDISTURBED:
14. TOTAL NUMBER CORE BOXES: 3
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED 10/4/86 COMPLETED 10/7/86
17. ELEVATION TOP OF HOLE: ~579.5
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: Geologist Richard W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Silt (ML), dBr, clayey, w/occ small ss frags. mod firm, v moist (recent heavy Rain)			Started drilling w/ 8" Folding Auger at 0.0 to 6.5'. oct/4/86
	1					
	2					
	3		Silty clay (CL), dBr, w/num sub-rounded to sub-angular wea ss frags, firm, moist			
	4					
	5		Clay (CL), silty-sdy, drBr, mod firm, moss, occ ss frags,			
	6					drove split spoon from 6.5 to 7.0'.
	7		Sandstone (Big Clifty) yBr w/rusty Br zones, th bd w/shallow ripples, highly oxidized, hard, friable (weak ss), vf grained, uniform rounded qtz,			Ran a RR Bit from 7.0 to 11.2' & set 6" PVC Casing
	8					good water return
	9		Highly Jointed w/lim stn & sdy clay filling along most Jts.			
	10					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-C5-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 5 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10		SS (cont.)			
	11	5, 0, 5, 0, 0, 5		11.2' Run 1		started Coring at 11.2' w/ HQ wire line Core bbl.
	12	5, 0, 0, 5, 0				
	13	0, 5, 5				losing ~25% of water
	14	5, 15, 0, 0	v highly oxidized, rusty Br.			
	15	0, 0, 0, 5				
	16	30, 10, 40		8.8/10.2		
	17	10, 0		-1.4'		
	18	5, 0, 0				
	19	45, 0, 0, 5				
	20			20.0		Pull depth ?

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

Hole No. WE3-CS-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 5 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	20		SS (Cont.)			
			- core left in hole + reamed out after grouting. (most probably)			
	21			21.4'		Oct 6, 86 - Grouted casing in hole at 11.2'.
				Run 2		
		0				
		5				
		5				
		0				
	22	0				Oct 7, 86 started back coring
		10				
		5				
	23	60				Loosing ~50% of drill water.
		60				
		50				
	24	70				
		60				
		75		7.3/9.4		
	25					
		15		-2.1		
		0				
	26					
	27					Lost all drilling water at ~27.5'
		10				
		5				
		10				
	28					
	29		Core loss zone related to solutioning in the upper Beech Creek Limestone			
	31					

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PROJECT | HOLE NO.

Hole No. WES-CS-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 4 OF 5 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30		Core loss zone (cont)			
				30.8 Run 3		
	31		← solution surfaces on Ls frag.			Drill rods dropped between 31.2' to 33.0'
	32		← rods dropped from 31.2 to 33.0'			
	33					
	34		Limestone (Beech Creek - middle/lower zone) m Br Gr, sl. wea appearance w/lim stain along jts to a depth of 36.3', f-m crystaline, foessiliferous, v hard, v dense, brittle.	5.8/8.6 2.8'		solution surface on top of Ls.
	35					
	36		← Base of oxidation 36.3' - - Limestone is dGr, + unwea below 36.3', num wavey shaley pts + stylolites			
	37		← dive Br clay fillings			
	38					
	39			39.4 Run 4		
	40					

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ole No. WES-C5-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 5 OF 5 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED 10/4/86 — COMPLETED 10/7/86
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	40		Ls (cont.)			
	41		dGn sh inclus in bot 0.2' Ls.	4.6/4.6		
	42		Base of Beech Creek			
			Top of Elwren - 42.2' Shale, dgrGn, mass, blocky, mod hard.			
	43					
	44		Bot. Depth - 44.0'			
	45					
	46					
	47					

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PROJECT | HOLE NO.

ple No. WES-C6-86

DRILLING LOG	DIVISION U.S. Navy	INSTALLATION Crane In	SHEET 1 OF 10 SHEETS

1. PROJECT: NWSC Groundwater/Geologic studies
2. LOCATION (Coordinates or Station): ABG
3. DRILLING AGENCY: WES
4. HOLE NO. (As shown on drawing title and file number): WES-C6-86
5. NAME OF DRILLER: Dan Taylor
6. DIRECTION OF HOLE: ☑ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 10.2
8. DEPTH DRILLED INTO ROCK:
9. TOTAL DEPTH OF HOLE: 100.6
10. SIZE AND TYPE OF BIT: HQ wireline core
11. DATUM FOR ELEVATION SHOWN (TBM or MSL):
12. MANUFACTURER'S DESIGNATION OF DRILL: Failing 1500
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED: UNDISTURBED:
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED Oct. 9, 1986 COMPLETED Oct. 14, 1986
17. ELEVATION TOP OF HOLE: ~ 624.0'
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: Geologist Richard W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Silty clay (CL) y Br, num ss frags, firm, moist, mass.			Drilled to 10.2' w/ 8" dia folding auger. Hit Ls at 10.2'. Ran 6 3/4" RR Bit to 11.0' + grouted 6" dia PVC casing in at 11.0'.
	1					
	2					
	3					
	4					
	5					
	6		Silty clay (CL), rBr w/ occ small ss frags + sand "grit", firm, moist.			
	7					
	8					
	9		Silty clay, (CL), olive Br (wea shale?) th bd. firm, moist.			
	10					

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PROJECT | HOLE NO.

Hole No. WES-C6-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 10 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED — COMPLETED
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10		(CL) cont.			Drilled from 10.2 to 11.0 w/ 6 3/4" RR Bit. Set 6" dia PVC Casing to 11.0'.
			Limestone, mgr Br, m-c crystaline, scattered fossils, v hard, v dense.	11.0' Run 1		Started coring at 11.0' w/ HQ wireline bbl, using clean water.
	11					
	12					
			Base of Galena 12.7'			
			Top of Big Clifty fm.			
	13		Shale, vd Gr-Blk, th bd, platey-blocky, hard, dense, abundant carbonaceous flakes + specks along bedding.			
	14			10.1/10.1	(Rec./Run)	
	15					
	16			100%		
	17					
	18					
	19					
	20					

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PROJECT | HOLE NO.

Hole No. WE3-C6-B6

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 10 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	20		Shale (cont.)			
	21			21.1 Run 2		
	22					
	23					
	24					
	25			8.8 / 10.0		
	26			-1.2 +0.4 -0.8		
	27					
	28					
	29					
	30					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

Hole No. WES-C6-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 4 OF 10 SHEETS

1. PROJECT
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number)
5. NAME OF DRILLER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE
10. SIZE AND TYPE OF BIT
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE — STARTED — COMPLETED
17. ELEVATION TOP OF HOLE
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30		Shale (cont.)			
				30.7		Pull depth
	31			31.1 Run 3		
	32					
			Sandstone (Big Clifty) olive tan w/ rusty Br zones, v fine uniform grained th bd with shallow ripples, oxidized, hard, friable, occ small Fe inclus, Lim stn along most Jts.			
	33					
	34					
				9.8 / 10.1 9.8		
	35			-0.3 +0.7 +0.4		
	36			100%		
	37					
	38					Started Losing ~25% of drill water
	39					
	40					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT | HOLE NO.

Hole No. WES-C6-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 5 OF 10 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	40		SS (cont.)			
		20 1 60		40.5		Pull depth
	41	40 30 50 30 0	Lim stn (open) thin clay coating	~~44.2~~ Run 4		
	42	20 0				
	43					
	44			10.2 / ~~10.2~~ 10.2		
	45	10		+0.2 +0.5 / +0.7		Losing 30-50% drilling water
	46			100%		
		40 30 10 85 1 90	Lim stn (open)			
	47					
	48					
	49					
	50					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

ple No. WES-C6-B6

DRILLING LOG	DIVISION	INSTALLATION	SHEET 6 OF 10 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	50		SS (cont.)			
		5		50.7		Pull depth
		0		5.2		
	51			Run 5		
		50				
		50				
	52					
		45				
	53					
	54			10.3		
		0	clay coating	10.3		
	55					
		45		+0.3 +0.2 0.5		Losing ~50% of drill water to Bottom of hole.
	56					
				100%		
	57	0				
		0				
	58	90	highly lim stnd, oxidized			
		0				
	59					
	60					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT | HOLE NO.

Hole No. WES-C6-E6

DRILLING LOG	DIVISION	INSTALLATION	SHEET 7 OF 10 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	60		SS (cont.)			
	61			61.0 ~~61.2~~ Run 6		Pull Depth
	62					
	63	0				
		45				
	64	55		9.7 ~~9.5~~ 9.7		
		0				
		10		~~70.2~~		
	65					
		0		100%		
	66					
	67	30				
		33				
		25				
	68					
	69					
	70					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

Hole No. WES-C6-8C

DRILLING LOG	DIVISION	INSTALLATION	SHEET 8 OF 10 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	70	0	SS (cont.)			
				70.7 Run 7		
	71	0				
		0				
		10	Lim stn			
	72	20				
		60				
	73	20				
		20				
		15	Coarser grained			
	74	0				
				9.9 / 9.9		
	75		(0.1-0.2' lim crusted zone at contact)			
		10	Base of Big Clifty fm - 75.6'			
			Top of Beech Creek			
	76	0	Limestone, mgr Br, f-m crystalline, fossiliferous, v hard, v dense, occ stylolites.	100%		minor solutioning on jts
	77	20	Jts are rgh + irreg, show signs of minor solutioning + are lim stained to ~90.0'. most jts are along beding.			
	78					
		10	(minor) solution w/ clay coating			
	79	0	" " "			
		0	" " "			
	80					

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PROJECT | HOLE NO.

Hole No. WES-C6-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 9 OF 10 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	80		LS (Cont.)			
			Limstone changes to dGr fine crystaline, fossiliferous, occ wavey shaley pts' + stylolites.	80.6 / Run 8		
	81					
		0	tan clay staining, open			
	82					
		0	1/4" clay coating, tan, open			
	83					
	84	0 / 10	tan clay coating (open	9.9 / 9.9		
		0				
	85	5				
	86	85 / 5	Lim stn, tan clay coating (open), rgh + irreg	100%		
	87					
	88	5 / 90 / 90	Lim stn, open, rgh + irreg.			
	89	70				
	90		base of oxidation ~ 90.0'			

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT | HOLE NO.

Hole No. WES-C6-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 10 OF 10 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	90	90 / 40 / 5	Ls (cont.)	90.5 / Run 9		
	91	30	Tight			
		0	Tight			
	92		Ls is v dGr in bot 3'.			
	93					
	94	30	Tight	10.1 / 10.1		
			Base of Beech Creek - 94.8			
	95		Top of Elwren fm			
			Shale, dgr Gn, w/zones of dr Br mass - th bd, hard, blocky - flakey, num random s'sides	100%		
	96					
	97					Blew water out of well and check water level ~ 94.5' 30 min. later. next morning (Oct 15, 1986) water level was 92.5'.
	98					
	99					
	100			100.6		Bot. hole - 100.6'

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Site No. WES-C7-86

DRILLING LOG	DIVISION US Navy	INSTALLATION Grane In	SHEET 1 OF 10 SHEETS

1. PROJECT: NWSC Geologic / groundwater studies
2. LOCATION (Coordinates or Station): ABG
3. DRILLING AGENCY: WES
4. HOLE NO. (As shown on drawing title and file number): WES-C7-86
5. NAME OF DRILLER: Dan Taylor
6. DIRECTION OF HOLE: ☑ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 6.5'
8. DEPTH DRILLED INTO ROCK:
9. TOTAL DEPTH OF HOLE: 101.6'
10. SIZE AND TYPE OF BIT: HQ wireline core
11. DATUM FOR ELEVATION SHOWN (TBM or MSL):
12. MANUFACTURER'S DESIGNATION OF DRILL: Failing 1500
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED: ; UNDISTURBED:
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED Oct 17, 1986; COMPLETED Oct 20, 1986
17. ELEVATION TOP OF HOLE: ~ 634.0'
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: Geologist Richard Witham

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Silty-clayey sand (SC) yBr, w/ ss frags + blocks, (highly wea ss zone) - large ss blocks were ripped up by dozer leveling drill site			Dozer cut down ~ 4' from orig surface too level for drill site. Drilled to 6.5' w/ 6" folding auger.
	1					
	2		Penn - (Mansfield fm)			Steam cleaned all tools prior to begining of drilling.
	3					
	4		↓ unconformity			
	5		Clayshale, olive gray, th bd, firm, moist. (Golconda)			
	6			6.5' ↑ RR B.t		
	7		Limestone, mgrBr, Coarse granular - Crystaline very few apparent fossils, mass, v hard, dense, evidence of oxidation.	7.9' Run 1		Set 6" dia PVC Casing to 7.9'. Cored from 7.9' to 10.8' w/ 2' long NX Core bbl.
	8			1.5/1.5	Rec/Run	
	9			9.4 Run 2		
	10					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT | HOLE NO.

File No. WES-C7-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 10 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10		Ls (cont.)	1.4/1.4'		
		15	clay coating	10.8'		
				3R 9.4		
	11			Run 3		Started coring w/ HQ wireline bbl at 11.0'. Using clean water as drilling fluid.
	12					
		15'				
	13					
	14					
	15			9.0/10.0		
		10				
	16			-1.0' Core Loss		
	17		Base of Golconda 17.4'			
			Top of Big Clifty Fm			
	18		Shale, blk-vd Gr, th bd, platy-fissile, abundant carbonaceous flakes and specks, mod hard, uniform			
	19					
	20					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

Hole No. WES-C7-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 10 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	20		Shale Cont			
				21.0' Run 4		
	21					
	22					
	23		Note: Core loss was ground away during drilling.			(17.4'-38.0') Shale zone represents the upper member of the Big Clifty fm.
	24					
	25			6.6/8.0 -1.4' core loss		
	26					
	27					
	28					
	29			29.0' Run 5		
	30					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-C7-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 4 OF 10 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30		Shale (cont.)			
	31			4.0 / ~~4.0~~ = 4.5		
				~~0.8~~ ~~+0.2~~ ~~=0.5~~		
	32					
	33			33.5		Full Depth
				~~33.8~~ Run 6		
	34		Lower 4 ft of shale is m-Gr Olive, highly oxidized w/ massive appearance, num tight fractures w/ lim stn & s'sides. many fractures w/ s'sides are dipping parallel at about 30°.			
	35			100%		
	36			5.2 / 5.0		
				+0.2 ~~=1~~ +0.3		
	37					
	38	0	Sandstone (Lower member - Big cliffy fm) lolive tan, th bd w/ shallow ripples, vf uniform grained, mod hard, friable, oxidized lim stn along d'ts, some j'ts have thin clayey			
		60				
		20		38.7 ~~38.8~~ Run 7		Full Depth
	39					
	40	0				

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

File No. WES-C7-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 5 OF 10 SHEETS

1. PROJECT
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number)
5. NAME OF DRILLER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE
10. SIZE AND TYPE OF BIT
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN | DISTURBED | UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE | STARTED | COMPLETED
17. ELEVATION TOP OF HOLE
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	40	0	Coating, occ small Fe inclusions, highly oxidized in top 1½'. Jts are generally rgh and planar.			
	41	0				
	42	5, 5				Lost all drill water at ~ 42.0'
	43	35, 0		10.1/10.0		
	44			+0.1		
	45					
	46	0, 10				
	47	5				
	48	5		49.5 Run 5		
	49	0				
	50	0				

PROJECT | HOLE NO.

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

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Hole No. WES-C7-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 6 OF 10 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	50		SS (cont.)			
	51	5				
	52					
	53					
	54			10.0 / 10.0		
	55					
	56	60 0 30 35 45	Lim stn, minor clayey coating			
	57					
	58					
	59			58.8' / Run 9		Oct 20, 1986 No water in well.
	60					

PROJECT | HOLE NO.

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

...ole No. WES-C7-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 7 OF 10 SHEETS

1. PROJECT
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number)
5. NAME OF DRILLER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE
10. SIZE AND TYPE OF BIT
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN | DISTURBED | UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE | STARTED | COMPLETED
17. ELEVATION TOP OF HOLE
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	60					
	61	20 / 30	Rusty Br, highly oxidized			
	62	0				
	63			100%		
	64			9.9 / 10.0		
				Soil		
	65					
	66	0 / 0				
	67	0				
	68		Rusty Br, highly oxidized	68.7 - 68.8		Full Depth
	69	5	slightly oxidized lt	Run 10		
	70					

PROJECT | HOLE NO.

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE.

Hole No. WES-C7-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 8 OF 10 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	70		SS (Cont.)			
		S 60				
	71					
		0				
	72					
	73					
	74			10.1/10.0		
				10.1		
	75					
		0				
	76					
		0	Rusty Br, oxidized, w/num 1/16" to 1/4" rounded Fe inclus.			
	77					
	78		Coaser grained, calcareous, fossil frags.			
				78.8' Run 11		
	79	0	Base of Big Clifty fm / Top of Beech Creek fm 79.1'			
		0	LS			
			Solution open			
	80		(description on next sheet)			

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PROJECT

HOLE NO.

Hole No. WES-C7-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 9 OF 10 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	80		Limestone, mgrBr, m-c crystaline, highly fossiliferous, v hard, v dense, occ styolites, oxidized along most jts down to 86.7'.			
		0	solution open			
	81					
	82					
		0				
	83	10	open, solutioning + Lim stn along jts			
		80				
		40				
	84	5		10.1/10.1		
		0				
	85					
			Ls color changes to dGr, m grandular-crystaline, w/occ to num wavey shaley pts. + occ styolites.			
	86					
		30	solutioning, (last jt w/ Lim stn) (Base of oxidation)			
	87					
		20	solutioning open			
	88					
		10				
		0				
	89	15		Run 12		
		0				
	90					

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PROJECT | HOLE NO.

Hole No. WES-C7-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 10 OF 18 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	90	10	Ls (Cont.)			
	91	5		5.0/5.0		
	92	0, 5, 0				
	93	10				
	94	0, 5, 5	1/2" to 1' gray soft clay in Jt.	93.9 Run 13		Blocked off
	95	5	vdGr in bottom 2-3'.	4.0/4.0		
	96	0				
	97		Base of Beech Creek Fm 97.8'	97.9 Run 14		
	98		Top of Elwren Fm Shale, dgrGn w/dBr mottling, mass to th bd, blocky-flakey, num random frac w/s'sides hard.			Note: ground top part of Elwren away
	99			2.6/3.7, -1.1 core loss		
	100		Bot depth - 101.6'	101.6		

PROJECT | HOLE NO.

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DRILLING LOG	DIVISION US Navy	INSTALLATION Crane In	SHEET 1 OF 19 SHEETS

1. PROJECT: NWSC Groundwater Study
2. LOCATION (Coordinates or Station): ABG (Geologic Studies)
3. DRILLING AGENCY: WES.
4. HOLE NO. (As shown on drawing title and file number): WES-C8-86
5. NAME OF DRILLER: Don Taylor
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 6.1 ft
8. DEPTH DRILLED INTO ROCK:
9. TOTAL DEPTH OF HOLE: 187.7 ft
10. SIZE AND TYPE OF BIT: HQ wireline Bit
11. DATUM FOR ELEVATION SHOWN (TBM or MSL):
12. MANUFACTURER'S DESIGNATION OF DRILL: Failing 1500
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED: UNDISTURBED:
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED Oct 31, 1986 COMPLETED Nov 20, 1986
17. ELEVATION TOP OF HOLE: ~ 628.0'
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: Geologist Richard W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Silty clay (CL), Br w/ abundant sdy grit + ss frags, firm, moist.			0.0 to 6.1' samples were obtained w/a 6" folding Auger.
	1					
	2					
	3					
	4					
	5					
	6			6.1 Run 1		Started Coring w/2 ft NX core bl at 6.1'
	7		Sandstone, tan, v fine grained, hard, friable oxidized, clay in jts, carbonaceous specks, occ. vugs. (Penn. - Mansfield fm)	1.2/2.4 (-1.2)		
	8			8.5 Run 2		
	9			1.4/2.0 (-0.6)		
	10		(9.9') Top of Mississippian Period			

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PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 19 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10		Shale, olive-olive Br, th bd, (however bedding appears reworked + distorted, possibly by creep down slope) num small ss frags mixed in, occ carbonaceous pts' + frags, highly wea + oxidized v firm-firm, moist-v moist.	10.5 / Run 3		
	11			0.3 / 1.7 (-1.4')		
	12			12.2 / Run 4		Started Coring with HQ wireline at 12.2'
	13		(Golconda)			Losing 50-60% water return
	14					
	15			3.0 / 4.8 (-1.8')		
	16					Reamed hole w/ 7 3/4" RR Bit + set 6" PVC casing to 16.4'
	17		Limestone, m-dgr Br, med crystalline, fossiliferous, especially in bot 0.2-0.3', v hard, v dense. (Golconda Ls)	17.0 / Run 5		
	18			1.3 / 1.5 -0.2		
			Base of Golconda fm - 18.4'	18.5		
	19		Top of Big Clifty fm. Shale, Blk-vdGr, th bd, platey-flakey, hard, carbonaceous flakes + specks along bd	Run 6 0.5/0.5 19.0 / Run 7		- Blocked - 2" split spoon Nov 1, 1986.
	20					

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PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 19 SHEETS

1. PROJECT
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number)
5. NAME OF DRILLER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE
10. SIZE AND TYPE OF BIT
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE — STARTED — COMPLETED
17. ELEVATION TOP OF HOLE
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	20		Shale (cont.)			
	21					
	22					
	23					Run 7 (19.0 - 29.2') was made w/o inner bl by mistake. Core was "burned" in at bot. to make recovery. Core loss was ground away by drill action.
	24			7.2/10.2		
				(-3.0)		
	25					
	26					
	27					
	28					
	29			29.2		
				RR B.t		Ran 5 7/8" R.T. B.t to a depth of 30.6 in effort to straighten hole.
	30		? (29.1-30.1) LS lens			

PROJECT | HOLE NO.

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

(TRANSLUCENT)

DRILLING LOG	DIVISION	INSTALLATION	SHEET 4 OF 15 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
2. LOCATION (Coordinates or Station)	12. MANUFACTURER'S DESIGNATION OF DRILL
3. DRILLING AGENCY	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
4. HOLE NO. (As shown on drawing title and file number)	14. TOTAL NUMBER CORE BOXES
5. NAME OF DRILLER	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	16. DATE HOLE — STARTED — COMPLETED
	17. ELEVATION TOP OF HOLE
7. THICKNESS OF OVERBURDEN	18. TOTAL CORE RECOVERY FOR BORING %
8. DEPTH DRILLED INTO ROCK	19. SIGNATURE OF INSPECTOR
9. TOTAL DEPTH OF HOLE	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30		Shale (Cont.)	RR B.t		
				30.6 Run 8		
	31					
	32					
	33					
	34					
				5.7 / 8.2		
	35					
				(-2.5)		
	36		Shale is olive, mass weathered, oxidized, num s'sides + random fractures.			
	37					
	38					
				38.8 Run 9		
	39					
			Sandstone (Bog clifty)			
	40					

ENG FORM 2826 — PREVIOUS EDITIONS ARE OBSOLETE — PROJECT — HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 5 OF 19 SHEETS

1. PROJECT
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number)
5. NAME OF DRILLER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE
10. SIZE AND TYPE OF BIT
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE — STARTED — COMPLETED
17. ELEVATION TOP OF HOLE
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	40	0	Sandstone (Cont.), dive tan w/rusty Br zones, oxidized, vf uniform rounded qtz grains, th bd, w/ shallow cross bd/ripples Jts are generally lim stn.			
	41	5				
	42	5	Lim stn			
		87				
		90	lim stn			
	43					Losing ~25% of water return
	44			9.8 / 9.8		
		1	v highly oxidized			
	45					
		0				
	46		v highly oxidized, Jts are coated w/ lim + partly healed w/ calcite			
		70				
	47	90				
		5				
	48	20	healed w/calcite			
		0		48.6 / Run 10		
	49	75	calcite			
		45	lim stn			
		0	½" shaley lim.			
	50					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 6 OF 19 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	50		SS (Cont.)			
		5	shaley coating			
	51					
	52					
		50 / 20	1.4 lim stn.			
	53			8.4 / 8.4		
	54					
	55					
	56					
		30		57.0' / Run 11		Nov. 3, 1986
	57					Hole was blocked at ~41' this morning; had to clean out w/5" RR Bit to 57.1' before starting back boring.
		0				
	58					
	59			6.0 / 6.3		
	60					

PROJECT | HOLE NO.

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 7 OF 19 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	60					
	61					
	62	D				Losing ~ 25% water return.
	63			63.3' Run 12		
	64	U				
		S	64.5-65.8, V highly oxidized, Rusty Br			
	65	U				
		S				
	66			9.8 / 10.1		
	67	S		-0.3'		
		S				
	68					
	69	S	shrim			
	70					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 8 OF 17 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	70		53, cont.			
			(70.4-72.4') coarser grained			
	71	45				
		45				
		20	stn (L.in)			
	72					
	73			73.4		
				Run 13		
	74					
	75	0	stn			
		35				
	76					
				10.0 / 10.0		
	77					
						Losing ~25% water return
	78	0				
		10				
	79	10	(78.8 to 80.7') is coarser grained than above.			
	80					

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PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 9 OF 19 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	80					
		0	Base of Big Clifty fm-80.7'			
			Top of Beech Creek fm-80.7'			
	81		Limestone, lt-m grBr, mass, m-c crystalline fossiliferous, v hard, v dense, brittle, occ stylolites,			
	82	0				
		40 / 45				
	83			83.4 / RQD 14		
	84					
	85	0	Gr clay coating			
	86	0		10.0 / 10.0		
			Ls is dGr, w/occ shaley pts below 86.1'			
	87	0				
	88	0				
	89	0				
	90					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 10 OF 19 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	90	0	Ls (Cont.)			
		0				
	91					
	92	0				
	93	0				
		15		93.4 / Run 15		Nov 4, 1986
		30				
	94					
		0				
	95	0				~ 50% water return
		1 / 5	sh lens			
	96			7.0 / 7.0'		
	97					
	98	0				
			Ls is vdGr in bot 2-3!			
	99	0				
		95	tight			
	100					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 12 OF 19 SHEETS

1. PROJECT
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number)
5. NAME OF DRILLER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE
10. SIZE AND TYPE OF BIT
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE — STARTED — COMPLETED
17. ELEVATION TOP OF HOLE
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	110		Shale/Claystone (Cont)			
	111					
	112			112.2 / 112.3		Pull depth
				Run 18		
	113					
	114					
	115		Base of Elmreen fm - 1150'			
			Top of Reelsville fm			
			Cale sandstone/sdy Limestone, mgr Br, th bd w/shallow cross bd or ripples, vfine grained, hard brittle	9.5 / 10.6		
	116			-1.1 / +1.2		
				+0.1		
	117					
	118		Rgh Tight			
	119					
	120					

PROJECT | HOLE NO.

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

(TRANSLUCENT)

DRILLING LOG	DIVISION	INSTALLATION	SHEET 11 OF 19 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	100		Inclus. of Elwren sh in bot 0.2'			
			Base of Beech Creek fm	100.4		
			Top of Elwren fm -100.4'	Run 16		
	101		Shale, dgrGn, mass-th bd, blocky-flakey, hard, num random s'sides	100%		
				1.9 / ~~3.0~~ 1.9		
	102			102.3		- Full Depth
				RR Bit		
	103		Shale, alter dkgrGn + drBr bedding, th bd, Platey-blocky, occ ss pts (minor), occ s'sides, hard	103.4'		Reamed hole w/ 5 7/8" dia RR Bit + set Casing (4" PVC) to 103.4' - Grouted to Surface, w/ bot of Casing sealed in Elwren Shale.
				Run 17		
	104					
	105					Nov 7, 1986 started back Coring
	106			8.8 / 8.9		
	107			~~-0.1~~ ~~+0.1~~		good water return
	108		Shale / Claystone, dgrGn, mass zones w/ irregular rounded grBr small ss inclus, alter w/ th bd zones w/ silty ss pts, hard			
	109					
	110					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 13 OF 19 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	120					
	121		Shale/claystone dgrGn, mass, occ small v hard Ls inclus	121.7		Pull depth
	122		Shale, dgrGn-gnGr (drBr mottling in upper 2.7'), th bd, blocky, hard, dense.	122.9		
	123			Run 19		
	124					
	125					
	126			9.6 / 9.4		
	127		Cale SS (predominate) 1-m grBr w/closely spaced alter dgrGn Shale pts, hard	+0.2 +1.0 +1.2		
			Base of Reelsville			
	128		Top of Sample Fm - 127.9 Shale, dgnGr in top few feet changing to vdGr below top few ft, th bd, platey-fissile, occ (seat) lGr SS lens, hard,			
	129					
	130					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 14 OF 19 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	130		Shale (Cont.)			
	131		1Gr SS w/shaley pts.	131.3		Pull depth
	132		1Gr SS w/shaley pts	132.3		
				2un20		
	133			(+1.0)		
	134					
	135					
				9.5 / 9.5		
	136					
	137					
	138					
	139					
	140					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 15 OF 19 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	140		Shale (cont.)			
				140.8		Pull depth
	141					
				141.8		
				Run 21 (+1.0)		Nov 10, 1986
	142			100%		Note: Had to shut down drilling most of Nov 10 & all of 11th Nov. due to Contractors in Ash Pile.
				2.5 / 2.5		
	143			143.3		Pull depth
						Water level - 76.7'
	144			144.3		Nov 12, 1986
				Run 22		
	145					
			1 Gr SS w/ shaley pts.			
	146			100%		
				9.0 / 8.0		
	147			+1.0'		
	148					
	149					
	150					

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PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 16 OF 17 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	150		Shale (Cont.)			
	151					Note: Between a depth of 152.3 & 170.6 ft, the Short core runs, blocking off, & poor Core recovery was due to loss of Circulation at the bit. What appeared to be water return at top of well was largely circulating through a hole in the section of drill stem that was added just before run 23.
	152			152.3 Run 23		
	153			1.6/2.1		
				-0.5		
	154			154.4 Run 24	(Blocked)	
	155			0.7/1.3, -0.6		
				155.7 Run 25		Blocked
	156		Sandstone, m Gr, fine grained, w/ Blk shale pts, hard, brittle			Nov 13 1986 Temp 8° F this morning / chill factor 20 below, started rig and broke gears (in Transmition that operates rig water pump) first thing. (Transmition frozen?) Had repairs made on Rig (Trans.) & started back drilling on Nov 17, 1986. (week end included)
	157					
	158			5.5/7.3		
	159					
	160					

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PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 17 OF 19 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	160		Sandstone (Cont.)			
	161					
	162					
	163			163.0 Run 26		Blocked Nov. 17, 1986
	164		Shale, Blk-vd Gr, th bd, platy-flaky hard, occ sdy pts, (as above)	2.0/3.7		
	165					
	166			166.7 Run 27		Blocked
	167			0.8/1.5		
	168			168.2 Run 28		Blocked Nov 18, 1986
	169			1.5/2.4		
	170					

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PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 18 OF 19 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	170		Base of Sample Fm. 170.6'	170.6		
			Top of Beaver Bend Fm	Run 29		
	171		Limestone	RR Bit		
	172			172.5		
				Run 29		Note: Runs 29+30 were made w/o the inter bl. The core from run 30 was not retrieved + had to be cut out w/a RR Bit.
	173			1.5/1.7		
	174			174.2		
				Run 30		
	175					
	176					
	177			0.0/9.9		
	178					
	179					
	180					

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PROJECT | HOLE NO.

(TRANSLUCENT)

ILLING LOG | DIVISION | INSTALLATION | SHEET 19 OF 19 SHEETS

CT

TION (Coordinates or Station)

LING AGENCY

E NO. (As shown on drawing title file number)

E OF DRILLER

ECTION OF HOLE
VERTICAL ☐ INCLINED _____ DEG. FROM VERT.

ICKNESS OF OVERBURDEN

PTH DRILLED INTO ROCK

TAL DEPTH OF HOLE

10. SIZE AND TYPE OF BIT
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN | DISTURBED | UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE | STARTED | COMPLETED Nov 20, 1986
17. ELEVATION TOP OF HOLE
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	180		Ls (Cont.			
	181					
	182		Base of Beaver Bend fm ~182.6'			
			Top of Bethel fm			
	183		sdy shale / shaley sandstone			
					184.1 ~~Rock~~	
	184				RR Bit	
	185					
	186					
	187					
	188		Bot. Depth - 187.7 ft			

PROJECT | HOLE NO.

FORM OBSOLETE.

Ie No. WES-C9-86

DRILLING LOG	DIVISION US Navy	INSTALLATION Crane In.	SHEET 1 OF 17 SHEETS

1. PROJECT NWSC Groundwater Study	10. SIZE AND TYPE OF BIT HQ wireline core
2. LOCATION (Coordinates or Station) ABG (Geologic Studies)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) WES-C9-86	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES 14
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE: STARTED Nov 27 1986 / COMPLETED Dec 5 1986
7. THICKNESS OF OVERBURDEN 7.8'	17. ELEVATION TOP OF HOLE ~ 601.5'
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 162.9'	19. SIGNATURE OF ~~INSPECTOR~~ Geologist Richard Williams

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Crushed Ls road bed rk.			0.0 to 12.0 drilled with 8" + 4" folding auger. Set 2.3' of 6" PVC surface casing.
	1		Silt (ML) olive Gr, occ rk frags, firm, sli moist, sli organic odor?			
	2		Silt (ML), sandy, clayey, rBr, w/nun ss frags.			Steam cleaned tools before starting drilling operations.
	3					
	4					
	5					
	6		may grade to clayey sand (SC) in bottom zone			
	7					
	8		Shale, d olive Gr, th bd, v firm, s'sides, wea, oxidized in lower 1 to 2 ft.			
	9					
	10					

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PROJECT | HOLE NO.

File No. WES-C9-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 17 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED: — COMPLETED:
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10		Shale (Cont.)			
	11					
	12			12.0' / Run 1		Started coring w/ HQ wireline core bl at 12.0', using clear water as drilling fluid.
	13		Top Big Clifty SS - 13.2' Sandstone, l olive yel Br, th bd w/shallow cross bd/ripples, vf grained, uniform, hd, friable, acc small Fe nodules (1/8-1/4" dia).			
	14	0	stn			
	15					
	16			9.5/10.0	(Rec/Run)	
	17	0		-0.5'		
	18					
	19	0				
	20					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

le No. WES-C9-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 17 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED: — COMPLETED:
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	20		SS (Cont.)			
	21	0	th clay fillings			
		0	sth	22.0		
	22			Run 2		
		0	th clay fillings			
	23					
	24					
	25		sli coaser grained, greater degree of oxidation than above + below; Rusty Br zones.	9.9/10.0		
	26			0.1		
			No Jts			
	27					
	28					
	29					
	30					

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PROJECT HOLE NO.

ole No. WES-C9-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 4 OF 17 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30					
		30	sli stn			
	31					
				32.0		
	32			Run 3		
		35	v little stn			
	33					
		30				
	34					Losing 25-50% water return
	35			10.0/10.0		
	36					
		0				
	37	0	highly oxidized, rusty Br,			
		0				
	38	0				
	39					
		20				
	40					

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PROJECT | HOLE NO.

Log No. WES-CS-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 5 OF 17 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	40					
		0	Blk min. stn.			
	41	0	" " "			
		0	" " "			
		0	" " "			
	42			42.0 / Run 4		
		3				
		70	- Blk min. stn			
	43	3	- Lim stn			
		0	- Blk stn			Losing 50% of drill water return
	44	0	- Lim stn			
		3				
		0	Lim stn			
	45	30	- sli coarser grained.			Lost all water return at ~ 46'.
		70	Fresh 70° Jt			
		20	Lim stn	9.6 / 10.0		
	46	60	- Patchy white powdery coating along 60° Jt.			
		10	th clay coating			
	47					
	48					
	49					
	50					

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PROJECT | HOLE NO.

Hole No. WES-C9-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 6 OF 17 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED: — COMPLETED:
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	50					
			- Solution (core loss) Lim stn on top			
	51	5				
		90	Top of Beech Creek Limestone - 51.0'			Base of oxidation - 51.3'
		0	L-m grBr med-coarse crystalline, fossiliferous, v hard, v dense, occ stylolites			
	52			52.0' / Run 5		
		0				
	53					
	54		Jts are rough, irregular and show evidence of being open (staining)			No water return
		0				
	55					
	56			9.8/10.0		
		0		-0.2		
		0				
	57		Darker grBr between 57.3 + 60.3'			
	58	80	stn open			
		0				
	59	30				
	60					

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PROJECT | HOLE NO.

Hole No. WES-CT-66

DRILLING LOG	DIVISION	INSTALLATION	SHEET 7 OF 17 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	60	0				
			60.3-72.0 dGr fm Crystalline Ls w/occ wavey shaley pts + occ stylolites			
	61					
		0				
	62	80		62.0' / Run 6		
		0				
	63	0				
		0				
	64	0				
		85	Calcite coated			
				10.0 / 10.0		No water return
	65					
	66		Num Blk shaley pts.			
		0				
	67					
		0				
		20				
		0				
	68					
	69					
		0				
		90	Stn			
	70					

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Hole No. WES-C9-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 8 OF 17 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	70		Ls (cont.)			
	71					
			Base of Beech Creek fm	72.0		Nov 28, 1986
	72		Top of Elwren fm - 72.0'	Run 7		
			Shale, dgrGn, mass to th bd, hard, blocky-flakey.			No water return
	73					
	74			4.8/4.8		
	75					Reamed hole w/ 5⅞ RR bit to 76.8'; Set 4" dia PVC Casing to 76.5', + grouted to Surface.
			Shale/Claystone, dr-Br w/ grGn mot, mass, hard; contains sub-rounded Cal ss/Ls inclus up to ~2" dia in bot 2-3'.			
	76			76.8		
	77			Run 8		Dec 2, 1986
	78					Started back coring w/ HQ wireline bit through the 4" casing.
	79			6.6/6.9		getting good water return
				>0.3		
	80					

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PROJECT | HOLE NO.

Hole No. WES-C9-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 9 OF 17 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE: STARTED / COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	80		sh/claystone (cont.)			
	81					
	82					
	83		Claystone/shale, dGn yh bd to mass, siltstone pts in upper & lower zones, occ sub-rounded small siltstone inclus. hard, dense.	83.4 / 83.7 Run 9		Full depth
	84					
	85					
	86			9.8 / 9.8		good water return
	87					
	88					
	89					
	90		Top of Rockville - 89.7'			

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PROJECT | HOLE NO.

Hole No. WES-C9-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 10 OF 17 SHEETS

1. PROJECT
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number)
5. NAME OF DRILLER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE
10. SIZE AND TYPE OF BIT
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE — STARTED — COMPLETED
17. ELEVATION TOP OF HOLE
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	90		Sandstone/Limestone, l-m grBr, vf, vdense, hard, faint cross bd,			
	91					
	92		conglomeritic w/fossil frags in bot 0.1'.			
	93		Shale, dgrGn w/drBr mottling, th bd, hard, has alter lGr sdy pts + thin lams below ~96', bedding is disturbed + swirled.	93.2 93.5 Run 10		Pull depth 12/3/86
	94					
	95					
	96					
	97			10.3 10.0 +0.3		
	98					
	99		Sandstone/limestone (similar to above), but coarser, occ grGn shale pts.			
	100					

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PROJECT | HOLE NO.

Hole No. WES-C9-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 11 OF 17 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	100					
			Top of Sample fm-100.3'			
			Shale, d Gr, th bd w/ num lGr ss pts & thin lens, hard, platey			
	101					
	102					
			cal ss, v hd, dense			
	103		Shale, v d Gr, - Blk, th bd, hard, platey-flakey, occ sdy pts, occ pyrite nodules,	103.5 Run 11		
	104					
	105					
	106					
				9.9 / 10.0		
	107			>0.1		
	108					
	109					
	110					

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PROJECT | HOLE NO.

Iole No. WES-C9-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 12 OF 17 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED — COMPLETED
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	110					Note
						Drill water return is leaving a blk "earthy" film on top of the water in the mud pan. The source is in the sample Fm.
	111					
	112					
	113					
				113.4 / 113.5		Pull depth
				Run 12		
	114					
	115					
	116					
	117			9.8 / 10.0		
				-0.2		
	118					
	119					
	120					

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PROJECT | HOLE NO.

Hole No. WES-C9-F6

DRILLING LOG	DIVISION	INSTALLATION	SHEET 13 OF 17 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	120					
	121					
	122					
	123			123.2		
				123.5		
				Run 13		
	124					
	125					
	126					
	127			10.3 / 10.0		
				+0.3		
	128					
	129					
	130					

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PROJECT | HOLE NO.

Hole No. WES-C9-C-

DRILLING LOG	DIVISION	INSTALLATION	SHEET 14 OF 17 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) WES-C9-86	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	130					
	131					
	132		Sandstone, l-m Gr, vf grained, well rounded qtz, th bd, occ shaley pts, occ pyrite inclus, hard.			
	133			133.5 / Run 14		12/4/86
	134					
	135					
	136		Shale (as above)			
	137			9.3 / 9.3		
	138					
	139					
	140					

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PROJECT | HOLE NO.

Hole No. WES-09-E6

DRILLING LOG	DIVISION	INSTALLATION	SHEET 15 OF 17 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	140					
	141					
	142					
				142.8 / Run 15		
	143					
	144					
			Top of Beaver Bend Fm - 144.6			
	145		Limestone, l-m gr Br, f-m crystalline, fossiliferous v hard, v dense, occ stylolites, scattered shaley pts,			Note: Run 15 originally went from 142.8 to 152.9'. The core was not retrived when the core bbl was pulled. It took 2 attempts at running the core bbl back over the core spl before at least the larger portion of core from run 15 was recovered. In going back over the core, 2.1' of core spl was ground away and the run was deepened to 153.6'.
	146			8.7 / 10.8		
	147			-2.1		
	148					
	149					Losing 25-50% water return
	150					

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PROJECT | HOLE NO.

Hole No. WES-C9-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 16 OF 17 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	150		LS (cont.)			
	151					
	152					
	153			153.6 / Run 16		
	154		numerous Blk shaley pts			
	155					Losing ~50% water return.
			Top of Bethel fm - 155.2' Sandstone, 1-m Gr-vf grained, th bd, w/numerous thin shaley pts & lens, hard sli friable.			
	156					
	157			9.2 / 9.2'		
	158		50-50 shale & SS lgs.			
	159					
	160					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-CO-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 17 OF 17 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
2. LOCATION (Coordinates or Station)	12. MANUFACTURER'S DESIGNATION OF DRILL
3. DRILLING AGENCY	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
4. HOLE NO. (As shown on drawing title and file number)	14. TOTAL NUMBER CORE BOXES
5. NAME OF DRILLER	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	16. DATE HOLE — STARTED: — COMPLETED:
	17. ELEVATION TOP OF HOLE
7. THICKNESS OF OVERBURDEN	18. TOTAL CORE RECOVERY FOR BORING %
8. DEPTH DRILLED INTO ROCK	19. SIGNATURE OF INSPECTOR
9. TOTAL DEPTH OF HOLE	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	160		40% blk sh pts + thin lens			
	161					
	162					
	163		Bottom Depth - 162.8'			

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PROJECT | HOLE NO.

Hole No. WES-C10-86

DRILLING LOG	DIVISION US Navy	INSTALLATION Crane In	SHEET 1 OF 8 SHEETS

1. PROJECT NWSC Groundwater Study	10. SIZE AND TYPE OF BIT HQ Wireline Core
2. LOCATION (Coordinates or Station) ABG (Geologic Studies)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) WES-C10-86	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES 6
6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE: STARTED 1/17/87 COMPLETED 1/21/87
7. THICKNESS OF OVERBURDEN 7.0	17. ELEVATION TOP OF HOLE ~ 606.5'
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 78.8'	19. SIGNATURE OF ~~INSPECTOR~~ Geologist, Richard W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Silty Clay (CL) yBr-rBr firm, w/ occ sub-rounded wea ss pebbles + fragments (Alluvial/Colluvial deposits)			0.0 to 11.1' drilled w/8" dia. folding Auger
	1					
	2					
	3					
	4					
	5					
	6					
	7		Shale, (Upper Big Clifty fm), dolive Gr, th bd, w/ num carbonaceous specks + flakes along bedding, wea, occ lim along bedding planes, v firm,			
	8					
	9					
	10					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-C10-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 8 SHEETS

1. PROJECT
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number)
5. NAME OF DRILLER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE
10. SIZE AND TYPE OF BIT
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN | DISTURBED | UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE | STARTED | COMPLETED
17. ELEVATION TOP OF HOLE
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10		Shale (cont.)			Set 6" dia. PVC Casing to 11.1' + Grouted in
	11			11.1' Run 1		
	12					
	13		Limestone, m gr Br, m-c granular-crystalline v hard, v dense, w/ occ dGr shaley pts.	1.23/4.8		
	14		Shale, (as above) in upper zone, changing to d-m gr Gn mass shale without carbonaceous inclus in lower zone.	2.5		Drill action indicated a soft zone 1 to 1½ thick underlying the LS layer.
	15			15.9 RRBit Run 2		Cleaned hole w/5" RR Bit to 16.0'
	16		Note; core loss is most probably shale, ground away during drill action.			
	17			2.1/2.8		Note: oil film (earthy) on top of drill water in mud pan; (coming from shale zone?)
	18			.07		
			Top of Big Clifty ss - 18.8'	18.8		
	19		Sandstone, Lt olive Tan, w/ shaley pts + lens + occ cherty inclus, friable, v fine weak ss.	Run 3		
	20					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

Hole No. WES-C10-82

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 8 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	20		SS (cont.)			
	21			3.9/4.4, -0.5		
	22					
		12	Sandstone, olive-yel Tan, v fine uniform grained qtz, shallow cross bd'ing/ripples, oxidized, hard, friable (weak ss)			
	23			23.0 / 23.2 Run 4		Pull depth
	24	10				
	25					
	26	5	most pts have lim or clay coating	10.2/10.0 +0.2		
	27	5 / 25				
	28	15 / 15				
	29	15				
	30					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT | HOLE NO.

Hole No. WES-C10-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 4 OF 8 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30		SS (Cont.)			
		10				
	31	10				
	32	0				
	33			33.2 / Run 5		
	34					Losing ~25-30% drill water
	35					
	36	30		9.9 / 10.0		
		30				
	37			-0.1		
	38					
	39					
	40					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT | HOLE NO.

Hole No. WES-C10-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 5 OF 8 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	40		SS (Cont.)			
	41					
	42					
	43			43.2 / Run 6		Jan 20, 1987 - Burned out Rig starter/had to make repairs. Jan 21, 1987 - started back coring.
	44	20				
	45	25°	- Blk stn - lost all drill water at this jt.			
	46	20		10.0 / 10.0		
	47					
	48	5				
	49	0				
	50					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

Hole No. WES-C10-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 6 OF 8 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	16. DATE HOLE — STARTED — COMPLETED
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	50		SS (Cont.)			
	51					
	52	5				
		0				
		0				
	53			53.2' Run 7		
	54					
	55					
		5				
	56			10.0 / 10.0		
		0				
		20				
	57		coarser, rusty bands			
		0				
	58	15				
			58.8' base of oxidation			
	59	0	Bot. of Big Clifty fm - 59.2			
			Top of Beech Creek Ls.			
			Limestone, m gr Br, m-c granular-crystalline, fossiliferous, v hard,			
	60					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

Hole No. WES-C10-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 7 OF 8 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	16. DATE HOLE — STARTED — COMPLETED
	17. ELEVATION TOP OF HOLE
7. THICKNESS OF OVERBURDEN	18. TOTAL CORE RECOVERY FOR BORING %
8. DEPTH DRILLED INTO ROCK	19. SIGNATURE OF INSPECTOR
9. TOTAL DEPTH OF HOLE	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	60		v dense, occ stylolites			
		0	sol open			
	61		most jts in Ls are along bedding; possibly minor solutioning along many jts.			
	62					
	63	0	sol open	63.2 / Run 8		
	64	0	"			
		10				
	65			10.0 / 10.0		
	66					
		5	Br clayey Lim Str.			
	67	0				
		0				
	68	0				
			Ls changes to d Gr. & contains occ to num blk shaley pts (wavey), occ stylolites			
		6				
	69					
		2				
	70					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-C10-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 8 OF 8 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	70	10	Ls (cont.)			
	71	5				
	72	0				
	73	0		73.2		
				Run 9		
	74	0				
	75					
		0		5.6		
		0		5.6		
	76					
	77	0				
	78		Elwren sh. inclusion bot 0.2'.			
			Top Elwren - 78.2 ft.			
			Shale dgrGr mass, occ gr Br Ls nodules, hd	78.8		
	79		Bot. Depth - 78.8'			
	80					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT | HOLE NO.

Hole No. WES-C11-86

DRILLING LOG	DIVISION US Navy	INSTALLATION Crane Ind	SHEET 1 OF 6 SHEETS

1. PROJECT Nwsc Groundwater Studies	10. SIZE AND TYPE OF BIT HQ wire line
2. LOCATION (Coordinates or Station) ABG. (Geologic Studies)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) WES-C11-86	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES 5
6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED Jan 27 1987 — COMPLETED Jan 28, 1987
7. THICKNESS OF OVERBURDEN 6.3'	17. ELEVATION TOP OF HOLE ~ 590.0'
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 59.5'	19. SIGNATURE OF INSPECTOR Geologist Richard W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Silty Clay (CL), Br-yBr, sdy, w/ weathered SS frags + pebbles, firm - mod firm, moist (v moist w/depth) (Recent rain + snow) Alluvial/Colluvial Deposits			moved Rig to well site Jan 23, 1987 (had
	1					
	2					
	3					
	4					
	5					
	6			6.3'		
			Sandstone/Clay, yBr - rusty Br, highly wea + oxidized friable SS w/ clay filled joints. (Surface - near Surface Residual wea zone in Big Cliffy SS.)	Run 1		Started Coring w/ 2' NX Core bbl. Run 1 was taken extra foot by mistake related to easy drilling. Using clean circulating water.
	7			0.0 / 3.0'		
	8		Poor to no Core Recovery	-3.0'		
	9			9.3		
				Run 2		
	10					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT | HOLE NO.

Hole No. WES-C11-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 6 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10		wea SS (cont.)	0.8/2.0 -1.2'		
	11			11.3 Run 3		changed to 10' HQ wireline core bl at 11.3'
	12		Sandstone (Big cliffy cont.) yel-olive Tan + rusty Br, vfine uniform qtz grains, th bd w/ shallow ripples, hd, friable weak SS, mod to highly oxidized			
	13					
	14					
	15			9.8/10.5 -0.7'		
	16					
	17					
	18					
	19					
	20					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-C11-06

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 6 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	16. DATE HOLE — STARTED — COMPLETED
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	20		SS (cont)			
	21					
				21.8 / Run 4		
	22					
	23					
	24					
	25					
				9.8 / 10.0		
	26					
				0.2'		
	27					
	28					
	29					
	30					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

Hole No. WES-C11-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 4 OF 6 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED — COMPLETED
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30		SS (Cont.)			
	31					
				31.8 Run 5		
	32					
	33					
	34					
	35			9.6/10.0		
	36			~~-0.4~~ -0.1'		
			Bot. of Big Clifty fm			
			Top of Beech Creek fm - 36.4'			
	37		Limestone, m gr Br, m-c granular/crystalline, fossiliferous, v hd v dense, occ stylolites			
	38					
	39					
	40					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-C11-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 5 OF 6 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
2. LOCATION (Coordinates or Station)	12. MANUFACTURER'S DESIGNATION OF DRILL
3. DRILLING AGENCY	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
4. HOLE NO. (As shown on drawing title and file number)	14. TOTAL NUMBER CORE BOXES
5. NAME OF DRILLER	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	16. DATE HOLE — STARTED — COMPLETED
	17. ELEVATION TOP OF HOLE
7. THICKNESS OF OVERBURDEN	18. TOTAL CORE RECOVERY FOR BORING %
8. DEPTH DRILLED INTO ROCK	19. SIGNATURE OF INSPECTOR
9. TOTAL DEPTH OF HOLE	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	40		Ls (cont.)			
	41			41.5 / 41.8' Run 6		Pull depth
	42					
	43					
	44					
	45			10.3 / 10.0		
	46			~~10.3~~		
	47					
	48					
	49					
	50					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT

HOLE NO.

Hole No. WES-C11-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 6 OF 6 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	50		Ls (cont.)			
	51					
				51.8		
				Run 7		
	52					
	53					
	54			5.3 / 5.7 / 5.3 / ~~0.4~~		
	55					
	56					
	57		Base of Beech Creek fm. / Top of Elwren fm.	57.1		Full depth
			Shale, dGn, mass	57.5		
				Run 8		
	58			1.8 / ~~1.4~~ / 1.9 / ~~1.0~~		
	59			58.9		- True bot. of hole
				59.5'		
	60		Bot. Depth - 59.5'			

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PROJECT | HOLE NO.

Hole No. WES-3-C12-86

DRILLING LOG	DIVISION US Navy	INSTALLATION Crane In.	SHEET 1 OF 5 SHEETS

1. PROJECT NWSC Groundwater Studies	10. SIZE AND TYPE OF BIT HQ Wireline Core
2. LOCATION (Coordinates or Station) 4 B6 (Geologic studies	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) WES-3-C12-86	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE: STARTED 2/2/87 COMPLETED 2/3/87
7. THICKNESS OF OVERBURDEN 5.4 ?	17. ELEVATION TOP OF HOLE ~585.5
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 51.2'	19. SIGNATURE OF ~~INSPECTOR~~ Geologist Richard W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Silty clay (CL), Br, becomes sdy w/depth occ ss frags + sub-rounded ss peebles, mod firm,			Drilled w/8" folding Auger from 0.0 to 5.4'. Steam cleaned all tools before starting.
	1					
	2					
	3					
	4		rBr - yBr in bot.			
	5		?			
	6		Sandstone, yBr, highly wea, w/clay along Jts ? No core recovery (Big Cliffy fm)			Attempted to core w/ 2' NX bl from 5.4 to 10.0; No Recovery. Water return ranged between 0 + 50% during drilling. Cleaned hole out w/a 7 7/8 RR Bit to 11.0' + set 6" P.V.C Casing.
	7					
	8					
	9		Less wea SS at ~10.0'.			
	10					

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PROJECT | HOLE NO.

Hole No. WES-C12-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 5 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10		Sandstone, ytan, vf uniform grained, wea, friable, lim + manga along jts, occ lim nodules.	11.0' Run 1		set 6" PVC to 11.0' + Grouted around outside. 2/3/87
	11	5, 0, 3				
	12	10, 5, 5				Lost all water, return at ~13'.
	13	5				
	14	0, 20				
	15	20, 10, 15		8.4 / 10.0		
	16	0		-1.6		
	17	60, 5, 1	- v highly oxidized, weathered, rusty, Br			
	18	60, 20				
	19					
	20					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

Hole No. WES-3-CIT-96

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 5 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	20		SS (Cont.)			
	21			21.0' Run 2		
	22		limonite crust + clay coating			
	23					
	24		Coarser grained (f-m)	7.7/8.4		
	25		mag + clay coating	-0.7'		
	26					
	27		mag stn			
	28					
	29			29.4 Run 3		
	30					

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PROJECT | HOLE NO.

Hole No. WEK-2-012-96

DRILLING LOG	DIVISION	INSTALLATION	SHEET 4 OF 5 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	16. DATE HOLE — STARTED — COMPLETED
	17. ELEVATION TOP OF HOLE
7. THICKNESS OF OVERBURDEN	18. TOTAL CORE RECOVERY FOR BORING %
8. DEPTH DRILLED INTO ROCK	19. SIGNATURE OF INSPECTOR
9. TOTAL DEPTH OF HOLE	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30					
	31		30.5 - 39.0' - very soft drilling w/no core recovery. Zone is largely a cavity created by solutioning in the Beech Creek Ls. The cavity is partially filled w/ wea ss blocks, clay + sd ?	1.1/9.6'		
	32					
	33					
	34		Lighter colored upper portion of the Beech Creek Ls is missing (A total of ~9-10' of Ls is missing or nearly equal to the cavity thickness)	-8.5'		
	35					
	36					
	37					
	38		Rgh planar surface at top of Beech Creek Ls	39.0		
	39	3	Beech Creek Lm ~39.0	R-1.4		
		6	Limestone, dGr, f-m crystaline, fossiliferous Blk shale pcs, occ stylolites, vid' vclass			
	40	5				

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PROJECT | HOLE NO.

Hole No. WES-3-C12-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 5 OF 5 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	16. DATE HOLE — STARTED — COMPLETED
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	40		Base of oxidation ~40.0'			
		0	Ls (cont.)	2.0/2.8		
	41					
		10		41.8 Run 5		Blocked
	42					
		5				
	43					
		0				
	44					
		0		7.1/7.2		
	45			-0.1		
		0				
	46					
		0				
	47					
		0				
		0	Base of Beech Creek - 48.9'	49.0 Run 6		
	49		Top of Elwren fm			
			Shale dark gr in mass hd	1.0/1.0		The boring was drilled to 51.2' however 1.2' of core was left in hole
	50					

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PROJECT | HOLE NO.

DRILLING LOG	DIVISION US Navy	INSTALLATION Crane In.	SHEET 1 OF 9 SHEETS

1. PROJECT NWSC Groundwater Studies	10. SIZE AND TYPE OF BIT HQ Wireline
2. LOCATION (Coordinates or Station) HEG (Geologic Study)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) WES-3-C13-86	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED ; UNDISTURBED
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES 6
6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE: STARTED 2/5/87; COMPLETED 2/9/87
7. THICKNESS OF OVERBURDEN 7.0'	17. ELEVATION TOP OF HOLE ~615.7
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 83.2'	19. SIGNATURE OF INSPECTOR Geologist Richard W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0–7		Silty Clay (CL) Br-yBr, sdy, w/occ small SS frags firm. (Residual-Colluvial soil)			Drilled to 11.0' w/8" dia folding Auger. Grouted in 6" PVC casing to 11.0'. (steam cleaned all tools before starting)
	7–10		Shale (Big Cliffy fm) olive + wea in top 2 ft, changing to dGr, th bd, platey-flakey, carbonaceous flakes + specks, sideritic bd. v firm			

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PROJECT

HOLE NO.

WES-3-2-13

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 9 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10		Shale (cont.)			
				11.0 Run 1		Started Coring w/H/9 wireline bl at 11.0'
	11					
	12					
	13					
				3.9/5.4		oil film developed on top of water in pan from shale
	14			-1.5		
	15					
	16			16.4 Run 2		Blocked
	17					
	18			5.4/7.4		
	19			~~-2.6~~ ~~-0.4~~ -1.6		
	20					

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PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 9 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	20		Sh (cont.) Concentration of lim nodules at contact.			
			Base of Big Clifty sh			
	21		Top of Big Clifty ss. 21.0'			
			Sandstone, lo liv tan, vfine uniform grained, shallow ripples, hd, friable			
	22				Box 1 of 6	
	23			23.4		Roll Depth
				23.8		
				Run 3		
	24					
	25				25.5	
	26			9.3 / 9.2		
	27	20				
		20	Lim stn	~~+0.1~~ +0.3 / +0.4	Box 2 of 6	
	28	40	Lim stn			
	29					
	30					

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PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 4 OF 9 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30		SS (Cont.)			
	31					
		10				
	32	0				
				32.7	Box	Pull depth
				33.0		
	33			Run 4	2	
		50	stn			
					of	
	34	0			6	
	35	40	stn			
		35				
		0				
	36			10.1 / 9.8	36.5	
	37			+0.3'		
					Box	
	38				3	
					of	
	39	30	stn		6	
	40	25	stn			

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PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 5 OF 9 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	40		SS (cont.)			
		25				
	41					
	42					
		45	stn clay coatings	42.8		
	43			Run 5	Box	
		25			3	
		25				
	44	10			of	
			- highly oxidized rusty Br			
	45				6	
	46	3	stn clay/sd coating (lost water at this pt.)	8.6 / 8.8		lost all drilling water at 46.0'
		30				
	47			2' / -0.1	47.5	
	48				Box	
					4	
	49				of	
					6	
	50					

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PROJECT | HOLE NO.

[redacted] 3-15-96

DRILLING LOG

DIVISION

INSTALLATION

SHEET 6 OF 9 SHEETS

1. PROJECT
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number)
5. NAME OF DRILLER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE
10. SIZE AND TYPE OF BIT
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE — STARTED — COMPLETED
17. ELEVATION TOP OF HOLE
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	50		55 (Cont.)			
	51					
		5	stn coated	51.5 / 51.6		Pull Depth
		0		Run 6		
	52	5				
			Coaser grained (f-m) v friable, oxidized			
	53					
		40				
	54					
					Box	
	55				4	
				8.3 / 8.2	of	
	56				6	
				70.1		
	57					
	58					
					58.9	
	59	5				
		0	Coaser grained, (f-m) oxidized		Box 5	
		0		59.8	of	
	60			Run 7	6	

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(TRANSLUCENT)

PROJECT

HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 7 OF 9 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	60		SS (cont.)			
			– Base of oxidation			
			– ss, as above (f-m) / Gr.			
	61		Base of Big Cliffy SS			
			Top of Beech Creek fm - 61.6'			ls is conglomeritic in top 0.2'
	62		Limestone, l-m gr Br, m-c crystaline - granular, occ stylolites fossiliferous, v hd, v dense			
	63				Box 5 of 6	
	64			8.8/9.0		
				~~0.2~~		
	65					
	66					
	67					
	68					
				68.6/68.8		Full Depth
	69			Run 8		
			Limestone (as above) but d Gr, f-m crystaline, w/occ -0 num wavey shaly bits			
	70				69.9	

Brsh open

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PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 8 OF 9 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	70		LS (Cont.)			
				43/4.1		
	71			40.2		
	72					
				72.9		Run out of Drill water
	73			Run 9	Box	Flange
					6	2/9/87
						WT 57.0'
	74				of	
	75				6	
				5.6/5.9		
	76			-0.3		
	77					
	78			78.5		Pull depth
				78.8		
				Run 10		
	79					
	80					

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PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 9 OF 9 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	80		Base of Beech Creek Ls			
			Top Elwren Fm - 80.2'		Bot. 80x6 ↓ 80.9	
			Shale, dgrGr, th bd, flakey, hd, occ s'sides, dry			Cut core samples to a depth of 80.9', too keep from having short sample in additional Box.
	81					
	82					
				82.9'		Pull Depth
	83			83.2'		
			Bot Depth - 83.2'			
	84					
	85					
	86					
	87					
	88					
	89					
	90					

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Hole No. WES-3-C14-86

DRILLING LOG	DIVISION US Navy	INSTALLATION Crane, In	SHEET 1 OF 12 SHEETS

1. PROJECT NWSC Groundwater Studies	10. SIZE AND TYPE OF BIT H Q Wireline Core
2. LOCATION (Coordinates or Station) ABG (Geologic Studies)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) WES-3-C14-86	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED 2/13/87 — COMPLETED 2/20/87
7. THICKNESS OF OVERBURDEN 0	17. ELEVATION TOP OF HOLE ~ 640.7
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 115.5'	19. SIGNATURE OF INSPECTOR Geologist Richard W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Sandstone, lGr + Tan, mottled mass v fine grained, contains carbonaceous matter wea + oxidized, hard, friable, lim + mang along jts. occ lim incrusted nodules.	1.0		Drilled to 1.0' w/RR bit. (Steam cleaned all tools before starting)
	1			Run 1		Started coring at 1.0' w/a 2' long NX core bl.
	2		Penn - Mansfield fm.	1.7/1.9 -0.2		(Casing depth 2.0')
				2.9		
	3			Run 2		
		GW		1.7/1.7		
	4			4.6		
		10		Run 3		
	5	10		1.8/2.0 -0.2		
	6	5/5		6.6		
			Interbedded shale + shaley sandstone, mGr + rusty Br, mottled, thbd, wea, oxidized, contains carbonaceous matter + occ lim incrusted nodules, lim + mang stn along jts.	Run 4		
	7			1.6/1.8 -0.2		
	8	5		8.4		
				Run 5		
	9	4/5		1.6/2.0 -0.4		
	10	0				

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PROJECT | HOLE NO.

Hole No. WES-3-C14-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 12 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10		Sandstone (as above)	10.4		
				Run 6		
					Box	
	11			1.7/1.9	1	
		50			of	Ran 7 3/4" RR 8.1' to 2.0' & set 2.0' of 6" dia. P.V.C casing.
		0				
		0		-0.2	10	
	12					
				12.3		
				Run 7		Changed to 10' long HQ wireline bit at 12.3'
					12.8	
	13					
		30				
	14					
		45			Box	
	15			6.8/6.8'	2	
		45				
					of	
		15				
	16				10	
						Losing 50% to 75% of drilling water
	17	15				
	18		Abundant carbonaceous matter in lower 2' w/ occ v thin coal lens.			
	19		Base of Mansfield - 19.1'	19.1		Blocked
			Top of Miss-Hardinsburg fm.	Run 8		
			Shale, dGr w/grGn mot, th bd, fissile, mod hd			
	20					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

Hole No. WES-3-C14-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 12 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	20		shale (cont.)			Lost all water return near start of Run 8.
	21			2.0/3.6		
			Top of Golconda fm - 21.4'			
			Limestone, shaley, dGr, th bd, platey, hard, fossiliferous, occ mGr crystalino Limestone lens + thin layers up to ~4" thick	-1.6	Box	
	22			22.4	2	Pull depth
				22.9'	of	Blocked
				Run 9	10	
	23					
	24					
			Lim stn	4.6/4.3		No water return
	25		- shale, dGr	+0.3	25.1	
	26		- shale, dGr		Box	
	27			27.0 / Run 10	3	Blocked 2/14/87
					of	
	28		yBr highly wea largely to clay fossiliferous	4.1/4.8	10	
	29			-0.7		
			- yBr (as above)			
	30					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

Hole No. WES-3-C14-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 4 OF 12 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30		Shaley Ls (cont)			
	31					
			Shale, dGr, th bd fossiliferous, hd	31.8 Run 11		
	32		oxidized in bot 0.2'			
		5	Limestone, m-dGr, m-c crystaline, fossiliferous, v hard, v dense.	2.5/2.6 -0.1		
	33					
	34		Base of Golconda - 34.3'			
			Top of Big Clifty fm Indian Springs Member	34.4 Run 12	Box 3 of 10	
	35		Shale, dGr, th bd, flakey-fissile, hard, carbonaceous flakes + specks along bd.			
	36			5.8/8.9		Blocked several times + ground core away in Run 12
	37			-3.1	~37.5	
	38				Box 4 of 10	
	39					
	40					

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PROJECT | HOLE NO.

Hole No. WES-3-1/4-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 5 OF 12 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	40		Shale (cont.)			
	41					
	42					
	43			43.3		
				Run 13	Box 4 of 10	
	44					
	45			3.0/3.2		
				-0.2		
	46			46.5		
				Run 14		
	47					
	48			1.1/3.2		
				-2.1 ~~+0.6~~ -1.5		
	49			49.1		Pull depth
				49.7		
				Run 15		
	50					

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PROJECT | HOLE NO.

Hole No. WES-3-C14-06

DRILLING LOG	DIVISION	INSTALLATION	SHEET 6 OF 12 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	50		Shale (Cont.)			
	51					
				4.2/4.0		
	52		Shale, dGr-GrGn mass, mod hd	~~+0.2~~ +0.6	52.5	
	53			53.3		Pull Depth
				53.7		
	54		grades to yBr + oxidized in bot ft. gypsum crystals near ss contact.	Run 16	Box 5 of 10	
		5				
		0				
		3				
	55	60	Top of Big cliffy SS - 54.8' Sandstone, lyTan, mass, v fine uniform grained, shallow ripples, hard, friable, oxidized			
		0				
	56	0				
		0		10.0/10.1		
		0				
	57			-0.1 +0.4		
		30				
	58					
	59	0				
	60					

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PROJECT | HOLE NO.

Hole No. WES-3-C14-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 7 OF 12 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	60	2	SS (cont.)			
		0				
		5			Box	
	61				5	
		15			of	
	62				10	
	63	0		63.3	63.3	Full Depth
		0		63.8		
	64	0		Run 17		
		0				
	65				Box	
		3			6	
		15 / 15			of	
	66	0		10.2 / 9.8	10	
	67			+0.4 / +0.1 / 0+5		
	68	0				
		45 / 32				
	69					
		0				
	70					

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PROJECT | HOLE NO.

Hole No. WES-3-C14-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 8 OF 12 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	70	0	SS (cont.)			
	71				Box 6 of 10	
		5				
	72	0				
		40				
		5				
	73					
		0		73.6		73.5 Pull Depth
				Run 18		
	74	40				
		40			74.5	
	75					
				10.3 / 10.2		
	76	0			Box 7 of 10	
	77			10.1		
		40				
	78					
	79					
		0	79.7 – Highly oxidized rusty Br			
	80					

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PROJECT | HOLE NO.

Hole No. WES-3-114-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 9 OF 12 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	80		SS (cont.)			
			80.6			
	81					
					Box 7 of 10	
	82	0 / 15				
	83					
				83.8		
	84	40 / 0 / 30	many Sh	Run 19		
	85					
					85.4	
	86	0				
					Box 8 of 10	
	87			10.0 / 10.0		
		0				
	88	0				
			coarser grained SS.			
	89					
	90	0				

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PROJECT | HOLE NO.

Hole No. WES-3-CM-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 10 OF 12 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	90		SS (Cont.)			
		0				
	91	0				
		5				
	92	0	Base of oxidation - 92.1'		Box 8 of 10	
	93		Wavey m-dGr shaley pts in lower 4' of SS.	93.8 Run 20		
	94					
	95					
	96				96.3	
	97		Base of Big Clifty SS - 97.0' Top of Beech Creek Ls - 97.0'	9.8/10.0		
		0	Limestone, mgrBr, m-c crystaline, fossiliferous, v hard, v dense, occ styolites.		Box 9 of 10	
		40		~~0.2~~		
	98					
	99					
	100					

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PROJECT | HOLE NO.

No. WES-3-C14-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 11 OF 12 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	100		Ls (cont.)			
	101					
	102				Box 9 of 10	
	103					
				103.6 / 103.8		Pull depth
	104		Limestone, as above but dGr, f-m crystalline, w/alternating zones w/wavey, shaley pts,	Run 21		
	105			3.4 / 4.3 ~~0.9~~ +0.2		
	106					
	107			107.0	107.0	Pull Depth
	108			100.1 / Run 22	Box 10 of 10	
	109					
	110					

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PROJECT | HOLE NO.

'e No. WES-3-014-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 12 OF 12 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	110		Ls (Cont.)			
		0				
		0				
	111			6.8 / 5.7		
		5				
	112			+1.1		
		0				
		5				
	113	41				
				113.8 Run 23		
	114		Small inclus. of Eluren shale in lower 0.3-0.4'	1.7 / 1.7		
		0	Base of Beech Creek 114.7'			
			Top of Eluren fm.			
	115		Shale, dgrGn, mass hard, blocky	115.5		Blocked off in shale.
			Bot. Depth 115.5'			
	116					
	117					
	118					
	119					
	120					

PROJECT | HOLE NO.

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Hole No. EWES-3-C15-86

DRILLING LOG	DIVISION US Navy	INSTALLATION Crane In	SHEET 1 OF 11 SHEETS

1. PROJECT NWSC Groundwater Studies	10. SIZE AND TYPE OF BIT HQ wireline
2. LOCATION (Coordinates or Station) ABG (Geologic Studies)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) WES-3-C15-86	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES 8
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED 2/23/86 — COMPLETED 2/26/87
	17. ELEVATION TOP OF HOLE ~ 618.6
7. THICKNESS OF OVERBURDEN 7.0'	18. TOTAL CORE RECOVERY FOR BORING %
8. DEPTH DRILLED INTO ROCK	19. SIGNATURE OF INSPECTOR Geologist Richard W. Hunt
9. TOTAL DEPTH OF HOLE 101.1'	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Silty Clay (CL), rBr, sl, sdy, occ ss frags, firm, (Residual-Colluvial soil)			Drilled to 9.0' w/8" dia. Folding Auger. Steam cleaned all tools before starting.
	1					
	2					
	3					
	4					
	5					
	6					
	7		Shale (Hardinsburg fm) Olive + wen (7.0 to 8.5'), changing to dGr below 9.5' th bd, Fissile v firm.			
	8					
	9					Drill from 9.0 to 10.0' w/7 3/4" RRB.t Grouted 10' of 6" PVC Casing.
	10					

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PROJECT

HOLE NO.

Project No. WES-3-C1586

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 11 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10		Shale (cont)	Run 1		2/24/87 Started coring w/ HQ wireline at 10.0'
	11		Top of Golconda - 11.6'			
	12		Limestone, lgr Br, finely crystalline, fossiliferous, v hard, v dense, occ stylolites			
			Jts are dim Sm			
	13					
			Sm			
	14			9.8/10.0		
	15			-0.2		
	16					
		45	fresh			
	17		Shale, dGr (sample was crushed during removal from core bl)			
	18		Limestone (as above)			
	19					
	20			20.0'		

PROJECT [redacted] HOLE NO.

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"le No. WES-3-C15-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 11 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE: STARTED / COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	20		Ls (cont.)	Run 2		
			Base of Colorado (20.9')			
	21		Top of Big Clifty Fm Shale, dGr, th bd, flaky-fissile carbonaceous flakes + specks along bd, mod hd			
	22		(oil film occured on top of water in mud pan from this zone)	5.0 / 5.6		Core loss was ground away during drilling
	23		(Indian Springs mem)	-0.6		
	24					
	25			25.6'		Reamed hole w/a 5½" RR bit and set 4" PVC casing through the upper 6" PVC casing to a depth of 24.0. Grouted casing in. 2/25/87
				Run 3		
	26					
	27			4.5 / 5.1		
	28					Core loss was ground away
	29			-0.6		
	30					

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PROJECT [redacted] HOLE NO.

Note No. [illegible]

DRILLING LOG	DIVISION	INSTALLATION	SHEET 4 OF 11 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30		sh (cont.)			
				30.7 / Run 4		
	31					
	32		Limestone, Gr-grBr, th bd w/shaley pts, f-m crystalline, fossiliferous, v hd, v dense.			
	33					
	34		Shale (as above)	7.7 / 7.7		Core loss was ground away during drilling.
	35			-2.0		
	36					
	37					
	38					
	39		Sandstone (Big Clifty) lyel-olive tan, v fine uniform grained, shallow ripples, friable, hard, oxidized (cont.) to a depth of 64.5'			
	41					

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PROJECT [illegible] HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 5 OF 11 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	40		mGr in top 1 ft w/ Calc clay inclus, dry	40.4		
			high oxidized zone	Run 5		
	41					
				3.2 / 3.4		
	42			-0.2	Box 3 of 8	
	43		mGr jts are lim + manganese stained	43.6 / 43.8		Pull depth
				Run 6		
	44					
	45					
	46		rusty Br (mostly) highly oxidized		46.4	
				9.8 / 10.0		
	47				Box 4 of 8	
	48			-0.2 +0.2		
	49					
	50					

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PROJECT [redacted] HOLE NO.

Project No. WES-3-715-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 6 OF 11 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	50		SS (Cont)			
	51					
	52					
	53			53.4		Pull depth
				53.8		
	54			Run 7		
	55					
	56					
	57			10.1 / 10.0		
	58		stn open	+0.1 −0.3 10.4		
	59					
	60					

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(TRANSLUCENT)

PROJECT [redacted] HOLE NO.

Hole No. [illegible]

DRILLING LOG	DIVISION	INSTALLATION	SHEET 7 OF 11 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	60		SS (cont.)			
	61					
	62					
		50	Sm. opened			
	63	5	rusty Br highly oxidized Lim stn			
		5		63.5		Full depth
			- Cal ss, v hard	63.8		
		15°	Lim stn - (base of oxidation	Run 8		
	64	60	along Jts is at 63.8'.		Box 5 of 8	
			— — —			
	65		Below 64.5' SS is lt Gr; no oxidation (same as above otherwise)			
	66					
				10.3 / 10.0		
	67					
				+0.3		
	68					
					68.9	
	69					
		0				
	70					

PROJECT | HOLE NO.

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" le No. WES-3-CR-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 8 OF 11 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	70	0	SS (cont.)			
		0				
	71					
	72	0			Box 6 of 8	
	73					
		5		73.8 / Run 9		
	74	2	sh lens (½")			
	75					
		0				
	76					
		5		9.7 / 10.0		
	77					
		0				
		15				
		0				
		45				
	78		Base of Big Clifty SS - 78.1			
			Top of Beech Creek LS (thin shaley/clayey lens at contact	-0.3		
		6	Limestone lgrBr,			
	79	70	m-c crystalline-granular, fossiliferous, occ stylolites, v hd, v dense			
		15				
	80				80.0	

rgh tight

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PROJECT HOLE NO.

le No. WES-3-C15-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 9 OF 11 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	80		LS (cont.)			
		0				
	81					
		10				
	82				Box	
		0			7	
	83			83.5	of	Pull depth
				83.8		
				Run 12	8	
	84					
	85					
		0				
	86					
		0				
		0	Limestone (as above) but dsr fine crystalline - granular w/occ shaley pts, shaley pts increase w/depth			
	87			10.0 / 9.7		
		0				
	88			~9.3		
		0				
	89					
	90					

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PROJECT HOLE NO.

Hole No. [illegible]

DRILLING LOG	DIVISION	INSTALLATION	SHEET 10 OF 11 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	90		Ls (cont.)			
					91.0	
	91					
	92					
	93				Box	
				93.5	8	
	94				of	
					8	
	95					
	96			7.6 / 7.6		
	97					
	98		Base of Green Rock Top of Fluvial Sm - 98.2' Shale darker thbd fissile mod hd.			(Lost all water at fluvial contact.) Chemical odor coming from sample when core was removed. (there was no water reaction when tested)
	99					
	100					

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PROJECT | HOLE NO.

File No. WES-3-415-2

DRILLING LOG	DIVISION	INSTALLATION	SHEET 11 OF 11 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	100		Shale (Cont.)			
	101			101.1		
			Bottom Depth - 101.1'			
	102					

PROJECT HOLE NO.

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(TRANSLUCENT)

DRILLING LOG	DIVISION US Navy	INSTALLATION Crane In	SHEET 1 OF 16 SHEETS

1. PROJECT: NWSC Groundwater Study
2. LOCATION (Coordinates or Station): A&B G / Geologic Studies
3. DRILLING AGENCY: WES
4. HOLE NO. (As shown on drawing title and file number): WES-3-C16-86
5. NAME OF DRILLER: Dan Tinker
6. DIRECTION OF HOLE: ☑ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 0
8. DEPTH DRILLED INTO ROCK:
9. TOTAL DEPTH OF HOLE: 15.7 ft
10. SIZE AND TYPE OF BIT: HQ wireline core
11. DATUM FOR ELEVATION SHOWN (TBM or MSL):
12. MANUFACTURER'S DESIGNATION OF DRILL: Failing 1500
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED: UNDISTURBED:
14. TOTAL NUMBER CORE BOXES: 13
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED 3/3/87 COMPLETED 3/12/87
17. ELEVATION TOP OF HOLE: ~681.3
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF ~~INSPECTOR~~ Geologist: Richard W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Thinly bedded, laminated Sandstone and Shale, w/ carbonaceous inclus, highly wea + oxidized, w/ limonite incrustations, rusty Br.			Cut out appox 5' of material too level drill site with a dozer. Sampled 0.0 to 20' w/ an 8" dia folding auger before refusal. Set 2' of 6" PVC sur. casing.
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

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PROJECT: [redacted] HOLE NO.

Project No. WES-3-C16-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 6 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10					
	11					
	12					
			Coal, blk, blocky	12.7		
				Run 1		Started Coring w/ HQ wirline at 12.7'
	13		shale dGr, th bd, flakey, carb. inclus, s'sides present, v firm - hard.	2.2/2.2		
	14					
				14.9		
	15			Run 2		
					Box 1 of 13	
	16					
			Thinly bedded alter. sandstone + shale lens (~50-50) med + dGr layering, hd, (very little to no carbonaceous matter)	7.8/8.8		
	17					
	18			-1.0'		
	19					
	20					

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PROJECT | HOLE NO.

Page No. WES-3-C16-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 16 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED: — COMPLETED:
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	20		thin bd ss + sh (cont.)			
	21					
					Box	
	22				1	
					of	
					13	
	23			23.7 / Run 3		
	24					
					24.9	
	25					
	26			7.6 / 9.1		
					Box	
	27			-1.5	2	
					of	
					13	
	28					
	29					
	30					

PROJECT | HOLE NO.

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

(TRANSLUCENT)

No. WES-3-C16-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 4 OF 16 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30		Thin bd ss + sh (cont.)			
	31					
	32					
				32.8		
	33			Run 4	Box	
					2	
	34			~~3.3~~	of	
				~~4.0~~		
				~~3.0~~	13	Dropped core in hole while coming out
			Shale, carbon, dGr-Blk, th bd hd	3.3/3.3		
	35					
			Coal, blk, blocky			
	36			36.1 (Runs)		Pull depth
			Claystone, dGr, mass, homo, hard, blocky.			
	37					
					37.8	
	38					
	39					
	40					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole no. WES-3 [illegible]

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 16 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE: STARTED / COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	40		Claystone (cont.)			
	41					
				41.8 / ~~Run 5~~		
	42					
	43					
					Box	
					3	
	44				of	
				10.5 / 6.7	13	Pick up some of Core drilled on Previous run, Ground rest of Core away.
	45			~~F3.9~~		
				1.9		
	46					
	47					
	48					
				48.5 / Run 6		3/5/87
			Shale vd Gr-Blk carbon, th bd, hd			
	49		Sandstone 1-m Gr, fine grained th bd, w/num Blk carbonaceous shaley pts, cross bd,			
	50					

PROJECT | HOLE NO.

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

H-1a No. wES-3-C16-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 6 OF 16 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE: STARTED / COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	50		(55) cont.			
	51				51.3	
	52		Vuggy toward bot. and oxidized, w/Lim stn.			
	53		Siltstone, Lm olive Gr, mass, homo, Angular clastic inclus are present but faint due to similarities in color and texture. There are abundant randomly oriented coal flakes and angular coal inclus up to ~¼" in size, Bedding is apparent in some zones dipping ~30-35°, hard.	9.9/10.0	Box 4 of 13	
	54			0.1		
	55					
	56					
	57					
	58			58.5 Run 7		
	59					
	60					

PROJECT | HOLE NO.

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

H No. WES-3-116-00

DRILLING LOG	DIVISION	INSTALLATION	SHEET 7 OF 16 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	60		Siltstone (cont.)			
	61				Box 4	
	62				62.5	
	63					
	64			9.5 / 9.8	Box 5	
			Base of Penn - 64.8			Top of Galconda ~~64.8~~ 65.3'
	65		Shale dolive Gr, th bd, Platey - flakey, hd.	-0.3		
			Shaley Limestone - Limy shale, dGr, th bd, fossiliferous, hd			
	66					
			Limestone, mGr, finely crystaline, fossiliferous, occ shaley pts, hard.			
	67					
	68			68.3 / Run 8		
			Shaley Limestone - Limy shale, (as above)			
	69					
	70					

PROJECT HOLE NO.

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 8 OF 16 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	70		Ls/sh (cont)			
	71		Limestone, lt-m gr Br, finely crystaline, fossiliferous, v hard, v dense,			Loss all drilling water in cavity zone.
	72		Rods dropped in cavity between 71.3 + 73.7'		Box 5	
	73			6.5 / 9.0		
	74			-2.4		- Core loss due to cavity.
	75		all fts are open, show solutioning + are lim stn.			
	76				76.4	
	77		← Base of oxidation - 77.1	77.3 Run 9	Box 6	
	78		Base of Golconda Fm. Top of Big Clifty Fm - 78.0 Shale, vd Gr, th bd, platey-flakey, carbonaceous flakes + specks along bd hard.	0.7 / 2.0 - 1.3		- Ls lodged in bl + ground underlying shale away (1.3' core loss)
	79		(Indian Springs Shale)	79.3 Run 10		
	80					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT HOLE NO.

File No. WES-3-016-86

DRILLING LOG

DIVISION	
INSTALLATION	
SHEET 9 OF 16 SHEETS	
1. PROJECT	
2. LOCATION (Coordinates or Station)	
3. DRILLING AGENCY	
4. HOLE NO. (As shown on drawing title and file number)	
5. NAME OF DRILLER	
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	
7. THICKNESS OF OVERBURDEN	
8. DEPTH DRILLED INTO ROCK	
9. TOTAL DEPTH OF HOLE	
10. SIZE AND TYPE OF BIT	
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	
12. MANUFACTURER'S DESIGNATION OF DRILL	
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED / UNDISTURBED
14. TOTAL NUMBER CORE BOXES	
15. ELEVATION GROUND WATER	
16. DATE HOLE	STARTED / COMPLETED
17. ELEVATION TOP OF HOLE	
18. TOTAL CORE RECOVERY FOR BORING %	
19. SIGNATURE OF INSPECTOR	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	80		Shale (Cont.)			
	81			81.2 Run 11		Reamed hole w/a 5" RR Bit to 81.3' + set 4" PVC casing; grouted into shale, 3/9/87
	82					
	83			2.5 / 5.4 ~~2.4~~ 9 -0.2	Bot	
	84			84.0'	6	Pull depth
	85					
	86			86.7' Run 12		
	87					
	88			8.2 / 5.5	89.0	
	89			~~+2.7~~		
	90					

PROJECT | HOLE NO.

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

Ie No. WES-3-016-86

DRILLING LOG

DIVISION	
INSTALLATION	
SHEET 10 OF 16 SHEETS	
1. PROJECT	10. SIZE AND TYPE OF BIT
	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
2. LOCATION (Coordinates or Station)	12. MANUFACTURER'S DESIGNATION OF DRILL
3. DRILLING AGENCY	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
4. HOLE NO. (As shown on drawing title and file number)	14. TOTAL NUMBER CORE BOXES
5. NAME OF DRILLER	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	16. DATE HOLE — STARTED — COMPLETED
	17. ELEVATION TOP OF HOLE
7. THICKNESS OF OVERBURDEN	18. TOTAL CORE RECOVERY FOR BORING %
8. DEPTH DRILLED INTO ROCK	19. SIGNATURE OF INSPECTOR
9. TOTAL DEPTH OF HOLE	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	90		Shale (cont.)			
	91					Lost drill water while completing Run 12 indicating seal around casing had broken. Grouted hole from bottom and up casing to a depth of 21' from top.
	92			92.2 Run13		3/10/82 Drilled out Grout & started back, coring at 92.2'. Got back water return.
	93					
	94				Box 1 of 13	
	95		Shale dgnGr, mass, blocky, wea olive gray-tan in bot foot.	6.5/7.0 -0.5		
	96					
	97					
	98					
	99		Sandstone (Big Cliffy) lo live gr to tan, vfine friable, th bd w/ shallow ripples, hard tan calc. nodules in upper 1½', occ shaley pts in to 4-5', (rusty Br, oxidized in upper 10')	99.2 Run14		
	100					

PROJECT

HOLE NO.

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

Hole No. WES-[illegible]

DRILLING LOG	DIVISION	INSTALLATION	SHEET 11 OF 16 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	100		SS (cont.)		100.2	
		10				
	101					
			dts are mostly stn w/ Lim	4.2 / 4.5		
		90	7 cm			
	102			-0.3		
	103	15				
				103.4		Full depth
		15		103.7		
		150		Run 15		
	104	0				
		0				
		40	stn, open		30x	
		90				
	105				8	
					of	
					13	Lost all water at ~ 105.0'
	106			10.3 / 10.0		
		5				
		5	open			
	107			+0.3		
		0				
	108					
		0				
		0				
	109					
		45				
	110					

PROJECT — HOLE NO.

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

(TRANSLUCENT)

Ie No. WES-3-CK-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 12 OF 16 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	110		SS (cont.)			
	111				111.3	
	112					
	113	19				
		35				
		46		113.7 / Run 16		3/11/87
	114					
	115					
		5			Box 9 of 13	
	116					
	117			9.8 / 10.0		
	118					
	119					
		35				
	120					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT HOLE NO.

Hole No. [illegible]

DRILLING LOG	DIVISION	INSTALLATION	SHEET 13 OF 18 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	120		SS (Dm.)			
	121					
			— base of oxidation 121.7'			
	122				122.4	
	123			123.5 / 123.7 / Run 17		— pull depth
	124				Box 10 of 13	
	125		occ wavy shales, pits below ~124'			
	126			9.8 / 10.0		occ wavy shale pits below ~126'
	127					
	128					
	129					
	130					

PROJECT

HOLE NO.

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

(TRANSLUCENT)

No. WES-3-C16-E6

DRILLING LOG	DIVISION	INSTALLATION	SHEET 14 OF 16 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE: STARTED / COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	130		SS (cont.)			
		0				
	131					
		0				
	132					
	133			133.3	133.3	Pull depth
				133.7		
				Run 18		
	134				Bot	
	135				11	
		10		10.2 / 10.0	of	
	136	0			13	
		5		+0.2 +0.4		
		30	Base of Sycamore fm			
	137	0	Top of Green Creek fm - 137.0'			
		5	Limestone 1-m gr 3r m-c crystalline, fossiliferous, occ stylolites, v hard, v dense. (most interesting open jts are along bedding)			
	138					
		3				
	139	10				
	140					

PROJECT | HOLE NO.

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

(TRANSLUCENT)

'e No. WES-3-C16-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 15 OF 16 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	140		LS (cont.)			
	141	0			Box 11 of	
	142	5				
		70' 5 1/2				
	143			143.5 / 143.7 Run 19		pull depth
	144				144.2	
	145	5			Box 12 of 13	
	146	0	Limestone (similar to above) but cleaner, f.m. crystalline, w/some wavy shaley pts.	10.2 / 10.0 +0.2		
	147	0				
	148	0				
	149					
	150					

PROJECT | HOLE NO.

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

(TRANSLUCENT)

DRILLING LOG

DIVISION	
INSTALLATION	
SHEET 16 OF 16 SHEETS	
1. PROJECT	
2. LOCATION (Coordinates or Station)	
3. DRILLING AGENCY	
4. HOLE NO. (As shown on drawing title and file number)	
5. NAME OF DRILLER	
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	
7. THICKNESS OF OVERBURDEN	
8. DEPTH DRILLED INTO ROCK	
9. TOTAL DEPTH OF HOLE	
10. SIZE AND TYPE OF BIT	
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	
12. MANUFACTURER'S DESIGNATION OF DRILL	
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED / UNDISTURBED
14. TOTAL NUMBER CORE BOXES	
15. ELEVATION GROUND WATER	
16. DATE HOLE	STARTED / COMPLETED
17. ELEVATION TOP OF HOLE	
18. TOTAL CORE RECOVERY FOR BORING %	
19. SIGNATURE OF INSPECTOR	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	150		Ls (Cont.)			
	151				Box 12 of 13	
			3/4" clay along jt (soln)			
	152					
	153					
				153.7	153.7	3/12/87
	154				Box 13 of 13	
	155		(Lower 0.4' contains rounded inclus of Elwren shale)			water level at time of well completion - Depth 123.4'
			clay in jt (upper soln)			
			Base of Beech Creek - 155.8'			
	156		Top of Elwren Fm shale dgrGn, th bd, platy-blocky, hd			
	157		Bot. of hole - 157.0'			
	158					
	159					

PROJECT | HOLE NO.

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

* (TRANSLUCENT)

File No. WES-3-017-86

DRILLING LOG

DIVISION	US NAVY
INSTALLATION	Crane In.
SHEET	1 OF 15 SHEETS
1. PROJECT	NWSC Groundwater Studies
2. LOCATION (Coordinates or Station)	A86 (Geologic Station)
3. DRILLING AGENCY	WES
4. HOLE NO. (As shown on drawing title and file number)	WES-3-017-86
5. NAME OF DRILLER	Dan Taylor
6. DIRECTION OF HOLE	☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	5.5'
8. DEPTH DRILLED INTO ROCK	
9. TOTAL DEPTH OF HOLE	149.5
10. SIZE AND TYPE OF BIT	HQ wireline
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	
12. MANUFACTURER'S DESIGNATION OF DRILL	Failing 1500
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED: ; UNDISTURBED:
14. TOTAL NUMBER CORE BOXES	12
15. ELEVATION GROUND WATER	
16. DATE HOLE	STARTED 3/14/87 ; COMPLETED 3/19/87
17. ELEVATION TOP OF HOLE	693.9
18. TOTAL CORE RECOVERY FOR BORING	%
19. SIGNATURE OF ~~INSPECTOR~~	Geologist Richard W. Hurt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Silty Clay (CL) Br-yBr w/Gr laminations, th bd, soft wet (Recent Rain) (Largely Residual soil)			Sampled from 0.0 to 5.5' w/ 8" dia folding finger. steam cleaned all tools before starting
	1					
	2					
	3					
	4					
	5		wea SS fragments in feet.		5.5	Refusal 5 - 5.5
	6		Sandstone, yBr, highly wea w/ clay in jts(?) (soft drilling) (Penn-mansfield fm)		RR Bit from 5.5' to 12.2	Ran a 7 7/8 [illegible] B.I to 12.2' + set 6" PVC Casing to this depth.
	7					
	8					
	9					
	10					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT | HOLE NO.

Hole No. W1-[illegible]

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 15 SHEETS

1. PROJECT
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number)
5. NAME OF DRILLER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE
10. SIZE AND TYPE OF BIT
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE — STARTED — COMPLETED
17. ELEVATION TOP OF HOLE
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10		SS/Clay (cont			
	11					
	12			12.2 / Run 1		3/16/87 Started coring w/a HQ wireline, core bl. at 12.2'
	13		Sandstone, mGr, fine grained occ shale pts & thin discont. lens, hd, friable			
	14					
	15			10.4 / 10.4		
	16		Sandstone, mGr, fine grained w/num alter wavey Blk shale pts & thin lens, hard carbonaceous flakes along bd.			
	17					
	18					
	19					

PROJECT — HOLE NO.

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

Ie No. WFS-3-C17-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 15 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
-	20		SS (Cont.)			
	21					
	22			22.6 / Run 2		
	23					
	24					
	25			10.4 / 10.4		
	26		Sandstone, m-dGr, f-m grained, mass, slightly friable nd			
	27					
	28					
	29					
	30		Alternating thin layers lens of (a) sandstone + blk shale (~50-50 ratio), (Cont.)			

PROJECT

HOLE NO.

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

Ie No. WPS-3-017-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 4 OF 15 SHEETS

1. PROJECT
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number)
5. NAME OF DRILLER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE
10. SIZE AND TYPE OF BIT
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE — STARTED — COMPLETED
17. ELEVATION TOP OF HOLE
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30		Carbonaceous flakes + specks along bd, hd, platey			
	31					
	32					
				33.0' Run 3		
	33		Base of Mansfield fm			
			Top of Hardinsburg fm — Shale Gn, mass, hard, crumbly	33.4'		
	34					
	35			4.3/4.8		
	36			-0.5		
	37		Shale similar to above but dGr			
				37.8 Run 4		
	38					
	39			3.9/6.1		
			Shale/claystone Gn + dr Br in bk, mottled in some zones, mass, [illegible]	-2.2'		Core loss [illegible] to drilling [illegible]

PROJECT — HOLE NO.

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

Hole No. WE-[illegible]

DRILLING LOG	DIVISION	INSTALLATION	SHEET 5 OF 15 SHEETS

1. PROJECT
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number)
5. NAME OF DRILLER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE
10. SIZE AND TYPE OF BIT
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE — STARTED — COMPLETED
17. ELEVATION TOP OF HOLE
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	40		blocky, hard, occ s'sides dipping ~40°, num "micro" healed random fractures, (shale is very similar to the Elwren shale which normally underlies the Beech Creek LS)			
	41					
	42					
	43					
				43.9 / [illegible]		
	44					
	45					
			Shale, dGr, (w/occ Gn + rBr streaks along bd in upper 3-4'), th bd, hard, flakey, occ s'sides dipping ~40°,			
	46					
	47			7.8 / 10.0		
	48			-2.2		Core loss is due to drill action
	49					
	50					

PROJECT | HOLE NO.

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

(TRANSLUCENT)

Hole No. WES-[illegible]

DRILLING LOG	DIVISION	INSTALLATION	SHEET 0 OF 15 SHEETS

1. PROJECT
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number)
5. NAME OF DRILLER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE
10. SIZE AND TYPE OF BIT
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE — STARTED — COMPLETED
17. ELEVATION TOP OF HOLE
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	50		Shale (Cont.)			
	51					
	52					
	53					
				53.9 / Run 6		3/17/87
	54					
	55					
	56					
				9.5 / 9.5		
	57					
	58		Base of Hardinsburg fm-38.0' Top of Golconda fm Limestone, shaley m-[illegible] after [illegible] fossiliferous [illegible] bd dip ~5°			
	59					
	61					

PROJECT | HOLE NO.

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

'e No. WFS-3-C17-E6

DRILLING LOG	DIVISION	INSTALLATION	SHEET 7 OF 15 SHEETS

1. PROJECT
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number)
5. NAME OF DRILLER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE
10. SIZE AND TYPE OF BIT
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE — STARTED — COMPLETED
17. ELEVATION TOP OF HOLE
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	60		Shaley Ls (cont.)			
	61					
	62		Limestone, mgrBr m-c crystaline, fossiliferous, occ stylolites, vhd v dense			
	63			63.4		
			Limestone, shaley (as above)	Run 7		
	64					
	65					
	66		Limestone, mgrBr (as above), oolitic			
	67			5.0 / 5.1		
				-0.1		
	68		Base of Golconda			
			Top of Big Clifty Fm: 68.3 Shale, vdGr, th bd, platy-flaky, abundant carbonaceous flakes + specks along bd, hd	68.4 Run 8		
	69					
				69.4		Full depth
	71					

PROJECT — HOLE NO.

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

(TRANSLUCENT)

Hole No. [illegible]

LLING LOG	DIVISION	INSTALLATION	Sh. 5 of 5 SHEETS
CT		10. SIZE AND TYPE OF BIT	
		11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	
TION (Coordinates or Station)		12. MANUFACTURER'S DESIGNATION OF DRILL	
LING AGENCY		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED	
NO. (As shown on drawing title or hole number)		14. TOTAL NUMBER CORE BOXES	
E OF DRILLER		15. ELEVATION GROUND WATER	
		16. DATE HOLE: STARTED / COMPLETED	
ECTION OF HOLE		17. ELEVATION TOP OF HOLE	
VERTICAL ☐ INCLINED _____ DEG. FROM VERT.		18. TOTAL CORE RECOVERY FOR BORING %	
CKNESS OF OVERBURDEN		19. SIGNATURE OF INSPECTOR	
PTH DRILLED INTO ROCK			
TAL DEPTH OF HOLE			

VATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	70		Shale (cont.)			
	71			1.4 / 5.5		Core between 69.8 + 73.9 (4.1') dropped out of core barrel during removal from boring.
				-4.1		
	72					Ran a 5 7/8" bit, RR B.- to 74.5; ground down core [illegible]
	73					Set casing (4" PVC) to a depth of 74.5' & Grouted casing in.
					73.9 RR 8.- 74.5 Run 9	
	74					
	75					
	76					
	77		shale is fossiliferous in lower zone			
	78				9.0 / 9.3	
	79		Limestone, m-cGr m-c crystalline ore shale, ots. fossiliferous v hd, v dense (faint hor. bedding)		-0.3	
			num sh pts. (79.3-80.1)			

PROJECT

HOLE NO.

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE.

Hole No. 4

DRILLING LOG

DIVISION	
INSTALLATION	
1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DR.
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	80					
	81		Shale, vd Gr, th bd, platey-flakey, hd carbonaceous flakes + specks along bd.			
	82					
	83			83.8		
	84					
	85					
	86		Shale, d gn Gr in top grading to olive ton w/depth, mass, mod hd.		10.0 / 10.2	
	87					
	88				-0.2	
	89		oxidized in bot zone			
			Top of Eg [illegible] SS - [illegible]			
	90					

PROJECT

HOLE NO.

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

(TRANSLUCENT)

File No. WES-3-C17-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 10 OF 15 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	90		Sandstone, olive tan, th bd w/shallow ripples, vf uniform grained; lim incrusted inclus in top few feet along w/occ shaley pts.			
	91					
	92	80	tight			Lost ~ 75% of drill water at about 92.0.
		0	open			
	93					
				94.0 / Run 11		
	94					
	95					
	96					
	97	30 / 45 / 20		9.8 / 9.8		
	98					
	99	5 / 0				
	100					

PROJECT | HOLE NO.

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

Hole No. [illegible]

DRILLING LOG	DIVISION	INSTALLATION	SHEET 11 OF 5 SHEETS

1. PROJECT
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number)
5. NAME OF DRILLER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE
10. SIZE AND TYPE OF BIT
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE — STARTED — COMPLETED
17. ELEVATION TOP OF HOLE
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	100		Sandstone (Cont.)			
		4.2				
	101					
	102	0				
		5				
	103	0				
		5		103.8 / Run 12		
	104					Lost all water return at beginning of Run 12
		5				
	105					
	106	10				
	107	0	Lim stn	10.0 / 10.2		
		20	Tuff			
	108	20		-0.2		
		5				
		5				
	109					
	110	15				

PROJECT

HOLE NO.

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

(TRANSLUCENT)

File No. WES-3-617-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 12 OF 15 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE: STARTED / COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	110		SS (cont.)			
	111	30 / 60	clay sim			
	112					
	113	5				
	114		lim stn, Rusty Br.	114.0 Run 13		
	115	40 / 5 / 5	stn (Blk)			
		0	stn			
	116	40				
	117	6		9.3 / 10.0		
	118	0	stn			
		0				
	119	8 / 3 / 5	Blk stn	-0.7		
	120					

PROJECT | HOLE NO.

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

(TRANSLUCENT)

I. D. No. WES-3-C17-46

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 4 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	120		SS (as above)			
	121	D	stn, blk			
		45	Blk stn			
	122	5				
		90	stn			
		5	Lim coated			
	123	45				
		45				
				124.0		
	124			Run 14		
	125					
		0	Lim stn			
	126					
		0				
	127					
		0				
		60	Coarser grained, oxidized Rusty Br. (Lim stn)			
		0				
	128	30			10.0/10.0	
		0				
		5				
		0				
		5				
	129		Ls, lgrBr, fossiliferous, v hd v dense, oxidized in part.			
		0	SS (as above)			
			Ls. (as above)			
	130	0				

PROJECT — HOLE NO.

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE.

Hole No. [illegible]

DRILLING LOG	DIVISION	INSTALLATION	SHEET 14 OF 15 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	130		SS (as above			
			sd, ls, high - oxidized			
	131		Top of Beech Creek - 130.8' Limestone, lgr Br, m-c crystaline fossiliferous occ stylolites, v hard, v dense			Water level at 131.4' after completion of boring and removal of drill stem from Bot. (149.5')
	132					
	133		Tight; Tight; Joints are irregular, rough and most are stained.			
	134			134.0 / Run 15		
			Lgr soft clay			
			stn open jts			
	135		jts are stn'd			
	136					
			Lim stn			
	137			9.5 / 10.0		
			Lim stn			
			Lim stn — (Base of oxidation) 138.0'			
	138		Limestone, similar to above but dgr, fine-med crystaline - occ wavy shale, pts.			
	139		stn			

PROJECT | HOLE NO.

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

(TRANSLUCENT)

.o No. WEK-8-[illegible]

DRILLING LOG	DIVISION	INSTALLATION	SHEET 15 OF 15 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	140		LS (cont.)			
			Stn			
	141					
	142					
	143			143.0		Full depth
				144.0		
	144			Run 16		
			S--			
	145		S--			
	146			5.9 / 5.5		
	147		Elwren sh inclus in bot 0.2-0.3'	+0.4		
			Base of Beech Creek - 147.8'			
	148		Top of Elwren fm. shale, dgrGn, massive blocky, hard, occ gr Br cole inclus.			
	149			149.5		
			Bot. 149.5'			
	150					

PROJECT | HOLE NO.

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE.

DRILLING LOG	DIVISION US Navy	INSTALLATION NWSC Crane Ind	SHEET 1 OF 3 SHEETS

1. PROJECT: Hydro Geologic Studies, ABG
2. LOCATION (Coordinates or Station):
3. DRILLING AGENCY: WES
4. HOLE NO. (As shown on drawing title and file number): C18
5. NAME OF DRILLER: Dan Taylor
6. DIRECTION OF HOLE: ☑ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 7.8'
8. DEPTH DRILLED INTO ROCK:
9. TOTAL DEPTH OF HOLE: 22.5'
10. SIZE AND TYPE OF BIT: HQ wireline core
11. DATUM FOR ELEVATION SHOWN (TBM or MSL):
12. MANUFACTURER'S DESIGNATION OF DRILL: Failing 1500
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED: UNDISTURBED:
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED: COMPLETED: Apr 1997
17. ELEVATION TOP OF HOLE: ~ 623.1
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: Geologist Richard W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Silty Clay w/ ss frags, Br - yBr			
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8		Limestone (Salamonie/Honey) l-m gr Br, f-m crystalline, fossiliferous, V dense, V hard, ang chips/fragments			
	9					
	10					

PROJECT | HOLE NO.

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

" le No. WES-3-C18-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 3 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE: STARTED / COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Ls (cont)			
	11					
	12					
	13					
	14					
	15					
	16					
	17					
	18					
	19					
	20					

PROJECT | HOLE NO.

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

Log No. WES-3-C18-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 3 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED: — COMPLETED:
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	20		Base of Colorado / Honey Ls - 20.5'			
			Indian Spring Shale (Big Clifty Fm)			
	21		dGr, moss			
	22					
	23		Bot Depth - 22.5'			

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PROJECT HOLE NO.

Hole No. WES-3-C19-86

DRILLING LOG	DIVISION US Navy	INSTALLATION Crane Ind.	SHEET 1 OF 13 SHEETS

1. PROJECT: Nwse Groundwater Study
2. LOCATION (Coordinates or Station): ABG (Geologic Studies)
3. DRILLING AGENCY: WES
4. HOLE NO. (As shown on drawing title and file number): WES-3-C19-86
5. NAME OF DRILLER: Dan Taylor
6. DIRECTION OF HOLE: ☑ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 0.0
8. DEPTH DRILLED INTO ROCK:
9. TOTAL DEPTH OF HOLE: 122.5
10. SIZE AND TYPE OF BIT: 4 0 wireline core
11. DATUM FOR ELEVATION SHOWN (TBM or MSL):
12. MANUFACTURER'S DESIGNATION OF DRILL:
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED: UNDISTURBED:
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED 5/5/87 COMPLETED 5/6/87
17. ELEVATION TOP OF HOLE: 648.4
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: Geologist Richard W. Hunt.

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Sandstone, lGr + y Tan, th bd, v fine grained friable, w/alternating silty-shaley carbonaceous Blk lenses + pts, shallow cross bedding, oxidized along jts + bedding, platey.			Dozer had to cut out ~6' of material too level drill site. There is a 3-4" thick Coal seam ~ 1½' above Boring surface elev.
	1				1.7'	
				Run 1		Started Coring w/2' long, NX core bl at 1.7'
	2			0.9/1.3 -0.4		
				3.0 Run 2		
	3					
	4			1.0/2.5 -1.5		
	5			5.5 Run 3		
	6			1.4/2.0 -0.6		
	7			7.5 Run 4		
	8			1.1/2.0 -0.9		
	9			9.5 Run 5		
	10					

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PROJECT | HOLE NO.

Ie No. WES-3-C19-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 13 SHEETS

1. PROJECT
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number)
5. NAME OF DRILLER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE
10. SIZE AND TYPE OF BIT
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN | DISTURBED | UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE | STARTED | COMPLETED
17. ELEVATION TOP OF HOLE
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10		SS w/ shaley lens (Cont.)			
				0.3/2.2 -1.9		ground core away
	11					
				11.7		
				Run 6		
	12					
	13		mass cross bedding & thicker shale lenses in bot 2-3.			
	14				Box 1 of 10	
	15			9.7/10.0		
			Clastic Siltstone w/ss inclus, mass, hard, num carbonaceous specks and flakes	-0.3		
	16					
			Carbonaceous Shale, Blk, th bd w/ thin coal lenses + pts, hard.			
	17				-17.9	
	18					
	19					
			Clastic siltstone (as above)			
	20					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

No. WES-3-CR-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 3 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE: STARTED / COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	20		Clastic siltstone (as above			
	21			21.7 / Run 7		
	22			0.8 / 1.3		
				-0.5		
	23			23.0 / Run 8		
					Box	
	24				2	
					of	
	25				10	
		0	Sandstone, lGr, v fine grained, hard, friable, oxidized	10.0 / 10.0		
	26					
		20	Lim stn + rust along jts			
	27	10				
		60				
	28					
			Siltstone/Claystone, m-dgr Gn, mass, hard, occ carbonaceous inclus.			
	29				29.5	
			Base of Mansfield Fm			
		0	Top of Golconda/Haney LS 29.7'			
	30					

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PROJECT [redacted] HOLE NO.

Hole No. WES-3-C19-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 4 OF 13 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30		Shaley Limestone / Limey Shale, th bd, m-d Gr, fossiliferous, hard.			
	31	5				
	32		Shale Gn, mass, occ br Gr shale inclus, num slickensides			
	33			33.0 Run 9		
	34		Limestone, mgrBr, mass, m-c crystalline, v hard, v dense, Fossiliferous,			
	35					
	36	45	joints show evidence of solutioning and have clay fillings + coatings	5.4 / 8.4		
	37	0		-3.0		
		80	clay filled			Blocked and washed core away.
	38	0				
		0				
		0				
	39	0				
		30				
	40					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-CM-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 5 OF 13 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED: — COMPLETED:
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	40		Limestone (cont.)			
					Box	
					3	
	41		shaley			
				41.4	of	Blocked
				Run 10		
					10	
	42	0	Lim stn			
		90				
		0	Base of Calcanda / Haney Ls - 42.6'			
			(Top of Big Clifty, Indian springs shale member.)			
	43		Shale, Blk-vdGr, th bd, fissile - flakey, hard, Carbonaceous specks along bedding	2.7 / 2.7		
					43.5	
	44			44.1		Blocked
				RR	Box	Reamed hole w/ 5½" RR Bit to 46.1' & set 4" PVC casing.
	45			Bit	4	
				(No core)		
					of	
	46			46.1		
				Run 11	10	
						formation making oil film on water in mud pan
	47					
				5.4 / 5.4		
	48					
	49					
	50					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C19-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 6 OF 13 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	50		Shale (cont.)			
	51		Limestone, mgrBr, mCrystalline, Fossiliferous, v hd, V dense (Possibly left in core bl from run in Gokonda Ls) ?	51.5 Run 12		
			Shale (as above)			
	52					
	53					
	54					
	55			7.8 / 7.8		
	56					
	57					
	58					
	59					
	60					

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PROJECT | HOLE NO.

Hole No. WES-3-CP-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 7 OF 13 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	60		Shale (cont.)			
	61		Shale, m-dgrGn, mass, blocky, hard, becomes yBr to oxidized toward bot.	61.3' Run 13		
	62		[Core Loss was washed away in this zone]			
	63		Base of Indian spring shale			Top Big Clifty SS 62
			Top of Big clifty SS - 63.5	3.0 / 5.2		
	64		Sandstone, y to olive tan, oxidized v fine grained, hard, friable, shallow ripples	-2.2		
		60			Box	Lost ≈ 50% of water return.
	65	90			5	
		60	Jts lim stn + filled w/clay		of	
	66			66.4 / 66.5 Run 14	10	
	67	0				
	68	5				
	69	60 / 60		7.2 / 7.1		
				+0.1		
	70					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

Hole No. WES-3-CP-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 8 OF 13 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE: STARTED / COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	70		SS (cont)			
	71					
		0	1/4" clay filled		71.7	
		0	clay "			
	72					
		0				
	73	0				
					BOX	
				73.6		
				Run 15		
		0				
	74				6	
					of	
	75				10	
	76					
	77			9.8 / 10.0		
		0				Lost all drill water ~ 78.0'
	78	13		~0.2		
		0				
	79	0				
		20				
	80	20				

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

Hole No. WES-3-C19-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 9 OF 13 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	80		SS (cont.)			
	81	0				
	82	0				
	83				83.0	
				83.4 / 83.6 Run 16		Pull depth
	84	0			Box	
		0			7	
	85	0			of	
	86				10	
				10.2 / 10.0		
	87	90	v hard, Calcareous			
				40.2		
	88	0				
	89	30	Lim stn			
		0				
	90					

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PROJECT | HOLE NO.

Hole No. WES-3-C19-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 10 OF 13 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	90		SS (cont.)			
	91	30	Lim stn — Base of oxidation - 91.2		Box 7 of 10	
	92	40°				
	93	0		93.6 Run 17		
	94	5	(91.2 - 101.8) SS is 1Gr + has ccc wave shaley pts toward bot		94.2	
	95	0			Box 8 of 10	
	96	0				
	97	75° 0		9.1 / 9.1		
	98	0				
	99	0 30				
	100					

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PROJECT | HOLE NO.

Hole No. WES-3-CA-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 11 OF 13 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	100		Sandstone (cont.)			
		0				
	101		conglomeritic in top 0.1' of Limestone			
		0	Base of Big Clifty SS - 101.8'			
		0	Top of Beech Creek LS.		Box	
	102		Limestone, mgr Br, m-c crystaline, fossiliferous, v hard, v dense, occ stylolites	102.7	8	
				Run 18	of	
	103	50°			10	
	104	0				
	105				105.4	
	106			9.6 / 10.2		
		5			Box	
		0			9	
	107			10.6	of	
		0			10	
	108					
	109					
	110					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-CA-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 12 OF 13 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	110	0	Ls (cont.)			
	111	0				
		0	Limestone (as above) but dGr, f-m crystaline, occ to num wavey shaley pts			
	112	5		112.3	Box 9	Pull depth
				112.9 Run 19	of 10	
	113	0				
	114	0				
	115	0				
	116	0				
		0		10.3 / 9.6	116.7	
	117			+0.6		
					Box	
	118	0			10	
					of	
	119	0			10	
	120	0				

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

Hole No. WES-3-CR-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 13 OF 13 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	120		Ls (Cont.)			
	121					
			Base of Beaverhill Creek Ls - 121.5'			
			Top of Elwren fm			
	122		shale, dgrGn, mass, hard.	122.5		
	123		Bot. of Hole 122.5'			

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

Hole No. WES-3-C20-86

DRILLING LOG	DIVISION US Navy	INSTALLATION NWSC, Crane Ind	SHEET 1 OF 12 SHEETS

1. PROJECT Hydrogeologic Studies, ABG	10. SIZE AND TYPE OF BIT HQ Wireline
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) 3-C20	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED 5/19/87 — COMPLETED 5/23/87
7. THICKNESS OF OVERBURDEN 0.0	17. ELEVATION TOP OF HOLE ~ 644.9
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 120.0'	19. SIGNATURE OF INSPECTOR Geologist Richard W Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Shale, olive yel-olive Gr, th bd, w/ sdy pts, platy			0.0 to 10.0' - R.R. Bit. Set 6" dia PVC Surface Casing. Started Coring with HQ wireline at 10.0'.
	1		Note: Dozer cut next to drill site shows shale extends ~ 4.0' above boring. A 1.0' coal bed overlies the shale bed above the boring ground surface.			
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. ES-3-C20-R

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 12 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 3- C20	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10		Sandstone, lGr, mass, fine grained, hd, friable	Run 1		
	11					
	12					
	13					
	14			9.5/10.1		
	15		Shale, dGr, th bd, hd, platey.	-0.6		
	16					
	17		Sandstone, r-yBr, Gr + Blk th bd, (wavey bd) w/ carbonaceous, sh + coal pts + swirls, hd, Friable			
	18					
	19					
	20					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Aolbrite. WES-3-C20-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 12 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 3 - C20	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	20		SS (cont.)	20.1 / Run 2		
	21					
	22					
	23					
	24			9.6 / 9.9		
	25			-0.3		
	26		(Base of Penn Sediments)			
			(Top of Miss Sediments) (Golconda/Haney Fm)			26.7'
	27		Shaley Limestone – Limey shale, m-dGr, th bd, hd, fossiliferous			
	28					
	29					
	30			30.0		

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

DRILLING LOG

DIVISION	
INSTALLATION	
SHEET 4 OF 12 SHEETS	
1. PROJECT	
2. LOCATION (Coordinates or Station)	
3. DRILLING AGENCY	
4. HOLE NO. (As shown on drawing title and file number)	3 - C20
5. NAME OF DRILLER	
6. DIRECTION OF HOLE	☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	
8. DEPTH DRILLED INTO ROCK	
9. TOTAL DEPTH OF HOLE	
10. SIZE AND TYPE OF BIT	
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	
12. MANUFACTURER'S DESIGNATION OF DRILL	
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED / UNDISTURBED
14. TOTAL NUMBER CORE BOXES	
15. ELEVATION GROUND WATER	
16. DATE HOLE	STARTED / COMPLETED
17. ELEVATION TOP OF HOLE	
18. TOTAL CORE RECOVERY FOR BORING	%
19. SIGNATURE OF INSPECTOR	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30		Shaley Ls (cont.)	Run3		
			Shale, vdGr, th bd platey			
	31		Limestone, l-m grBr, m-c crystaline, fossiliferous, v hd, v den			
	32					
	33					
	34			9.0 / 9.0		
	35					
	36		Limey Sh (as above)			
	37					
	38					
	39		(Base of Gatesonda/Honey)	39.0		39.0'
			(Top of Big Clifty fm) (Indian springs mem)	Run4		
	40		Shale, vdGr-Blk, th bd carbonaceous, platey-flakey			

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C20-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 5 OF 12 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 3- C20	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	40		Shale (cont.)			
	41			4.1/4.1		
	42					
	43			43.1		
				Run 5		
	44					
	45					
	46			9.3/10.0		
	47			-0.7		
	48					
	49					
	50					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. WES-3-C20-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 6 OF 12 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 3 - C20	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	50		Shale (cont.)			
	51					
	52					
	53			53.1 / Run 6		
	54					
	55					
			alter SS lenses			
	56		Shale becomes olive Gr, mass, oxidized in bot 1½'	10.0 / 10.1		
	57			-0.1		
	58					
	59		(Base of Indian Springs)			59.2'
			(Top of Big Clifty SS) (cont.)			
	60					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. WES-3-C20-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 7 OF 12 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 3-C20	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: ; UNDISTURBED:
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED: ; COMPLETED:
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	60		Sandstone, olive Yel-Br, th bd-mass, shallow ripples, oxidized, hd, friable			
	61					
	62					
	63			63.2 / Run 7		
	64					
	65					
	66			10.0 / 10.0		
	67					
	68					
	69					
	70					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C20-8

DRILLING LOG	DIVISION	INSTALLATION	SHEET 8 OF 12 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 3-C20	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	16. DATE HOLE — STARTED — COMPLETED
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	70		Sandstone (cont.)			
	71					
	72					
	73			73.2 / Run 8		
	74					
	75					
	76			10.0 / 10.0		
	77					
	78					
	79					
	80					

ENG FORM | PROJECT | HOLE NO.

Hole No. WES-3-C20-B

DRILLING LOG	DIVISION	INSTALLATION	SHEET 9 OF 12 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 3-C20	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	16. DATE HOLE — STARTED — COMPLETED
	17. ELEVATION TOP OF HOLE
7. THICKNESS OF OVERBURDEN	18. TOTAL CORE RECOVERY FOR BORING %
8. DEPTH DRILLED INTO ROCK	19. SIGNATURE OF INSPECTOR
9. TOTAL DEPTH OF HOLE	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	80		SS (Cont.)			
	81					
	82					
	83			83.2		
				Run 9		
	84					
	85					
	86					
				10.0 / 10.0		
	87					
	88					
	89					
	90					

ENG FORM 1836 — PROJECT — HOLE NO.

Hole No. WC-3-C20-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 10 OF 12 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 3-C20	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	16. DATE HOLE — STARTED — COMPLETED
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	90		Sandstone (cont.)			
	91					
	92					
	93			93.2		
				Run 10		
	94					
	95					
	96					
	97			10.0 / 10.0		
	98					
	99					
	100		(Base of Big Clifty fm) (Top of Beech Creek fm)			99.8'

ENG FORM 1836 — PROJECT — HOLE NO.

[redacted].WE-3-C20-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 11 OF 12 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 3-C20	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	100		Limestone, l-m grBr, m crystalline, fossiliferous, v hd, vdcn, occ styolites			
	101		Solutioning on Ls at above contact.			Base of oxidation ~102'.
	102					
	103			103.2 / Run 11		
	104					
	105					
	106			9.3 / 9.3		
	107					
	108		Ls changes to dGr, f-m crystalline occ wavey shaley pts.			
	109					
	110					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. WES-3-C20-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 12 OF 12 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 3-C20	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	110		LS (cont.)			
	111					
	112			112.5 Run 12		
	113					
	114					
	115			6.3/6.3		
	116					
	117					
	118		(Base of Beach Creek fm)			118.6'
			(Top of Ehwen fm)	118.8 Run 13		
	119		Shale, Gn, mass	0.9/1.2 -0.3		
	120		Cot. Depth - 120.0'			

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE | PROJECT | HOLE NO.

Hole No. WES-3-C21-86

DRILLING LOG	DIVISION US Navy	INSTALLATION NWSC, Crane, Ind	SHEET 1 OF 13 SHEETS

1. PROJECT Hydrogeologic Studies, ABG	10. SIZE AND TYPE OF BIT HQ Wireline Core
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) 3-C21	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED 5/26/87 — COMPLETED 5/28/87
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE ~639.8
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 123.0	19. SIGNATURE OF INSPECTOR Geologist Richard W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Sandstone, y Br, mass, oxidized, friable,			0.0 to 12.0' drilled with R.R. Bit set 6" dia PVC surface casing
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C21-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 13 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 3- C21	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10		Sandstone (cont)			
	11					
						Started Coring with HQ wireline at 12.0'
	12			12.0 Run 1		
	13					
	14					
	15					
	16			9.0 / 9.7		
	17			-0.7		
	18					
	19					
	20					

Ie No. WES-3-C21-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 13 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 3-C21	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	20		SS (Cont.)			
			(Base of Penn Sediments)			20.7'
			(Top of Miss Sediments) (Hardinsburg fm)			
	21		Shale, Gn w/rBr claystone inclus, mass in top; dgnGr, th bd, in bot.	21.7 / Run 2		
	22					
	23					
			(Base of Hardinsburg fm)			23.8'
			(Top of Golconda/Haney fm)			
	24		Shaley Limestone — Limey shale, m-dGr, th bd, fossiliferous, hd.			
	25					
	26			10.0 / 10.0		
	27					
	28					
	29					
	30					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

File No. WES-3-C21-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 4 OF 13 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 3-C21	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30		Shaley Ls (Cont.)			
	31					
			Limestone, l-m gr Bs, m-c crystaline, v hd, v den, fossiliferous	31/7 Run 3		
	32					
	33					
	34					
	35		Shaley Ls (as above)	8.8/10.0		
	36					
	37			1.2		
			crystaline Ls (as above			
	38					
	39					
	40		(Base of Golconda/Haney Fm) (Top of Big Clifty fm)			39.8'

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C21-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 5 OF 13 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 3-C21	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	16. DATE HOLE — STARTED — COMPLETED
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	40		(Indian Springs Mem)			
			Shale, vd Gr-Blk, th bd, platey-flakey, Carbonaceous, hd			
	41			41.5 / 41.7		Pull Depth
				Run 4		
	42					
	43					
	44			6.3 / 6.1		
	45			+0.2		
	46					
	47					
				47.8		
	48			Run 5		
	49			5.4 / 6.0		
	50			-0.6		

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C21-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 6 OF 13 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 3-C21	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	50		Shale (cont.)			
	51					
	52					
	53					
				53.8 / Run 6		
	54					
	55					
	56					
			Becomes olive Gr, mass in bot 3.0''	9.1 / 9.9		
	57					
	58					
	59		(Base of Indian Spr. Mem)	-0.8		59.1
			(Top of Big Clifty SS)			
			(Cont)			
	60					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Aale No. WES-3-C21-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 7 OF 13 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 3-C21	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	60		Sandstone, olive-yBr, v fine, th bd-mass, shallow ripples, oxidized, friable.			
	61					
	62					
	63					
				63.7		
				Run 7		
	64					
	65					
	66					
	67					
	68			9.8 / 10.0		
	69			-0.2		
	70					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C21-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 8 OF 13 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 3-C21	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	70		Sandstone (cont.)			
	71					
	72					
	73					
				73.7 Run 8		
	74					
	75					
	76					
	77			9.5/9.7		
				-0.2		
	78					
	79					
	80					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C21-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 9 OF 13 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 3-C21	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	80		SS (Cont.)			
	81					
	82					
	83			83.4		
				Run 9		
	84					
	85					
			– Base of oxidation 85.7'			
	86					
			SS 1 gr Tan below 85.7			
	87			10.1/10.1		
	88					
	89					
	90					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C21-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 10 OF 13 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 3-C21	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	16. DATE HOLE — STARTED — COMPLETED
	17. ELEVATION TOP OF HOLE
7. THICKNESS OF OVERBURDEN	18. TOTAL CORE RECOVERY FOR BORING %
8. DEPTH DRILLED INTO ROCK	19. SIGNATURE OF INSPECTOR
9. TOTAL DEPTH OF HOLE	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	90		SS (cont.)			
	91					
	92					
	93			93.5 / Run 10		
	94					
	95					
	96					
	97			9.9 / 9.9		
			(Base of Big Clifty fm)			97.8
	98		(Top of Beech Creek fm)			
			Limestone, m gr Br, m crystaline, fossiliferous, v hd, v den, occ stylolites,			
	99					
	100					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE

PROJECT | HOLE NO.

Hole No. WES-3-C21-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 11 OF 13 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 3-C21	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	100		Ls (cont)			
	101					
	102					
	103			103.4 / Run 11		
	104					
	105					
	106					
	107			10.0 / 10.0		
	108		Ls changes to sl Gr, f crystalline, one wavey shaley pts. (as above)			
	109					
	110					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

File No. WES-3-C21-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 12 OF 13 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 3-C21	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE: STARTED / COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	110		LS (Cont)			
	111					
	112					
	113			113.4		
				Run 12		
	114					
	115					
	116					
	117			9.0		
	118			9.6		
	119		(Base of Beech Creek fm)	-0.6		119.2
			(Top of Eburen (fm)			
			Shale, dgrGn, mass-th bd hd			
	120					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C21-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 13 OF 13 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 3-C21	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE: STARTED / COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	120		Shale (Cont) (occ th ss lenst pts in top zone)			
	121					
	122					
				123.0		
	123		Bot. Depth - 123.0'			
	124					
	125					
	126					
	127					
	128					
	129					
	130					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

File No. WES-3-C22-B

DRILLING LOG	DIVISION US Navy	INSTALLATION Nwsc, Crane Ind	SHEET 1 OF 2 SHEETS

1. PROJECT: Hydrogeologic Studies, ABG
2. LOCATION (Coordinates or Station):
3. DRILLING AGENCY: WES
4. HOLE NO. (As shown on drawing title and file number): 3-C22
5. NAME OF DRILLER: Dan Taylor
6. DIRECTION OF HOLE: ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN:
8. DEPTH DRILLED INTO ROCK: -
9. TOTAL DEPTH OF HOLE: 16.5'
10. SIZE AND TYPE OF BIT: R.R. Bit
11. DATUM FOR ELEVATION SHOWN (TBM or MSL):
12. MANUFACTURER'S DESIGNATION OF DRILL: Failing 1500
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED: UNDISTURBED:
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED 6/4/87 COMPLETED 6/4/87
17. ELEVATION TOP OF HOLE: ~615.6
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF ~~INSPECTOR~~ Geologist: R. W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Silty clay, y Tan w/ ss frags			
	1					R.R. Bit (No Cores)
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9		Limestone, shaley			
	10					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

lot file WES-3-C22-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 2 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 3-C22	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10		Gokonda/Haney (Possibly isolated blocks)			
	11					
	12					
	13					
	14		Shale (Indian sprs)			
	15					
	16					
	17		Bot Depth 16.5'			

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C23-86

DRILLING LOG	DIVISION U.S. Navy	INSTALLATION NWSC, Crane Ind	SHEET 1 OF 2 SHEETS

1. PROJECT Hydrogeologic Studies, ABG	10. SIZE AND TYPE OF BIT R.R. Bit
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) 3-C23	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED 6/8/87 — COMPLETED 6/9/87
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE ~ 616.6
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 15.5'	19. SIGNATURE OF INSPECTOR Geologist Richard W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Silty clay w/ SS frags			
	1					Drilled w/ R.R. Bit (No Cores)
	2					
	3					
	4					
	5					
	6		Limestone, shaley (Golconda/Haney)			
	7					
	8					
	9					
	10					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. WES-3-C23-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 2 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 3-C23	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10		Ls (cont.)			
	11					
	12		Shale, Blk, hd, (Indian Springs)			
	13					
	14					
	15					
	16		Bot. Depth- 15.5'			
	17					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C24-86

DRILLING LOG	DIVISION US Navy	INSTALLATION NWSC, Crane, In	SHEET 1 OF 3 SHEETS

1. PROJECT: Hydrogeologic Studies
2. LOCATION (Coordinates or Station): ABG (Johnson Hollow
3. DRILLING AGENCY: WES
4. HOLE NO. (As shown on drawing title and file number): WES-3-C24-86
5. NAME OF DRILLER: Dan Taylor
6. DIRECTION OF HOLE: ☑ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: ~15.0' ?
8. DEPTH DRILLED INTO ROCK:
9. TOTAL DEPTH OF HOLE: 28.2'
10. SIZE AND TYPE OF BIT: HQ wireline
11. DATUM FOR ELEVATION SHOWN (TBM or MSL):
12. MANUFACTURER'S DESIGNATION OF DRILL: Failing 1500
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED: UNDISTURBED:
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED Jun 15, 1987; COMPLETED Jun 16, 1987
17. ELEVATION TOP OF HOLE: 551.2'
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: Geologist Richard W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Sandy silt (ML), Br-rBr, w/oxidized friable sandstone frags, cobbles + pebbles, mod firm, sli moist. (Alluvium)			Dozer cut down ~2' from original ground surface in leveling drill site. 0.0 to 11.8' drilled w/a 7" dia folding auger + RR bit.
	1					
	2					
	3					
	4					
	5		more sdy + dBr below ~5.0' to ~7.5'			
	6					
	7					
	8		(7.5-15.0') sdy silt, yBr-rBr w/num ss frags, cobbles + pebbles.			
	9					
	10					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-CZY-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 3 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10					
	11			11.8		started coring w/ HQ wireline at 11.8'
	12					
	13					
	14					
	15		? Big cliffy ss' formation Sandstone Blocks, y Tan, oxidized, v fine grained, hard, friable, highly stl'd w/ Lim + mang. coating sts. (Zone represents sandstone blocks that have collapsed into solution cavities in the underlying Beeck Creek Ls. Cavities that are partially open & partially soil filled account for the poor core recovery)	4.0/10.0		Lost all water, return at 15.0'
	16			6.0'		
	17					
	18					
	19					
	20					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-024-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 3 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	20		Sandstone Blocks (Cont.			
	21					
				21.8		
				Run 2		
	22					
	23					
	24			1.8/5.2		
	25			-3.4		
			solution surface			
	26		Beech Creek Limestone (basal zone), dGr, crystalline fossiliferous,			
			- small Elwren shale inclus in bot 0.3'	27.0		Blocked
	27		Elwren Shale, m-dGn mass, hard,	1.2/1.2		
	28					
			Bottom depth - 28.2'			
	29					
	30					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

DRILLING LOG	DIVISION US Navy	INSTALLATION NWSC, Crane In	SHEET 1 OF 8 SHEETS

1. PROJECT Hydrogeologic Studies	10. SIZE AND TYPE OF BIT HQ wireline
2. LOCATION (Coordinates or Station) ABG (Johnson Hollow)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) WES-3-C25-86	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED 6/17/87 — COMPLETED 6/18/87
7. THICKNESS OF OVERBURDEN 8.0'	17. ELEVATION TOP OF HOLE 595.0'
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 70.7'	19. SIGNATURE OF INSPECTOR Geologist Richard W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Sandy Silt - Silty Sand (mL-sm) yBr-rBr, w/num oxidized ss frags, cobbles & pebbles, mod soft, moist. (Alluvium)			Drilled 0.0 to 10.5' w/7" folding Auger
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8		Base of Valley Fill 8.0'			
	9		Shale olive - olive gray, mass, v firm slightly moist, weathered. (Indian springs member of Big Clifty fm)			
	10		Base of Shale 10.0'			

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 8 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10		(Top of Big Clifty SS – 10.0')			
				10.5' Run 1		Started coring w/ HQ wireline at 10.5.
	11	0	Sandstone, lyel-olive Tan vfine uniform grained, th bd with shallow ripples mod hard, friable, oxidized w/ Lim stn along Jts.			
		0				
		0				
	12	0				
		0				
	13	0				
	14					
		0				
	15	0		9.2/10.0		
		0				
		0				
	16	30/0				
		10				
		33		-0.7		
	17	30				
	18	40				
	19					
	20	0				

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 8 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	20		SS (cont.)	20.5		
				Run 2		
	21	0				
		0				
	22				22.4	
		0				
	23					
		0			Box	
		60				
	24				2	
		45				
				9.7	of	
	25			10.0	6	
		0		-0.3		
	26					
	27					
	28	30				
		30				
	29					
	30					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 4 OF 8 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30		SS (Cont.)			
				30.5		
				Run 3		
	31					
	32					
		30				
	33					
	34					
					34.3	
		0	Calcareous SS	10.1 / 10.2		
	35	0				
				-0.1	Box	
	36	5			3	
	37				of	
					6	
	38					
	39					
		0				
	40	0				

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 5 OF 8 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	40		SS (Cont)			
				40.7 / Run 4		
	41					
	42					
	43	20				Lost all drill water at ~42.6'
	44					
		0				
	45			10.2 / 10.2	45.7	
	46				Box	
	47				4	
		0				
		0			of	
		0				
	48				6	
			Shaly pts in bot few feet of SS.			
	49	0				
	50	0				

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 6 OF 8 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	50		SS (Cont.)			
		20				
		10				
				50.9		
	51	0		Run 5		
		0				
			Base of Big Clifty SS - 51.6'			
			Top of Beech Creek Ls.			
	52		Limestone, l-m gr Br, m-c crystalline, fossiliferous, v hard, v dense, occ stylolites.			
		0				
	53					
	54					
		0				
	55			10.1 / 10.1		
	56					
					56.9	
	57				Box	
		0				
	58				5	
			Ls becomes d Gr below ~58'			
					of	
	59				6	
		0				
		5				
		0				
	60					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 7 OF 8 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	60		Ls (cont)			
	61			61.0 Run 6		
	62					
	63					
	64					
	65		occ wavey shaley pts in lower zone			
	66					
	67					
	68					
	69					
	70					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

DRILLING LOG

DIVISION	
INSTALLATION	
SHEET 8 OF 8 SHEETS	
1. PROJECT	
2. LOCATION (Coordinates or Station)	
3. DRILLING AGENCY	
4. HOLE NO. (As shown on drawing title and file number)	
5. NAME OF DRILLER	
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	
7. THICKNESS OF OVERBURDEN	
8. DEPTH DRILLED INTO ROCK	
9. TOTAL DEPTH OF HOLE	
10. SIZE AND TYPE OF BIT	
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	
12. MANUFACTURER'S DESIGNATION OF DRILL	
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED / UNDISTURBED
14. TOTAL NUMBER CORE BOXES	
15. ELEVATION GROUND WATER	
16. DATE HOLE	STARTED / COMPLETED
17. ELEVATION TOP OF HOLE	
18. TOTAL CORE RECOVERY FOR BORING %	
19. SIGNATURE OF INSPECTOR	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	70		Base of Beech Creek LS - 70.5			
			Top of Elwren Shale, dGn			
			Bottom Depth - 70.7'			

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

Hole No. WES-3-C26-86

DRILLING LOG	DIVISION US Navy	INSTALLATION NWSC Crane In	SHEET 1 OF 11 SHEETS

1. PROJECT Hydrogeologic Studies	10. SIZE AND TYPE OF BIT HQ Wire line Core
2. LOCATION (Coordinates or Station) A86	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) WES-3-C26-86	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED 7/28/87 — COMPLETED 8/3/87
7. THICKNESS OF OVERBURDEN 0.0	17. ELEVATION TOP OF HOLE 638.6
8. DEPTH DRILLED INTO ROCK 105.7'	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 105.7'	19. SIGNATURE OF INSPECTOR Geologist Richard W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Shale / Clayshale, olive Gr w/ rusty Br Lim stn, th bd, very firm (wea), occ carbonaceous streaks (Hardinsburg fm)			Split spoon spl's, from 0.0 to 13.5. Dozer cut down ~4' from ori surface in leveling drill site.
	1			1.5		
	2					
	3			3.0		
	4			4.5		
	5					
	6			6.0		
	7			7.5		
	8					
	9			9.0		
	10					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C26-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 11 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10		Shale (cont.)	10.5		
	11					
	12			12.0		
	13					Ran 6 3/4" RR Bit to 14.2 + set 6" pvc casing to 14.2'
			Base of Hardinsburg Sh	13.5		
			Top of Cokenda/Haney Ls (mississippian)	RR Bit		
	14		Limestone yBr + highly wea in top 1.3', grades into lgr Br, oxidized, med crystaline fossiliferous, v hard, v dense, Lim stn + solutioning along jts + bedding.	14.2 Run 1		Started Coring w/HQ wireline rigging.
	15					
	16			7.1 / 9.5		
	17					
	18			-2.4		
	19		Drill action indicated soft zone between 18.5' + 20.5'; possibly highly wea shaley zone or cavity.			
	20					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C26-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 11 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	20		Ls (Cont.			
	21					
	22					
	23			23.7		
				Run 2		
	24			1.8/2.1		
	25		Base of Colorado/Honey Top of Indian Spring Sh - 25.0' (Big Cliffy fm)	-0.3		
	26		Shale Blk-vd Gr, th bd, platey, hard, carbonaceous flakes along bedding,	25.8		Blocked
				Run 3		
				0.8/1.0 -0.2		
				26.8		
	27			RR Bit		Reamed hole to 28.1' & set 4" dia PVC casing thr the 6" upper casing.
	28			28.1		
				Run 4		
	29			5.0/5.2 -0.2		
	30					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C26-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 4 OF 11 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30		Shale (cont.)			
	31					
	32					
	33			33.3		
				Run 5		
	34					
	35					
	36			6.1/9.6		Core was stuck in inner bl. + had to be dug out. Core loss due to mech reasons.
				-3.5		
	37					
	38					
	39					
	40					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Iole No. WES-3-C26-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 5 OF 11 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	40		Shale (cont.)			
	41					
	42			42.9		
	43		Shale/clayshale, olive-olive Gr, mass, wea, w/kim stn, occ fossils	Run 6		
	44					
	45			10.1/10.1		
			Base of Indian Spring sh			
			Top of Big Clifty SS - 45.8			
	46		Sandstone, olive Gr-Tan, th bd to mass, v fine grained, hard, friable, shallow ripples, oxidized.			Lost all drill water Return in sandstone
	47					
		5	stn num wavey shaley pts from 45.8 to 49.7'.			
	48					
	49					
	50					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C26-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 6 OF 11 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	50		Sandstone (cont)			
	51					
	52	15				
	53			53.0 / 24.7		
	54					
	55	10				
	56	0		10.0 / 10.0		
	57					
	58					
	59					
	60					

FNG FORM 1926 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C26-26

DRILLING LOG	DIVISION	INSTALLATION	SHEET 7 OF 11 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	60	10	Sandstone (cont)			
	61					
	62	10				
				63.0		
	63			Run 8		
	64					
	65					
				9.6 / 9.6		
	66					
	67					
		2				
	68					
	69					
		30				
	70	2				

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C26-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 8 OF 11 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	70	45	stn SS (Cont.)			
	71					
	72			72.6 / Run 9		
	73	5				
	74		Rusty Br f-m grained Cross bedded			
	75	50				
		5	Jts are Lim stn'd	9.5 / 9.5		
	76					
	77	45 / 50				
	78					
	79					
	80					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C26-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 9 OF 11 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	16. DATE HOLE — STARTED: — COMPLETED:
	17. ELEVATION TOP OF HOLE
7. THICKNESS OF OVERBURDEN	18. TOTAL CORE RECOVERY FOR BORING %
8. DEPTH DRILLED INTO ROCK	19. SIGNATURE OF INSPECTOR
9. TOTAL DEPTH OF HOLE	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	80		SS (Cont.)			
	81					
	82			82.1 Run 10		
			← Base of major oxidation 82.5'			
	83					
			Base of Big Cliff SS			
			Top of Beech Creek LS - 83.6			
	84		Limestone, lgr Br, med crystaline, fossiliferous, v hard, v dense, occ stylolites			84.1 ~ Base of all oxidation
	85			6.9 / 7.0		
				>0.1		
	86					
	87					
	88					
	89			89.0 - 89.1 Run 11		Pull depth
	90					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. WES-3-C26-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 10 OF 11 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	90		LS (cont.)			
	91			4.2/4.1 +0.1		
	92					
	93			93.2 Run 12		Flange
	94		Limestone (as above) but dGr, f-m crystaline, occ to num wavey shaley pts.			
	95					
	96			10.0/10.0		
	97					
	98					
	99					
	100					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C26-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 11 OF 11 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	16. DATE HOLE — STARTED — COMPLETED
	17. ELEVATION TOP OF HOLE
7. THICKNESS OF OVERBURDEN	18. TOTAL CORE RECOVERY FOR BORING %
8. DEPTH DRILLED INTO ROCK	19. SIGNATURE OF INSPECTOR
9. TOTAL DEPTH OF HOLE	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	100		Limestone (cont.)			
	101					
	102					
	103			103.2		
				Run 13		
			Base of Beach Creek Ls			
	104		Top of Elkwren Sh - 103.9	2.5 / 2.5'		
			Shale, dGn, mass, hard, occ pyrite nodules.			
	105			105.7'		
	106		Bot Depth - 105.7'			

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C27-86

DRILLING LOG	DIVISION U.S. Navy	INSTALLATION NWSC	SHEET 1 OF 8 SHEETS

1. PROJECT Hydrogeologic Studies, ABB.	10. SIZE AND TYPE OF BIT HQ Wireline Core
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) C27	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE: STARTED 8/12/87 COMPLETED 8/13/87
	17. ELEVATION TOP OF HOLE 602.14
7. THICKNESS OF OVERBURDEN	18. TOTAL CORE RECOVERY FOR BORING %
8. DEPTH DRILLED INTO ROCK	19. SIGNATURE OF ~~INSPECTOR~~ Geologist Richard W. Hunt
9. TOTAL DEPTH OF HOLE 73.3'	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Silty clay, yBr, sandy, w/ss frags, v firm (CL)			Sampled from 0.0 to 17.7' w/a 3" dia split spoon (pushed downward rather than driving) Cleaned boring w/a 8" dia flight auger. Set 6" dia PVC casing to 17.7' Started coring w/a HQ wireline rigging at 17.8'
	1					
	2		Clay, (CH) yTan + lGr (mottled) w/red + blk specks, occ SS frags. v firm-stiff, (wea. Indian Springs Shale mem.)			
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-227-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 8 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10		clay (wea shale) (Cont.)			
	11					
	12					
	13					
	14					
	15					
	16		sandy toward bot. w/num. manga inclus (balls)			
	17			17.8 Run 1		
	18	40 / 10	sandstone (Big cliffy fm), yel-olive Tan mass, highly oxidized friable, highly jt'd w/Lim + clay along jts.			
	19	10 / 60 / 15		5.7 / 5.7		Lost all drill water return in first run.
	20	15				

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C27-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 8 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	20	30 50 30	Sandstone (cont.)			
	21	10 10 50 30				
	22	5 50 5				
	23	10 5 80 5		23.4 / Run 2		
	24	5 10				
	25	0 30 50				
	26	20 80		9.5 / 10.0		
	27	5 30 5 20		-0.5		
	28	10 5				
	29	5 5				
	30					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE | PROJECT | HOLE NO.

Hole No. WES-3-C27-06

DRILLING LOG	DIVISION	INSTALLATION	SHEET 4 OF 6 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	16. DATE HOLE — STARTED — COMPLETED
	17. ELEVATION TOP OF HOLE
7. THICKNESS OF OVERBURDEN	18. TOTAL CORE RECOVERY FOR BORING %
8. DEPTH DRILLED INTO ROCK	19. SIGNATURE OF INSPECTOR
9. TOTAL DEPTH OF HOLE	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30	5	Sandstone (cont.)			
		0				
		0				
	31	5				
		5				
		30				
	32					
	33	20				
		5		33.4 / Run 3		
		10				
	34					
		10				
	35	5				
	36					
				10.0 / 10.0		
	37					
	38					
		20				
		20				
	39	20 / 10				
		30				
		90				
	40	60 / 0				

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE — PROJECT — HOLE NO.

Hole No. WES-3-C27-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 5 OF 8 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	40	15	Sandstone (cont.)			
		10				
		10				
		10				
	41	10				
		5				
	42	5				
		30				
	43	0		43.4		
				Run 4		
		0				
	44	40				
		60				
		70				
	45	0				
		0				
		5				
	46	5				
		30		9.0/10.0		
	47					
		5				
		0		1.0		
		40/5				
	48	45/10				
		30				
	49	60				
		10				
		60				
	50					

Hole No. WES-3-C27-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 6 OF 8 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	50	S	Sandstone (cont.)			
	51	86 85				
	52					
	53			53.4' Run 5		
	54					
	55					
	56		Tan-Br sdy clay in cavity (core loss zone)			
	57			4.2/7.2		
	58	S	(Beech Creek fm - 58.1)			
		d	Limestone, dGr + Br, f-m crystalline, fossiliferous v hd, v dense, oxidized in top zone occ stylolites	-3.0		
	59	0				
		0				
	60					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C27-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 7 OF 8 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED — COMPLETED
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	60		Ls (cont.)			
				60.6		
				Run 6		
	61					
			Base of oxidation (61.6')			
	62					
				4.6 / 5.2		
	63					
				-0.6		
	64		num shaley pts in bot. zone			
	65					
				65.8		
				Run 7		
	66					
	67					
				3.5 / 3.8		
	68			-0.3		
	69					
				69.6		
				Run 8		
	70					

Hole No. WES-3-C27-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 8 OF 8 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	16. DATE HOLE — STARTED — COMPLETED
	17. ELEVATION TOP OF HOLE
7. THICKNESS OF OVERBURDEN	18. TOTAL CORE RECOVERY FOR BORING %
8. DEPTH DRILLED INTO ROCK	19. SIGNATURE OF INSPECTOR
9. TOTAL DEPTH OF HOLE	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	70		Base of Beech Creek Fm	70.4'		
			Top of Ehrenfm			
			shale, d grGn, mass v firm-hd, w/r Br mottling in bot ft.			
	71					
	72					
	73					
			Bot. Depth - 73.3'			
	74					
	75					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

[redacted] WB-3-C28

DRILLING LOG	DIVISION US Navy	INSTALLATION NWSC	SHEET 1 OF 8 SHEETS

1. PROJECT: Hydrogeologic Studies, ABG
2. LOCATION (Coordinates or Station):
3. DRILLING AGENCY: WES
4. HOLE NO. (As shown on drawing title and file number): C28
5. NAME OF DRILLER: Dan Taylor
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN:
8. DEPTH DRILLED INTO ROCK:
9. TOTAL DEPTH OF HOLE: 77.1'
10. SIZE AND TYPE OF BIT: HQ wireline core
11. DATUM FOR ELEVATION SHOWN (TBM or MSL):
12. MANUFACTURER'S DESIGNATION OF DRILL:
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED: UNDISTURBED:
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED Aug 18, 1987 COMPLETED Aug 21, 87
17. ELEVATION TOP OF HOLE: 611.4'
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF ~~INSPECTOR~~ Geologist: Richard W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Silty sdy clay w/ ss frags (Residual Soil), y-olive Tan, vfirm (CL)			0.0 to 14.3' was sampled w/a 3" dia split spoon (pushed)
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8		Clay (CH), y tan-olive, v stiff. (wea Indian springs shale)			
	9					
	10					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 8 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C28	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10		Clay (cont.)			
	11		Shale, olive, mass, w/ lim stn, v firm (Indian Springs)			
	12					
	13					
	14		(Top of Big Clifty SS - 14.0) Sandstone, y-olive Tan, v fine, th bd-mass, shallow ripples, oxidized hd, friable.	RRB Run 1		
	15					
	16					
	17			9.5 / 10.5		
	18			-1.0		
	19					
	20					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 8 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C28	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	20	0, 80	Sandstone (cont.)			
	21	0			Box 2 of	
	22	0				
	23				23.3	
				23.8 Run 2		
	24					
	25	0			Box 3 of	
	26	70				
		30				
	27			9.9/10.0		
		0				
		5		-0.1		
	28	5				
	29	0				
	30					

Lim Sm

ENG FORM 1926 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 4 OF 8 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C28	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30	20	Sandstone (cont.)			
	31				Box 3 of	
	32	5				
		10				
	33	15				
		5		33.8		
	34	0		Run 3	34.6	
	35					
	36					
		0			Box 4 of	
	37			10.0/10.0		
	38					
		0				
	39					
	40					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 5 OF 8 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C28	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	40		Sandstone (cont.)			
		5				
	41					
		0				
		20				
	42					
		20				
	43					
				43.8 / Run 4	Box 1 of	
	44					
		0				
		0				
	45					
		5			45.7	
		5				
	46					
		0				
	47					
				9.5 / 9.5	Box 5 of	
	48					
		20				
	49					
		20				
	50					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 6 OF 8 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C28	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	50		Sandstone (cont.)			
	51	20				
	52	0				
		0			Box	
	53			53.3	5	
		5	calcareous	Run 5	of	
	54	0				
			1" tan clay			
	55		Base of Big Clifty 55 - 55.1'			
		0	(Top of Beech Creek Ls.)			
		0	Limestone, mgrBr, m-c crystaline, mass, fossiliferous, v hard, v dense, occ stylolites			
	56	0	oxidized along jts w/ lim and clay stn, minor solutioning along some jts.	10.0/10.2		
	57				57.0	
				0.2		
	58				Box 6	
	59	5 0			of	Lost all drill water at 59.0'
	60					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 7 OF 8 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C28	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	60		Limestone (cont.)			
		0				
	61					
	62	0				
		0				
		0				
	63	0	Ls grades to dGr f-m crystalins, w/bec shaley pts	63.5 Run 6		
	64	5				
		0				
		0				
	65	0				
		0				
	66	0				
		0				
	67	0		7.6 / 7.8		
		0				
		0	Base of [illegible] or shale - 67.6	0.2		
	68	0				
		0				
	69	0				
		0				
		0				
	70	0				

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 8 OF 8 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C28	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	70		Ls (cont.)			
		0				
		0				
	71	0		73.1 / 73.3		Pull Depth blocked
	72	0		2.8 / 2.6		
		0				
	73	0		10.2		
	74			73.9		Flange
	75		(Base of Beech Creek fm)			
			(Top of Ekeren fm - 75.1') shale, dGn, mass, hd, abundant pyrite nodules	3.2 / 3.2		
	76					
	77			77.1		
			Bottom Depth - 77.1'			
	78					
	79					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C29-86

DRILLING LOG	DIVISION US Navy	INSTALLATION NWSC, Crane, In	SHEET 1 OF 28 SHEETS

1. PROJECT Hydrogeologic Studies, ABG	10. SIZE AND TYPE OF BIT HQ Wireline core
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) C29	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED 8/25/87 — COMPLETED 8/31/87
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE 796.03
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 278.8 ft	19. SIGNATURE OF INSPECTOR Geologist R.W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Clayey silt, sdy, yBr w/Gr mottling, firm (Residual Soil)			Drilled to 10.1' w/ flight auger and R.R Bit. Set 6" dia PVC Casing to 9.5'. Started Coring w/ HQ wireline at 10.1'.
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9		Top of Rk			
	10		SS (cont.)			

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-B-C29-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 28 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	16. DATE HOLE: STARTED / COMPLETED
	17. ELEVATION TOP OF HOLE
7. THICKNESS OF OVERBURDEN	18. TOTAL CORE RECOVERY FOR BORING %
8. DEPTH DRILLED INTO ROCK	19. SIGNATURE OF INSPECTOR
9. TOTAL DEPTH OF HOLE	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10		Sandstone, olive Gr + Tan, oxidized, fine grained, mass w/occ discontinuous carbonaceous pts + occ shaley pts, Friable	10.1 Run 1		
	11					
	12					
	13					
	14					
	15			7.7 / 10.2		
	16			2.5		
	17					
	18					
	19					
	20					

Hole No. WES-3-C29-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 28 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	20		SS (Cont.)	20.3 Run 2		
	21		Alternating Sandstone & Shale lenses (70% SS; 30% sh in top half / 50-50 in lower half) wavey hor bd, platey			
	22					
	23		Oxidized to 24.7'			
				7.1 / 7.2		
	24			-0.1		
	25					
	26					
	27			27.4 -27.5- Run 3		Pull depth
	28					
			Shale, vdGr, th bd, occ lGr ss lens, hd, platey, occ dOliveBr siltstone nodules, occ s'sides.	6.0 / 5.9 +0.1		
	29					
	30					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

ole No. WES-3-C29-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 4 OF 28 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	16. DATE HOLE — STARTED — COMPLETED
	17. ELEVATION TOP OF HOLE
7. THICKNESS OF OVERBURDEN	18. TOTAL CORE RECOVERY FOR BORING %
8. DEPTH DRILLED INTO ROCK	19. SIGNATURE OF INSPECTOR
9. TOTAL DEPTH OF HOLE	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30		Shale (cont.)			
	31					
	32					
	33			33.4 / Run 4		
	34					
	35					
	36		Shaley Sandstone – Sandy Shale, lGr + vdGr, (~ 50-50 sh-ss), clastic, wavey to swirling bd,			
	37			10.0 / 10.0		
	38					
	39					
	40					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C29-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 5 OF 28 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	40		Shaley sandstone (cont.)			
	41					
	42					
	43			43.4 Run 5		
	44					
	45					
	46			8.0/10.0		
	47			~~7.0~~		
	48			-0.3		
	49		Shale, vdGr-Blk, th-bd, mass, platey, soapy texture.			
	50					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

File No. WES-3-C29-66

DRILLING LOG	DIVISION	INSTALLATION	SHEET 6 OF 28 SHEETS

1. PROJECT
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number)
5. NAME OF DRILLER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE
10. SIZE AND TYPE OF BIT
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN | DISTURBED | UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE | STARTED | COMPLETED
17. ELEVATION TOP OF HOLE
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	50		Shale (cont.)			
	51			51.7		Pull depth
	52					
	53			53.4		
				Run 6		
	54					
	55			5.6/3.9		
				+ 1/17		
	56					
	57			57.3		
				Run 7		
	58					
	59			5.8/6.1		
	60		SS + Sh, Conglomeritic mixture, w/carbonaceous inclus.			

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-CC9-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 7 OF 28 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	60		ss & sh (cont.)			
			Sandstone, lGr, thbd mass, fine grained, friable, occ carbonaceous streaks.			
	61					
	62					
	63			63.1 / 63.4 Run 8		Pull depth
	64					
	65					
	66					
	67			10.3 / 10.0		
			vdGr shale lens.	10.3		
	68					
	69					
	70					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C29-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 8 OF 28 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	70		Sandstone (cont.)			
	71		SS becomes dGr, shaley + has occ dGr sh lens below 70.9'			
	72					
	73			73.4 / Run 9		
	74					
	75					
	76					
	77		Shale, vdGr, th bd-mass, platey-blocky, indurated, soapy texture, occ s'sides, occ d olive Br v hard siltstone nodules.	9.6 / 10.0		
	78			~~0.4~~ 0.1		
	79					
	80					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C29-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 9 OF 28 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	80		Shale (cont.)			
	81					
	82					
	83			83.1 / 83.4		Pull depth
				Run 10		
	84					
	85					
	86					
	87			10.2 / 9.9		
				10/3		
	88					
	89					
	90					

Hole No. WES-3-C29-56

DRILLING LOG	DIVISION	INSTALLATION	SHEET 10 OF 28 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	16. DATE HOLE — STARTED: — COMPLETED:
	17. ELEVATION TOP OF HOLE
7. THICKNESS OF OVERBURDEN	18. TOTAL CORE RECOVERY FOR BORING %
8. DEPTH DRILLED INTO ROCK	19. SIGNATURE OF INSPECTOR
9. TOTAL DEPTH OF HOLE	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	90		Shale (cont.)			
	91					
	92					
	93			93.3 / Run 11		
	94					
	95					
	96			9.7 / 10.0		
	97			~~0.3~~ -0.1		
	98					
	99					
	100					

ENG FORM 1926 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C29-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 11 OF 28 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	100		Shale (cont.)			
	101					
	102					
	103			103.1 / 103.3	Run 12	Pull depth
	104		Shaley Sandstone, lGr + dGr (70-80% ss; 20-30% sh) th bd, bd is wavey, friable (has a elastic appearance)			
	105					
	106					
	107			10.1 / 10.1		
	108			(+0.2)		
	109					
	110					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Ho No. WES-3-C09-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 12 OF 28 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE: STARTED / COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	110		Shaley SS (Cont)			
	111					
	112					
	113			113.2 / 113.4		Pull Depth
				Run 13		
	114					
	115					
	116					
	117			9.9 / 10.0		
	118			-0.1 +0.2		
	119					
	120					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. wES-3-C29-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 13 OF 28 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	120		Shaley SS (Mont			
	121					
	122					
	123			123.1		Pull depth
				123.4		
				Run 13		
	124					
	125					
	126					
				10.3 / 10.0		
	127					
				~~10.3~~		
	128					
	129		Oxidized in bot 2'			
	130					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C29-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 14 OF 28 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	130					
			Sandstone frags w/clay + lim crusting, red+y Br, (v highly oxidized)			
	131					
			Sandstone, lgrBr, fine grained, mass, occ lim inclus, occ carbonaceous inclus, friable, oxidized			
	132					
	133			133.4 / Run 15		
	134					
	135					
	136					
	137			10.0 / 10.0		
	138		alter dGr shale lens.			
	139					
	140					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C29-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 15 OF 28 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	140		SS (cont.)			
			dRed, v highly oxidized			
	141		(Base of Penn Sediments)			
			141.2' (Top of Miss Sediments)			
			Limestone, 1-m Gr, v fine granular, oolitic, v hd, v den, occ stylolites & shaley pts, oxidized in top 0.5'.			
	142					
	143		(Glen Dean fm)	143.4 / Run 16		
	144					
	145					
	146			10.0 / 10.0		
			146.5' (Top of Hardinsburg fm)			
	147		Sandstone + shale in alternating thin lGr and vdGr lens + pts, wavey bd, hd, platey.			
	148					
	149					
	150					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Iole No. WES-3-C29-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 16 OF 28 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	150					
	151		Gradational Change			
			Sandstone, lGr w/ olkr vd Gr-Blk wavey sh lens & pts. (similar to above			
	152					
	153					
				153.4 / Run 17		
	154					
	155					
	156			10.0 / 10.0		
	157					
	158					
	159					
	160					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C29-BC

DRILLING LOG	DIVISION	INSTALLATION	SHEET 17 OF 86 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	160		SS (cont)			
	161					
	162					
	163			163.4 / Run 18		8/27/87
	164		Sandstone, lGr, fine grained, calcareous, v dense, hard, mass.			
	165					
	166					
	167			8.5 / 8.9		
	168			-0.4		
	169		num dGr sh lens & pts, occ carbonaceous inclus.			
	170		Shale (cont)			

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C29-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 18 OF 28 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	170		Shale, dGr + grGn, mass, contains mottled dbr Red claystone zones, shale is mod soft in top few feet.			
	171					
	172			172.3 Run 19		Blocked
	173					
	174					
	175			2.5 / 5.1 -2.6		Run 19 - Core was lodge in Core bl + had to be pounded out. Core lost to mechanical reasons.
	176		Num s'sides occur between 175.0 + 180.5'.			
	177			177.4 Run 20		Blocked
	178			1.6 / 1.6		
	179			179.0 Run 21		
	180					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3 C29-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 19 OF 28 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	180		Shale (cont.)			
	181			4.1/4.4		
	182			-03		
	183			183.4 / Run 22		
	184		Thin bed below 183.0'.			
	185					
	186			9.8/10.0		
	187			-0.2		
	188					
	189					
			Base of Hardinsburg fm			189.7'
	190		Top of Golconda / Haney fm			

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C29-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 20 OF 28 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	190		Shaley limestone, m-d Gr, th bd, fossiliferous, hd,			
	191					
	192					
	193			193.4		
				Run 23		
	194					
	195					
			Alternating dGr shale lens in bot 4'.	4.5/4.8		
	196			-0.3 -0.2		
	197					
	198			198.1 / 198.2		Full depth
				Run 24		
			Limestone, grBr, mass, f-m crystalline, fossiliferous, vden, v hd			
	199					
	200					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C29-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 21 OF 28 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	200		LS (cont.)			
			- sh, dGr			
	201					
	202					
				8.2 / 8.1		
	203					
				+0.1		
	204					
	205		- alter thin shale lens			
	206		(Base of Golconda/Hanna)			206.1'
			(Top of Big Clifty fm) Indian springs mem	206.3 Run 25		
	207		Shale, vdGr-Blk, th bd, platey, indurated, fossiliferous, occ carbonaceous inclus			
	208					
				6.1 / 7.7		
	209					
				-1.6'		
	210					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE | PROJECT | HOLE NO.

Iole No. WES-3-C29-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 22 OF 28 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE: STARTED / COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	210		Shale (Cont.)			
	211					
	212					
	213					
	214			214.0 / Run 26		
	215					
	216					
	217					
	218			9.3 / 10.0		
	219		Shale becomes mass, d olive Gr in bot 3.0' (218.0 to 221.0'	~~.07~~ -0.5		
	220					

Hole No. WES-3-C29-BC

DRILLING LOG	DIVISION	INSTALLATION	SHEET 23 OF 28 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	220		Sh (cont.)			
			Conglomeritic w/SS inclus in bot 0.5'			
			(Base of Indian Springs)			221.0'
	221		(Top of Big Clifty SS)			
			Sandstone, 1-m Gr, th bd w/shallow ripples, v fine grained, friable			Note: Lost all drill water at 221.0'
	222					
	223					
				223.8 / 224.0 Run 27		Full depth
	224					
	225	0				
	226					
		0				
	227	30				
		30				
		45		10.2 / 10.0		
	228	0				
		30		+0.2		
	229	30				
		5				
		70				
	230					

Hole No. WES-3-C29-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 24 OF 28 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE: STARTED / COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	230	70 / 2°	SS (Cont.)			
	231					
	232					
	233					
	234			234.0 / Run 28		
	235					
	236			5.1 / 5.1		
	237					
	238					
	239			239.1 / Run 29		
	240					

Hole No. WES-3-C29-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 25 OF 28 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	240		SS (Cont.)			
	241					
	242					
	243					
	244	30		10.0 / 10.2		
	245			-0.2		
	246					
	247					
	248					
	249			249.3 / Run 30		
	250					

Iole No. WES-3-C29-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 26 OF 28 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	16. DATE HOLE — STARTED — COMPLETED
	17. ELEVATION TOP OF HOLE
7. THICKNESS OF OVERBURDEN	18. TOTAL CORE RECOVERY FOR BORING %
8. DEPTH DRILLED INTO ROCK	19. SIGNATURE OF INSPECTOR
9. TOTAL DEPTH OF HOLE	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	250		SS (cont.)			
	251			3.3/3.6		
				-0.3		
	252					
				252.9		
	253			Run 31		
	254					
	255					
				6.4/6.4		
	256					
	257					
	258					
	259					
				259.3		
				Run 32		
	260					

ENG FORM 1836 — PROJECT — HOLE NO.

Hole No. WES-3-C29-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 27 OF 28 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	260		(Base of Big Clifty ss)			260.4'
		0	(Top of Beech Creek Ls)			
	261	0/10	Limestone, l-m grBr, m crystaline, v hd, v den, occ styolites, fossiliferous.			
	262	0				
	263	0				
	264	0				
		0/100		10.0/10.0		
	265					
	266	90				
	267	70				
	268	0				
	269		Ls changes to dGr, f-m crystaline, occ wavey shaley pts	269.3 Run 33		
	270	0				

ENG FORM ___ PROJECT HOLE NO.

Hole No. WES-3-C29-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 28 OF 28 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	16. DATE HOLE — STARTED — COMPLETED
	17. ELEVATION TOP OF HOLE
7. THICKNESS OF OVERBURDEN	18. TOTAL CORE RECOVERY FOR BORING %
8. DEPTH DRILLED INTO ROCK	19. SIGNATURE OF INSPECTOR
9. TOTAL DEPTH OF HOLE	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	270		LS (Cont.)			
		u				
		u				
	271					
		u		4.6 / 4.6		
	272	o				
	273					
		o		273.9		
	274		clay filled	Run 34		
		o				
	275	5				
		60				
	276			4.9 / 4.9		
	277					
	278		dGn Eluren Shale, inclus in bot 0.5			
			(Base of Beech Creek Ls)			278.3'
			(Top of Elwren Fm) Shale, dGn, mass	278.8		
	279		Bot. Depth- 278.8 ft. (WES-3-C29-86)			
	280					

ENG FORM 1836 — PROJECT — HOLE NO.

Iole No. WES-3-C30-86

DRILLING LOG	DIVISION US. Navy	INSTALLATION NWSC	SHEET 1 OF 27 SHEETS

1. PROJECT Hydrogeologic Studies, A 86.	10. SIZE AND TYPE OF BIT HQ wire line core
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) WES-3-C30-86	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE: STARTED 9/2/87 COMPLETED 9/15/87
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE 777.21
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 263.6	19. SIGNATURE OF INSPECTOR Geologist R.W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Residual Soil, silty clay & clayey, sandy silt with weathered sandstone frags.			Ran 7 3/4" dia R.R. Bit to 11.4' and set 6" dia PVC surface casing.
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

ENG FORM 1836 PREVIOUS EDITIONS OBSOLETE PROJECT HOLE NO.

Hole No. WES-3-C30-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10					
	11		Top Rock -	11.4 Run 1		Started coring w/HQ wireline rigging at 11.4'
	12		Sandstone, yel-rusty Br, oxidized, fine grained, shallow cross bd, hard, friable.			
	13					
	14					
	15			5.6 / 7.1		
	16			-7.5 -1.4		
	17					
	18		Sandstone similar to above, but with num dGr thin shale lens. bd dip ~3°.	18.5 Run 2		18.4 - Pull Depth
	19					
	20					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C90-87

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED: — COMPLETED:
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	20					
	21			4.8/4.7		
	22			PD.1		
	23			23.2		
				Run 3		
			No apparent oxidation below ~ 23.8.			
	24					
	25					
	26		Shale, dGr, th bd, platey hd.	9.9/9.9		
	27					
		++ ++	Coal, Blk, blocky hd.			
	28		Siltstone - Claystone, olive gray, mass, hd, blocky, numi carbonaceous leaf imprints, etc.			
	29					
	30					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C30-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 4 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	16. DATE HOLE: STARTED / COMPLETED
	17. ELEVATION TOP OF HOLE
7. THICKNESS OF OVERBURDEN	18. TOTAL CORE RECOVERY FOR BORING %
8. DEPTH DRILLED INTO ROCK	19. SIGNATURE OF INSPECTOR
9. TOTAL DEPTH OF HOLE	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30		Siltstone (Cont)			
	31					
	32					
	33			33.1		
				Run 4		
	34					
			Shale, Blk, th bd, indurated, blocky, carbonaceous, occ dark hd chert nodules.			
	35			9.0 / 10.0		
	36					
				10.0		
	37			10.5		
	38					
	39					
	40					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE | PROJECT | HOLE NO.

Hole No. WES-3-C30-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 5 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE: STARTED / COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	40		Shale, (Cont)			
	41					
	42			42.6		Pull Depth
	43			43.1		
				Run 5		
	44		Sandy Siltstone Gr mass, becoming th bd w/ depth, hd			
	45					
	46			10.0 / 9.5		
				+0.5		
	47					
	48					
	49					
	50					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-030-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 6 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	50		Siltstone (cont)			
	51					
	52					
			Sandstone, 1-m Gr, v fine, w/occ to num Blk wavey carbonaceous shale pts + thin lens, scattered coal pts, hd, friable.	52.6 Run 6		
	53					
	54					
	55					
	56			9.7 / 10.2		
	57			-0.5 -0.2		
	58					
	59					
			Shale, Blk, silty, th bd, indurated.			
	60					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C30-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 7 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	60		Shale (cont.)			
	61		Claystone, m-olive, th bd, mass, soapy texture, crumbly, with slickensides.			
	62			62.5		Full depth
				62.8		
				Run 7		
	63					
	64		Shale Blk-v d Gr, th bd, indurated hd, carbonaceous, occ d olive hd siltstone-claystone nodules			
	65					
	66			10.3 / 10.0		
				+0.3		
	67					
	68					
	69					
	70					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C30-BL

DRILLING LOG

DIVISION	
INSTALLATION	
SHEET 8 OF 27 SHEETS	
1. PROJECT	
2. LOCATION (Coordinates or Station)	
3. DRILLING AGENCY	
4. HOLE NO. (As shown on drawing title and file number)	
5. NAME OF DRILLER	
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	
7. THICKNESS OF OVERBURDEN	
8. DEPTH DRILLED INTO ROCK	
9. TOTAL DEPTH OF HOLE	
10. SIZE AND TYPE OF BIT	
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	
12. MANUFACTURER'S DESIGNATION OF DRILL	
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED / UNDISTURBED
14. TOTAL NUMBER CORE BOXES	
15. ELEVATION GROUND WATER	
16. DATE HOLE	STARTED / COMPLETED
17. ELEVATION TOP OF HOLE	
18. TOTAL CORE RECOVERY FOR BORING %	
19. SIGNATURE OF INSPECTOR	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	70		Shale (cont)			
	71					
	72					
				72.8		
				Run 8		
	73					
	74					
	75					
	76			9.7 / 10.0		
	77					
	78			.03 / .01		
	79					
	80					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C30-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 9 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	80		Shale (cont.)			
	81					
	82			82.6 / 82.8		Pull depth
				Run 9		
	83					
	84					
	85					
	86			10.2 / 10.0		
	87	(SH)	Sandstone, dgrBr, shaly, (clastic?) contains thin shaky swirls and wavy pts, hd, partly oxidized,	+0.2		
	88					
	89					
	90					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C30-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 10 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	90					
			Sandstone, clastic, shaley, lGr + Blk, wavy th bd, carbonaceous, hd.			
	91					
	92					
				92.8 Run 10		
	93					
	94					
	95					
	96			9.8 / 10.0		
			Coal, Blk, blocky, hd			
	97					
			shale, vdGr-Blk, th bd, platey, carbonaceous, hd.	-0.2		
	98					
	99					
	100					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C30-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 11 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	100		Shale (cont.)			
	101					
	102					
				102.6 / 102.8 Run 11		Pull depth
	103					
	104					
			Coal, Blk, blocky, hd			
	105		Sandstone, lGr, mass, v fine, carbonaceous, hd, friable.			
	106		Siltstone, lGr-olive Gr, mass-th bd, num carbonaceous leaf imprints-etc, hd, blocky-crumbly.			
	107			10.2 / 10.0		
	108			+0.2		
	109					
	110					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C30-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 12 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE: STARTED / COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	110		Siltstone (Cont.)			
	111					
	112		Sandstone, lGr with num vdGr wavey shaley pts, v fine grained hd friable, carbonaceous in lower half.	112.8		
	113			Run 12		
	114					
	115					
	116			10.2 / 10.2		
	117					
	118					
	119		Sandstone lGr w/yel tan oxidized zones, fh bd - mass, fine, shallow cross-bd, hd, friable			
	120					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C30-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 13 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	120		Sandstone (cont.)			
	121					
	122					↑ Penn Sediments
			Base of Pennsylvanian at 123.0'.	123.0		— Unconformity - 123.0'
	123		Limestone (Glen Dean) Gr, fine crystaline oolitic, v hd, v dun. (Solution surface on top) (Base of Glen Dean fm - 124.2')	Run 13		Miss. Sediments ↓
	124		Top of Hardinsburg fm			
	125		Shale, dGr, th bd, silty, hd, platey-flakey.			
	126			7.5/7.5		
	127					
	128		wavy siltstone + sh laminations			
	129					
	130					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C30-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 14 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	130		Shale (cont.)	130.5 Run 14		
	131					
				0.7 / 2.6		131.9 - Pull depth
	132			~~1.9~~ -0.7		
	133			133.1 Run 15		133.1 + 1.2 = 131.9
	134		Sandstone, 1-m Gr w/oxidized yel-tan zones, mass, v fine, cross-bedded, hd, friable.			
	135					
	136			9.0 / 8.0		
	137			~~+1.0~~ +1.2		
	138					
	139					
	140					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C30-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 15 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	140		SS (Cont.)			
				140.9 / 141.1		Pull depth
	141			Run 16		
	142					
	143					
	144					
	145			10.2 / 10.0		
	146		num Blk wavey Carbonaceous sh pts + thin lens.	+0.2		
	147					
	148					
	149					
	150		Shale, dGr w/alter			

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C30-E6

DRILLING LOG	DIVISION	INSTALLATION	SHEET 16 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	150		lGr SS lens			
	151		Sandstone, lGr (similar to above	151.1 Run 17		
	152					
	153		Shale, w/alter sandstone lens (as above			
	154		Sandstone, lGr, w/num wavey dk gray shaley pts hd, friable	6.9 / 7.4		
	155		Shale, vd Gr, th bd, w/occ thin lGr SS lens, platey, hd, occ pyrite nodule			
	156			~~.05~~ .04		
	157					
	158					
				158.5 Run 18		158.4 - Pull depth
	159		shale, d Gn in top few feet, grading to vd gn Gr toward bot, mass + blocky in top zone; th bd + flakey in bot zone, num slickensides, hd			
	160					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C30-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 17 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	160		Shale (cont			
	161					
	162			6.3 / 10.1		
	163			-3.8 +0.1		
	164			164.7		Pull depth
	165					
	166					
	167					168.6 3.9 164.7
	168					
			Base of Hardensburg fm	168.6		
	169		Top of Golconda / Haney fm - 168.6'. Shaley, fossiliferous limestone - limey shale, th bd, dGr, w/occ 1Gr dense Ls	Run 19		
	170					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C30-06

DRILLING LOG	DIVISION	INSTALLATION	SHEET 18 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED: — COMPLETED:
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	170		lams + thin layers, hd.			
	171			8.5 / 5.0'		
	172			~~+3.5~~ +3.9		
	173		Shale, vd Gr, th bd, platey.	173.2		Pull Depth
				173.6 Run 20		
	174					
	175		Limestone, l-m grBr, m-c crystalline, w/ fossils, v dense, v hd.			
	176			10.2 / 9.8		
	177			+0.4		
	178					
	179					
	180					

ENG FORM 1926 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C30-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 19 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	180					
			Shaley Ls (as above)			
	181					
			Crystaline Limestone (as above)			
	182					
	183		Base of Colenda / Honey	183.4		
			Top of Indian Springs Sh (Big Clifty mem.) - 1833'	Run 21		
	184		Shale, vdGr-Blk, th bd, carbonaceous, platey - flakey, hd.			
	185			3.5 / 4.2		
	186			~~0.7~~ 0.3		
	187			187.2		Full depth
				187.6		
				Run 22		
	188					
	189			6.2 / 5.8		
				~~0.4~~		
	190					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C30-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 20 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	190		Shale (cont.)			
	191					
	192					
	193			193.4 / Run 23		
	194					
	195					
	196			9.7 / 9.7		
	197					
	198					
	199		Shale, becomes med olive Gr, mass, + crumbly below 199.1'			
	200					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C30-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 21 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	200		Shale (cont.)			
	201		Base of Indian Springs Sh			
	202		Top of Big Clifty SS – 201.9'			
			Sandstone, 1-m Gr, mass w/shallow ripples, vF-F grained, hd, Friable.	203.1	Run 24	
	203					
	204					
	205					
	206			10.0 / 10.1		
	207			-0.1		
	208					
	209					
	210					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C30-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 22 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	210		Sandstone (cont.)			
	211					
	212					
	213			213.2 / Run 25		213.1 - Pull depth
	214					
	215					
	216			10.3 / 10.2		
	217					
	218			+0.1		
	219					
	220					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C30-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 23 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	220		Sandstone (cont.)			
	221					
	222					
	223			223.4 Run 26		
	224					
	225					
	226			10.0 / 10.0		
	227					
	228					
	229					
	230					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE — PROJECT — HOLE NO.

Hole No. WES-3-C30-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 24 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED — COMPLETED
	17. ELEVATION TOP OF HOLE
7. THICKNESS OF OVERBURDEN	18. TOTAL CORE RECOVERY FOR BORING %
8. DEPTH DRILLED INTO ROCK	19. SIGNATURE OF INSPECTOR
9. TOTAL DEPTH OF HOLE	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	230		Sandstone (cont.)			
	231					
	232					
	233			233.4 / Run 27		
	234					
	235					
	236					
	237			9.6 / 10.0		
	238			0.4		
	239					
	240					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C30-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 25 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED — COMPLETED
	17. ELEVATION TOP OF HOLE
7. THICKNESS OF OVERBURDEN	18. TOTAL CORE RECOVERY FOR BORING %
8. DEPTH DRILLED INTO ROCK	19. SIGNATURE OF INSPECTOR
9. TOTAL DEPTH OF HOLE	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	240		Sandstone (Cont.)			
	241		Conglomeritic in bot. 0.2'			
			Base of Big Cliffy SS.			
	242		Top of Beech Creek Fm 241.8'			
			Limestone, l-m grBr, m-c crystaline, fossiliferous, occ stylolites.			
	243			243.4		
				Run 28		
	244					
	245					
	246			10.2 / 10.2		
	247					
	248					
	249					
			Limestone (similar to above, but dGr,			
	250					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C30-B6

DRILLING LOG	DIVISION	INSTALLATION	SHEET 26 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	250		f-m Crystalline, occ to num wavy blk shaley pts.			
	251					
	252					
	253			253.6 Run 29		
	254					
	255					
	256					
	257			9.9/10.0'		
	258			-0.1		
	259					
	260		rounded inclus. of Eluron shale in bot. 0.3' Base of Beach Creek - 260.0'			

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. WES-3-C30-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 27 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	260		Top Elwren Shale 260.0'			
			dGn - grGn, mass, hard			
	261					
	262					
	263			263.6		
	264		Bottom Depth 263.6'			
	265					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

DRILLING LOG	DIVISION U.S. Navy	INSTALLATION NWSC Crane, Ind.	SHEET 1 OF 2 SHEETS

1. PROJECT Hydrogeologic Studies, ABG	10. SIZE AND TYPE OF BIT HQ wireline core
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) C31	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER Dan Taylor	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN 7.7'	16. DATE HOLE — STARTED 9/16/87 — COMPLETED 9/22/87
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE 790.43
9. TOTAL DEPTH OF HOLE 267.2'	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR Geologist Richard W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Clayey-sdy silt, Br-yBr, (Residual soil)			0.0 to 11.5', R.R. Bit; set 6" PVC Casing. Started Coring w/HQ wireline at 11.5'
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8		Sandstone, red-yelBr, cross bd, v fine-fine, friable, occ shaley pts, oxidized			
	9					
	10					

ENG FORM 1836-1 PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10		Ss (cont.)			
	11			11.5'		
				Run 1		
	12					
	13					
	14			3.3/5.1		
				1.8		
	15					
	16					
			Alternating sandstone & shale lenses, y tan + Gr, th bd, platey.	16.6		
				Run 2		
	17					
	18			6.5/7.0		
	19			~~0.5~~ 0.3		
	20					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE — PROJECT — HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C31	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	20		After SS + Sh (cont.)			
	21					
	22					
	23		Sandstone, (Similar to SS above)	23.4 / 23.6 Run 3		pull depth
	24		Sholey Sandstone, clastic, m-d Gr, occ sh pts, hd. friable,			
	25					
	26			9.8 / 9.9		
	27			-0.1 +0.2		
	28					
	29					
	30					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 4 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C31	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30		Shaley ss (Cont.)			
	31					
	32		th bd ss + sh in bot 2.0'			
	33			33.2 / 33.5		Pull depth
				Run 4		
	34		Shale, vdGr, th bd, platey-blocky, occ d olive vhd siltstone nodules + thin lens in bot 4.0'			
	35					
	36			9.8 / 9.7		
	37			~~+0.1~~ +0.3		
	38					
	39					
	40					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE | PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 5 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	16. DATE HOLE — STARTED — COMPLETED
	17. ELEVATION TOP OF HOLE
7. THICKNESS OF OVERBURDEN	18. TOTAL CORE RECOVERY FOR BORING %
8. DEPTH DRILLED INTO ROCK	19. SIGNATURE OF INSPECTOR
9. TOTAL DEPTH OF HOLE	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	40		Shale (Cont.)			
	41					
	42					
	43			43.0 / 43.2 Run 5		Full depth
	44					
	45			10.2 / 10.0		
	46	++++	Coal, Blk, hd, blocky	~~10.2~~		
	47		Claystone, lGr, mass w/num carbonaceous inclus, hd, soapy texture, num S'sides			
	48					
	49					
	50					

ENG FORM 1836 — PROJECT — HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 6 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C31	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	50		Claystone (cont)			
	51					
	52		Sandstone, 1-m Gr, mass, fine grained, occ carbonaceous inclus.			
	53			53.4		
	54		Shale, Blk, mass carbonaceous, indurated, occ d olive siltstone nodules + pyrite inclus.	Run 6		
	55					
	56					
	57			9.7 / 9.9		
	58			0.2		
	59					
	60					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE — PROJECT — HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 7 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C31	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	60, 61		Shale (cont.)			
	62, 63		Coal, Blk, mass, hd, blocky Blk carbonaceous sh.	63.3	Run 7	
	64, 65, 66, 67, 68		Sandstone, m Gr, mass, fine grained, hd, friable, clastic in top 2.0' w/carbon swirls + streaks.	10.0 / 10.0		
	69, 70		Shale, vdGr, th bd, blocky, hd, occ dolive siltstone nodules + lens (scat fossils?)			

ENG FORM 1836 — PROJECT — HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 8 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C31	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	70		Shale (cont.)			
	71					
	72					
	73			73.3 / Run 8		
	74					
	75					
	76			9.7 / 10.0		
	77			~~0.3~~ 0.0		
	78					
	79					
	80					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 9 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C31	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	80		Shale (cont.)			
	81					
	82		Sh becomes Carbonaceous below 81.0'			
	83			83.0 / 83.3 Run 9		Full depth
	84					
	85					
	86			10.3 / 10.0		
	87			~~10.3~~		
	88					
	89					
	90		SS (cont			

ENG FORM 1836 PREVIOUS EDITIONS OBSOLETE — PROJECT — HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 10 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C31	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	90		Sandstone, dgrBr, Shaley, clastic w/Blk Shale swirls and pts. hd.			
	91					
	92					
	93			93.3 / Run 10		9/17/87
	94		Shale, Blk, Carbonaceous (as above)			
	95		Sandstone (similar to above) Cross bedded in portions, abundant carbonaceous specks & flakes,			
	96			10.0 / 10.0		
	97					
	98					
	99					
	100					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 11 OF 27 SHEETS

1. PROJECT
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number)
5. NAME OF DRILLER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE
10. SIZE AND TYPE OF BIT
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN | DISTURBED | UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE | STARTED | COMPLETED
17. ELEVATION TOP OF HOLE
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	100		SS (cont)			
	101					
	102					
	103		Coal, Blk, hd, blocky	103.3		
				Run 11		
	104		Shale, d Gr, th bd, indurated, blocky			
	105					
	106					
	107			10.0 / 10.0		
	108					
	109					
	110					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 12 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C31	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	110		Sh (cont			
	111					
	112					
			Coal, Blk, hd, Blocky			
	113		Sandstone, lgr Br, v fine, carbonaceous	113.3		
			Siltstone, l-m olive, th bd (bd ~20° dip), abundant carbonaceous inclus, hd, blocky, oxidized	Run 12		
	114					
	115					
	116					
			Sandstone, y to rusty Br, f-m grained, hd, friable, oxidized	10.0 / 10.0		
	117					
	118					
	119					
	120					

ENG FORM 1926 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 13 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C31	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	120		ss (Cont.)			
	121					
	122					
	123			123.3		
				Run 13		
	124					
	125					
	126		(Base of Penn. Sediments) 126.3 ft	8.4/8.4		
			(Top of Miss. Sediments) (Glen Dean Fm)			
	127		Limestone, l-m Br, m crystalline, v dense v hard, small fossils			
	128					
	129					
	130					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 14 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C31	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	130		LS (Cont.)			130.3'
			(Top of Hardinsburg Fm)			
			Shale, dGr, th bd, hd, blocky.			
	131			131.7		
				Run 14		
	132					
	133					
	134			5.4 / 5.6		
	135			~~0.8~~ 0.0		
	136					
	137		olive in bot 0.6', oxidized	137.1 / 137.3		Pull depth 9/18/87
				Run 15		
			Sandstone, rusty-yel Br, v fine grained, shallow Cross bd, hd, friable			
	138					
	139			6.2 / 6.0		
	140			+0.2		

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE — PROJECT — HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 15 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C31	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	140		SS (cont.)			
	141					
	142					
	143			143.3		
				Run 16		
	144					
	145					
	146					
	147			10.0 / 10.0		
			SS becomes 1-m Gr + not oxidized below 147.6'			
	148					
	149					
	150					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 16 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C31	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	150		SS (cont)			
	151					
	152		Sandstone, 1-m Gr, w/Blk carbonaceous shaley pts & wavy thin lens, friable			
	153			153.3 / Run 17		
	154					
	155					
	156					
	157			8.1 / 8.1		
	158					
	159					
	160					

DRILLING LOG	DIVISION	INSTALLATION	SHEET 17 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C31	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	160		SS (cont.)			
	161			161.4 Run 18		
			Shale, Gn to dgnGr. mass, hd			
	162					
	163					
	164			5.5 / 5.9		
	165			~~0.4~~ -0.2		
	166					
	167		Sh grades to udGr, th bd in bot half	167.1 / 167.3 Run 19		Pull depth 9/20/87
	168					
	169			6.2 / 6.0		
	170			+0.2		

ENG FORM 1836 — PROJECT — HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 18 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C31	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	170		Shale (cont.)			
	171					
	172					
			(Base of Hardinsburg fm)			-172.9'
	173		(Top of Golconda / Haney) Limy Shale, dGr, th bd, occ fossils, hd.	173.3 / Run 20		
	174					
	175		Limestone, dGr, finely crystaline, occ small fossils, occ shaley lens, v hd, v den			
	176			9.9 / 10.0		
	177		Shale, vdGr, th bd, platey, hd			
	178		Limestone, l-mBr, coarsely crystaline, fossiliferous, v hard, v dense, occ stylolites	-0.1		
	179					
	180					

DRILLING LOG	DIVISION	INSTALLATION	SHEET 19 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C31	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	180		LS (cont.)			
	181					
	182					
	183			183.3 Run 21		Flange
	184					
	185					
	186					
	187			10.0 / 10.0		
	188		Base of Galena/Haney Fm			188.2'
			Top of Big Clifty Fm (Indian Springs Mem)			
	189		shale, vd Gr, Blk, th bd, platey-Flakey carbonaceous, hd			
	190					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 20 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C31	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	190		Shale (Cont.)			
	191					
	192					
	193			193.3 / Run 22		
	194					
	195					
	196			7.2 / 8.5		
	197			1.3		core ground away
	198					
	199					
	200					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 21 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C31	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	200		Sh (cont.)			
	201					
				201.8 / Run 23		9/21/87
	202					
	203			2.9 / 3.3		
				-0.4		
	204					
	205			205.1 / Run 24		
	206					
	207		(Base of Indian springs)			-207.2
			(Top of Big Clifty SS.)			
	208		Sandstone, ly Tan-olive, th bd-mas, v fine, shallow ripples, hd, friable, oxidized	6.2 / 8.2		Core Ground away
	209			-2.0		
	210					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE — PROJECT — HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 22 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 231	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	210		SS (Cont)			
	211					
	212					
	213			213.3		
				Run 25		
	214					
	215					
	216			8.5 / 9.3		
	217			-0.8'		
	218					
	219					
	220					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 23 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C31	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	220		SS (cont			
	221					
	222			222.6		
				Run 26		
	223					
	224					
	225					
	226			10.1 / 10.1		
	227					
	228					
	229					
	230					

Activity WES-3-C31-BC

DRILLING LOG	DIVISION	INSTALLATION	SHEET 24 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C31	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	230		SS, (Cont.)			
	231					
	232		Base of oxidation - 232.2'			
				232.7 Run 27		
	233		SS becomes IGr (as above)			
	234					
	235					
	236		Note: 235.6 to 240.4 SS is v friable	10.2 / 10.2		
	237					
	238					
	239					
	240					

PROJECT HOLE NO.

[redacted]-3-C31-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 25 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C31	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	240		SS (cont.)			
	241					
	242			242.9		
	243			Run 28		
	244					
	245					
	246					
			(Base of Big Clifty Fm)			246.4
			(Top of Beech Creek Fm)	6.3/6.9		
	247		Limestone, l-mgrBr, mass, m-c crystaline, fossiliferous, v hard, v dense, occ stylolites			
	248			~~0.6~~ 0.0		
	249			249.2		Pull depth
				249.8		
	250			Run 29		

ENG FORM ... PROJECT HOLE NO.

Hole No. WES-3-C31-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 26 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C31	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	250		LS (cont			
	251			4.1 / 3.5		
	252			+0.6		
	253			253.3		
				Run 30		
	254					
	255					
	256					
	257			10.0 / 10.0		
	258					
	259					
	260					

PROJECT | HOLE NO.

[redacted] AES-3-231-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 27 OF 27 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C31	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	260		Ls (Cont)			
	261					
	262					
	263			263.3		Note: Hung outer core bl while removing core from center bl after run to 263.3'. Had to abandon boring after cutting drill rods, off at ~230.0'. Moved 15 ft north of abandoned boring + drilled a second boring w/a R.R Bit to a depth of 267.2'. Hit Top of Elwren shale at 265.0' (based on drill action)
	264			Drilled w/a R.R. Bit		
	265		Base of Beech Creek Fm Top of Elwren Fm Shale			
	266					
	267			267.2'		
			Bot depth - 267.2'			Grouted first boring to surface.
	268					
	269					
	270					

ENG FORM [illegible] PROJECT HOLE NO.

Hole No. WES-3-C32-86

DRILLING LOG	DIVISION US Navy	INSTALLATION NWSC	SHEET 1 OF 18 SHEETS

1. PROJECT Hydrogeologic Studies, ABG	10. SIZE AND TYPE OF BIT HQ Wireline
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY WES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) WES-3-C32-86	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED ; UNDISTURBED
5. NAME OF DRILLER Don Taylor	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE: STARTED 11/4/87; COMPLETED 11/12/87
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE 709.28
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 176.9 ft	19. SIGNATURE OF INSPECTOR Geologist Richard W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Silty-Sandy Clay (Residual Soil)			Ran R.R. Bit to 11.0' and set 6" dia PVC casing
	1					
	2					
	3					
	4					
	5		Shale, blk, carbonaceous, th bd w/nun lGr Tan fine sandstone lens, pts and rounded inclus, (~60% Sh + 40% SS), ~ hor bd, hd			
	6					
	7					
	8					
	9					
	10					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C32-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 18 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C32	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10		Shale (cont.)			
				11.0		
	11			Run 1		Started coring w/ HQ wireline at 11.0'
	12					
	13					
				6.2 / 6.5		
	14					
				8.3		
	15					
	16					
	17		grades to predominately SS w/ sh lens (as above)	17.2		- Pull depth
				17.5 / Run 2		
	18					
	19			5.8 / 5.5		
				+0.3		
	20					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C32-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 18 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C32	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	20					
			Less shale lens below 20.2 to 31.0' friable, cross bd ss predominate, oxidized			
	21					
	22					
				23.0		
	23			Run 3		
	24					
	25					
	26					
				10.0 / 10.0		
	27					
	28					
	29					
	30					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C32-06

DRILLING LOG	DIVISION	INSTALLATION	SHEET 4 OF 18 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C32	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30		SS (cont.)			
	31		Sandstone, lBr-y Tan, th bd, fine grained, cross bd, hd, friable, oxidized,			
	32					
				33.0		
	33			Run 4		
	34					
	35	85				
	36	60 50		10.0 / 10.0		
	37					
	38					
	39					
	40					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C32-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 5 OF 18 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C32	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	40		SS (cont.)			
	41					
	42					
	43			43.0 Run 5		
	44					
	45					
	46			10.0/10.0		
	47					
	48	83	Clay coated			
	49					
	50					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C32-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 6 OF 18 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C32	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	50		SS (cont.)			
	51					
	52					
		Qu	Tan Clay Coated			
	53			53.0		
				Run 6		
	54					
	55					
		Qu	Clay Coated			
	56					
		Qu		10.0 / 10.0		
	57					
	58					
	59					
			Base of Penn - 59.6'			
	60		Top of Miss. (Hardinsburg Fm)			

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WBS-3-C32-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 7 OF 8 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C32	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	16. DATE HOLE — STARTED — COMPLETED
	17. ELEVATION TOP OF HOLE
7. THICKNESS OF OVERBURDEN	18. TOTAL CORE RECOVERY FOR BORING %
8. DEPTH DRILLED INTO ROCK	19. SIGNATURE OF INSPECTOR
9. TOTAL DEPTH OF HOLE	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	60		Shale, dGn w/drBr zones, mass, blocky-crumbly, hd.			
	61					
	62					
				63.0		
	63			Run 7		
	64					
	65					
	66					
				8.4 / 9.5		
	67			-1.1'		
	68					
	69					
	70					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C32-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 8 OF 18 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C32	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	70		sh (cont.)			
	71					
	72					
				72.5 Run 8		Blocked.
			Gradational contact			
	73		Shale, dGr, thbd, platey-flakey, hd	1.4/2.2		
				-0.8		
	74					
				74.7 Run 9		Blocked
	75					
	76					
	77					
				8.0/8.6		
	78					
				-0.6		
	79					
	80					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C32-BC

DRILLING LOG	DIVISION	INSTALLATION	SHEET 9 OF 18 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C32	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	80		shale (cont.)			
	81					
	82					
			(Base of Hardinsburg)			
	83		(Top of Golconda/Haney) - 82.9'	83.1 / 83.3		Full Depth
			shaley Limestone - Limey Shale, dGr earthy, th bd, fossiliferous, hd, occ shale lens.	Run 10		
	84					
	85					
	86			10.2 / 10.0		
	87			+0.2		
	88		Limestone, lgrBr, mass, m-c crystaline, occ fossils, v hd, v dens.			
	89					Lost all drill water return in this Ls zone
	90					

ENG FORM 1836 PROJECT HOLE NO.

Hole No. WES-3-C32-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 10 OF 18 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C32	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	90		Ls (cont.)			
	91					
	92	70 / 50	Stn			Lost all drill water at ~92.0
	93			93.3		
			shaley Ls (as above)	Run 11		
	94			2.3/2.5		
	95			-0.2		
			(Base of Golconda/Haney) (Top of Indian Springs sh-95.6')	95.8		
				Run 12		Blocked
	96		Shale, Blk-vdGr, th bd, carbonaceous, platey-flakey, fossiliferous in mid-lower zone, hd			
	97					
	98			6.4/7.5		
	99			-1.1		
	100					

ENG FORM 1836 — PROJECT — HOLE NO.

Hole No. WES-3-C32-C6

DRILLING LOG	DIVISION	INSTALLATION	SHEET 11 OF 18 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C32	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	100		Shale (cont.)			
	101					
	102					
	103			103.1 / 103.3		Pull depth
				Run 13		
	104			2.6 / 2.8		
	105			-0.2		
				105.7		Pull depth
	106			106.1		
				Run 14		After Run 14: ran a 6" dia R.R. bit to 101.2' and set 4" pvc casing. Pumped in 5 barrels of grout mix which topped out at ~94.0' (Top of Ind. spr. sh.) Grout going out into joints & solution passages in Golconda Ls. Poured in 2, 100 lbs bags of sand which came up to ~86' in boring in order to seal openings in Ls. Pumped in 2 more barrels of grout which filled boring to ~14' from the surface around the casing.
	107			2.0 / 1.6		
				+0.4		
				107.7		
				Run 15 (11/12/87)		
	108			6.0 / 1.5		
				-1.5		
	109			109.2		
				Run 16		
	110					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. WES-3-C32 86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 12 OF 18 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C32	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	110		Shale (Cont.)			
	111			3.6/4.0		
				-0.4		
	112					
	113			113.2		
				Run 17		
	114		Shale grades to mass, dolive Gr.			
	115					
	116			9.9/10.0		
				-0.1		
	117		Base of Ind. Sps. Shale			
			Top of Big Clifty SS - 117.3'			
	118		Sandstone, l-m olive-y Tan, th bd w/shale lens in top 6', changing to massive w/shallow ripples below 6', oxidized, hd, friable.			
	119					
	120					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. WES-3-C32-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 13 OF 18 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C32	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	120	0	Sandstone (cont.)			
	121	30				
	122					
	123			123.2		
				Run 18		
	124	90				
	125	0				
	126	50		10.0 / 10.0		
	127	60				
	128	0				
	129	0				
	130					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. WES-3-C32-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 14 OF 18 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C32	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	130		Sandstone (cont)			
	131					
	132					
	133			133.2 / Run 19		
	134	30				
		30				
	135	30		10.0 / 10.0		
	136	20				
		0				
	137	20				
	138					
	139	20 / 20				
	140					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE

PROJECT | HOLE NO.

Hole No. WES-3-C32-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 15 OF 18 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C32	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	140		Sandstone (cont.)			
	141		rusty Br, highly oxidized			
	142	30, 20, 50				
	143			143.2		
				Run 20		
	144	30				
	145					
	146	30		9.9 / 10.0		
	147	30, 40, 0		-0.1		
	148					
	149					
	150					

Iole No. WES-3-C32-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 16 OF 18 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C32	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	150		Sandstone (cont.)			
	151	0				
	152	5				
	153	0		153.2 / Run 21		
		5	(Base of Big Clifty Fm)			
		100	(Top of Beech Creek Fm) – 153.6'			
	154	5	o xidized			
		5	Limestone, lgrBr m-c crystaline, fossiliferous, occ stylolites, v hard, v dense, changes to dGr f-m crystaline Ls in lower zone w/ occ wavy Blk shaley pts.			Base of oxidation 154.8
	155					
	156	0		10.0/10.0		
	157	0				
	158					
	159					
	160					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE — PROJECT — HOLE NO.

Hole No. WES-3-C32-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET 17 OF 18 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C32	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	160	0, 0	LS (cont.)			
	161	0				
	162	15				
	163	30, 0, 0		163.2 Run 22		
	164	5				
	165	0				
	166	10, 0				
	167	0		10.0 / 10.0		
	168	0				
	169					
	170					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE — PROJECT — HOLE NO.

Hole No. WES-3-C32-BC

DRILLING LOG	DIVISION	INSTALLATION	SHEET 18 OF 18 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C32	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	170		Ls (cont.)			
	171	0				
	172	5				
	173	5		173.2 / Run 23		
	174		Base of Beech Creek fm (Top of Elwren - 174.6')	3.7 / 3.7		
	175		Shale, dGn, mass hd.			
	176			176.9		
	177		Bottom Depth - 176.9'			
	178					
	179					
	180					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE — PROJECT — HOLE NO.

DRILLING LOG	DIVISION US Navy	INSTALLATION NWSC Crane Ind.	SHEET 1 OF 25 SHEETS

1. PROJECT: Hydrogeologic Studies, ABG
2. LOCATION (Coordinates or Station):
3. DRILLING AGENCY: WES
4. HOLE NO. (As shown on drawing title and file number): C33
5. NAME OF DRILLER: Black Harried
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 5.0'
8. DEPTH DRILLED INTO ROCK:
9. TOTAL DEPTH OF HOLE: 249.8
10. SIZE AND TYPE OF BIT: HQ Wireline Core
11. DATUM FOR ELEVATION SHOWN (TBM or MSL):
12. MANUFACTURER'S DESIGNATION OF DRILL: Failing 1500
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED: ; UNDISTURBED:
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED 11/18/87; COMPLETED 11/30/87
17. ELEVATION TOP OF HOLE: 783.51
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF ~~INSPECTOR~~ Geologist: Richard W. Hunt

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Clayey-sandy silt, (Residual Soil), y Tan-Br, mod firm			Ran 8" dia Flite Auger to 14.8' + set 6" dia PVC casing. Cleaned boring to 16.4' w/ 5½" R.R. Bit
	1					
	2					
	3					
	4					
	5		Highly weathered silty shale w/v fine silty SS laminations and pts, y Tan Br.			
	6					
	7					
	8					
	9					
	10					

ENG FORM 1836 PREVIOUS ARE OBSOLETE | PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 25 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C 33	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10		Shale (cont.)			
	11					
	12					
	13					
	14					
	15					
	16		Sandstone, y Tan + lGr, th bd, occ zones w/ shale lens, highly wea, Friable, Lim along Jts and bedding planes	16.4' Run 1		Started coring w/ H.Q. wireline at 16.4'. 11/19/87
	17					
	18					
	19			7.0 (Rec) / 7.0' (Run)		
	20					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 25 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C33	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	20					
	21					
	22					
	23		Sandstone, shaley, lGr + vdGr, th bd w/ alter shaley pts + thin lens ~hor bd, occ rusty Brown oxidized (lim stn) zones, hard, platey	23.4 Run 2		
	24					
	25					
	26					
	27			9.6/10.0		
	28			-0.4'		
	29					
	30					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE — PROJECT — HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 4 OF 25 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C33	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30		Shaley sandstone (cont.)			
	31					
	32		shale, vdGr-Blk, occ Carbonaceous inclus, th bd, hard, platey.			Base of oxidation 32.0'.
	33			33.4' / Run 3		
	34					
	35					
	36					
	37			10.0 / 10.0		
	38		Coal, Blk, hd, blocky.			
	39		Sandstone, silty, mGr, mass, hard, friable, v fine, carbonaceous inclus.			
	40					

DRILLING LOG	DIVISION	INSTALLATION	SHEET 5 OF 25 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C 33	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	40		SS (cont.)			
	41					
	42					
	43			43.4 / Run 4		11/20/87
	44					
	45					
	46					
	47			9.7 / 10.0		
	48			0.3		
	49		Sandstone becomes thin bd w/occ shaley pts + thin coal pts + inclus.			
	50					

DRILLING LOG	DIVISION	INSTALLATION	SHEET 6 OF 25 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C33	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30		SS (cont.)			
	51					
	52					
	53		Claystone, m olive Gr, mass, hard, blocky, occ carbonaceous inclus	53.4 Run 5		11/20/87
	54					
	55					
	56		Gradational change			
	57		Shale, vd Gr - Blk, carbonaceous, indurated, platey,	8.5 / 10.0		Core ground away
	58			~~1.5~~ 1.1		
	59					
	60					

ENG FORM 1836 PREVIOUS EDITIONS OBSOLETE — PROJECT — HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 7 OF 25 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C 33	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	60		Shale (cont.)			
	61					
	62					
	63			63.0 / 63.4	Run 6	Pull depth
	64					
	65					
	66					
	67			10.0 / 10.0		
	68					
	69					
	70					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 8 OF 25 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C33	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	70		Shale (cont.			
	71					
	72					
	73			73.0		Pull depth
				73.4 / Run 7		
	74		occ dolive Br siltstone concretions in bottom 7-8 ft.			
	75					
	76					
	77			10.4 / 10.0		
				10.4		
	78					
	79					
	80					

ENG FORM 1836 — PROJECT — HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 9 OF 25 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C33	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	80		Shale (cont.)			
	81					
	82		Sandstone, shaley, m-d Gr, th bd, irregular wavy bedding w/alternating shaley pts, clastic zones, v fine, carbonaceous inclus, hard, friable.			
	83			83.4		
				Run 8		
	84					
	85					
	86					
				10.0		
	87			10.0		
	88					
	89					
	90					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 10 OF 25 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C33	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	90		Sandstone (cont.)			
	91					
	92					
	93			93.4 Run 9		
	94					
	95		Coal, Blk, hd, blocky.			
	96		Shale, Blk-vdGr, thbd, w/numerous closely spaced lGr sandstone pts, indurated, platey, carbonaceous.	10.0/10.0		
	97					
	98					
	99					
	100					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE — PROJECT — HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 11 OF 25 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C33	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	100		Shale (cont.)			
	101					
	102					
	103			103.4		
				Run 10		
	104					
	105					
	106			10.0 / 10.0		
	107					
	108					
	109					
	110					

DRILLING LOG	DIVISION	INSTALLATION	SHEET 12 OF 25 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C 33	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	110		Sh (cont.)			
	111					
	112					
	113			113.4 / Run 11		
			No ss pts in bot 4 ft.			11/24/87
	114					
	115					
	116			10.0 / 10.0		
	117		Coal, Blk, hd, blocky.			
			Shale, (as above)			
	118		Sandstone, m Gr, mass to th bd, v fine, hard, friable, num carbonaceous inclus, (top ~5' contains Blk wavy carbon sh pts)			
	119		- oxidized, w/Lim			
	120					

FNG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE — PROJECT — HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 13 OF 25 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C33	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	120		Sandstone, (cont)			
	121					
	122					
	123			123.4 / Run 12		
	124					
	125					
	126					
	127			9.8 / 10.0		
				-0.2		
	128					
	129					
	130					

DRILLING LOG	DIVISION	INSTALLATION	SHEET 14 OF 25 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C 33	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	130		SS (cont.)			
			Bot foot is conglomeritic.			
	131		(Base of Penn Time)			
			(Miss Sediments)			
			Shale, dGn, mass, hard, s'sides present, occ dbrRed zones			
	132		(Hardinsburg fm)			
	133			133.4		
				R4n13		
	134					
	135					
	136			9.2 / 10.0		
	137			~~0.2~~ -0.6		
	138					
	139					
	140					

ENG FORM ____ PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 15 OF 25 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C33	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE: STARTED / COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	140		Shale (cont.)			
	141					
	142					
	143			143.2 / 143.4		Pull depth
				Run 14		11/25/87
	144		Gradational			
	145		Shale, Blk vdGr w/occ. Gr lens, th bd, indurated, platey, Carbonaceous			
	146			9.9 / 10.0		
	147			~~10.1~~ +0.2		
	148					
	149					
	150					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 16 OF 25 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C 33	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	150		Shale (cont.)			
	151					
	152					
	153			153.1		Pull depth
				153.4		
				Run 15		
	154					
	155					
	156					
			(Base of Hardinsburg fm)	10.3		
			(Top of Golconda / Haney fm)	10.0		
	157		156.6' Limestone, shaley, m-d Gr, th bd, (Alter shaley + crystaline Ls) fossiliferous	40.3		
	158					
	159		Limestone, mgrBr, m-c crystaline, mass fossiliferous, v dense, v hard.			
	160					

ENG FORM 1836-1 PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 17 OF 25 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C33	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	160		LS (Cont.)			
	161					
	162					
	163					
				163.4 Run 16		
	164					
	165					
	166			9.9 / 10.0		
	167			-0.1		
	168					
	169					
	170		(Base of Gokonda/Honey - 170.0')			

ENG FORM 1836 — PREVIOUS EDITIONS ARE OBSOLETE — PROJECT — HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 18 OF 25 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C33	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	170		(Top of Indian Springs Mem – 170.0')			
			Shale, Blk-vdGr, th bd, indurated, carbonaceous, platey			
	171					
	172					
	173			173.4 / Run 17		
	174					
	175					
	176			10.0 / 10.0		
	177					
	178					
	179					
	180					

ENG FORM 1836 — PROJECT — HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 19 OF 25 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C33	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	180		Shale (cont.)			
	181					
	182					
	183			183.4		
				Run 18		
	184					
	185					
	186			9.6 / 10.0		
	187			-0.4		
	188		Bot 4-5', shale grades to mass, m-d olive gray. oxidized in bot. 1½'.			
	189					
	190					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE — PROJECT — HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 20 OF 25 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C33	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	190		Shale (cont.)			
	191					
			(Base of Indian Springs -191.7')			
			(Top of Big Clifty SS-)			
	192		Sandstone			
	193			193.4		
				Run 19		
	194					
	195					
				10.0 / 10.0		
	196					
	197					
	198					
	199					
	200					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 21 OF 25 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	200		55 (cont.)			
	201					
	202					
	203			203.4		
				Run 20		
	204					
	205					
	206			10.0 / 10.0		
	207					
	208					
	209					
	210					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 22 OF 25 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	210		SS (cont.)			
	211	5				
	212	5				
		0				
	213			213.4		
				Run 21		
	214	30				
	215					
		0				
	216			10.0 / 10.0		
	217					
	218					
		0 / 0 / 60				
	219					
	220					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE | PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 23 OF 25 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C33	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	220		SS (Cont.)			
	221					
	222	10				
	223	5		223.4 / Run 22		
		5				11/30/87
	224	5 / 60				
	225					
		0				
	226		Base of Big Clifty Fm	10.0 / 10.0		
	227		(Top of Beech Creek Fm - 226.8') Limestone, m gr Br, m-c crystaline, fossiliferous, v hard, v dense, occ stylolites			
	228					
	229	70 / 0				Base of Oxidation 229.7
	230					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE | PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 24 OF 25 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C33	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	230		LS (cont)			
	231					
	232					
		0	clay seam			
	233			233.4		
				Run 23		
	234					
	235					
		45°				
	236			10.0 / 10.0		
		5				
	237					
		5				
	238		LS changes to dGr, f-m crystalline w/ore shaley pts below 238 ft.			
	239					
	240					

HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 25 OF 25 SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) C33	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	240		Ls (Cont)			
	241					
	242					
	243					Did not lose all water return in this boring.
		20°		243.4 / Run 24		
	244					
	245					
	246			6.4 / 6.4		
	247					
		85	rounded Gn shale inclus.			
	248		(Base of Beech Creek Fm - 248.3)			
			(Top of Ekuren Fm)			
			shale, dGn, mass, hd, blocky			
	249					
				249.8		

Well Installation Diagrams

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-C1-E6 (Beaver Bend Ls)			Date well screen was set: 12/12/86
627.5			+2.7			
624.8			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting Screen – 109.2' Note: small amount of water was leaking around casing that had been sealed in the Elwren Shale at the time of drilling the well. Higher than normal water level was due to this leakage from the Beach Creek Ls.
			160.0'			
			Bentonite Pellets			
			162.0			
			Filter Pack			
450.8			174.0'			
			Well Screen			
440.8			184.0			
			Trap			
			185.0'			
			197.2' Boring Depth			

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No.: WES-3-C1P2-E6 (Beech Creek LS)			Date well screen was set: 9/22/86
627.2			±2.5			
624.7			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen – 70.2'
			40.0			
			Bentonite Pellets			Only Teflon in well is the 10' screen
			43.0'			well has a 5' long 4x5" core bbl + approx 50' of drill rods lodged in at bot. Well screen was set beside the drill rods.
			Filter Pack			
532.7			92.0'			
			Well Screen			
522.7			102.0'			
			~~Trap~~ No Trap			
			110 ±' Boring Depth			

WES-3-C1P3-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No. WES-3-C1P3-86 (Golconda/Henry Ls)			Date well screen was set: 4/ /86
627.3			+2.5			
624.8			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen – 14.6
			10.0			
			Bentonite Pellets			
			12.0			Teflon Pipe – 9.6 to 25.6'
			Filter Pack			
			19.6			
			Well Screen			
			24.6			
			Trap			
			25.6			
			25.6 Boring Depth			

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-C2-86 (Beaver Bend Ls)			Date well screen was set: 10/24/86
584.0			+2.5'			
581.5			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting Screen – 69.0'
			97.0			
			Bentonite Pellets			Teflon pipe between 64.0 + 130.5'
			101.0			4" PVC Casing set to 54.8'
			Filter Pack			
462.0			119.5			
			Well Screen			
452.0			129.5			
			Trap			
			130.5			
			132.7 Boring Depth			

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-C2P2-86 (Beech Creek LS)			Date well screen was set: 10/29/86
582.6			+2.5			
581.1			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen – 36.0'
			14.0'			
			Bentonite Pellets			Teflon pipe between 27.6 to 49.0'
			17.0'			
			Filter Pack			
543.1			38.0'			
			Well Screen			
533.1			48.0'			
			Trap			
			49.0'			
			49.0' Boring Depth			

PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-C3-86			Date well screen was set: 9/13/87
600.3			+2.5			
597.8			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen – 85.2'
			133.0			
			Bentonite Pellets			Teflon pipe between 134.0 & 150.0'
			136.5			
			Filter Pack			
458.8			139.0			
			Well Screen			
448.8			149.0			
			Trap			
			150.0			
			150.7 Boring Depth			

ENG FORM ... PREVIOUS ARE OBSOLETE — PROJECT — HOLE NO.

ES-3-3

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No.: WES-3-C3P2-86 (Beech Creek Ls)			Date well screen was set: 10/23/86
600.2			+2.5'			
597.7			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting Screen – 39.0'
			18.0'			
			Bentonite Pellets			
			20.0'			Teflon pipe between 35.8 + 36.8'
			Filter Pack			
541.9			55.8			
			Well Screen			
531.9			65.8			Lost all drill water near Base of Ls
			Trap			
			66.8			
			67.0 Boring Depth			

[redacted] WES-3-C4-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number)
5. NAME OF DRILLER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE
10. SIZE AND TYPE OF BIT
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN | DISTURBED | UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE | STARTED | COMPLETED
17. ELEVATION TOP OF HOLE
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-C4-86 (Beech Creek LS)			Date well screen was set: 11/25/86
624.6			+2.5			
622.1			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting Screen – 74.0
			21.5			
			Bentonite Pellets			
			24.5			Teflon pipe between 68.0 to 84.5'
			Filter Pack			
548.6			73.5			
			Well Screen			
538.6			83.5'			
			Trap			
			84.5			
			85.3' Boring Depth			

HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-C5-86 (Beech Creek LS)			Date well screen was set: 10/29/86
581.8			+2.5			
579.3			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen – 32.3
			10.0			
			Bentonite Pellets			Teflon pipe between 27.0 to 43.0'
			14.0			
			Filter Pack			
547.3			32.0			
			Well Screen			
537.3			42.0			
			Trap			
			43.0			
			44.0 Boring Depth			

HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
2. LOCATION (Coordinates or Station)	12. MANUFACTURER'S DESIGNATION OF DRILL
3. DRILLING AGENCY	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
4. HOLE NO. (As shown on drawing title and file number)	14. TOTAL NUMBER CORE BOXES
5. NAME OF DRILLER	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	16. DATE HOLE — STARTED — COMPLETED
	17. ELEVATION TOP OF HOLE
7. THICKNESS OF OVERBURDEN	18. TOTAL CORE RECOVERY FOR BORING %
8. DEPTH DRILLED INTO ROCK	19. SIGNATURE OF INSPECTOR
9. TOTAL DEPTH OF HOLE	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No.: WES-3-06-86 (Beech Creek LS)			Date well screen was set: 10/16/86
625.9			+2.5			
623.4			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen – 92.5
			29.0			
			Bentonite Pellets			
			32.0			
						Teflon pipe between 87.0 to 98.0'
			Filter Pack			
536.0'			87.0			
			Well Screen			
526.0			97.0			
			Trap			
			98.0'			
			100.0 Boring Depth			

PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
2. LOCATION (Coordinates or Station)	12. MANUFACTURER'S DESIGNATION OF DRILL
3. DRILLING AGENCY	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
4. HOLE NO. (As shown on drawing title and file number)	14. TOTAL NUMBER CORE BOXES
5. NAME OF DRILLER	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	16. DATE HOLE — STARTED — COMPLETED
	17. ELEVATION TOP OF HOLE
7. THICKNESS OF OVERBURDEN	18. TOTAL CORE RECOVERY FOR BORING %
8. DEPTH DRILLED INTO ROCK	19. SIGNATURE OF INSPECTOR
9. TOTAL DEPTH OF HOLE	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-C7-86 (Beech Creek CS)			Date well screen was set: 10/21/86
636.8			+2.5			
634.3			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting Screen – 77.2
			18.0			
			Bentonite Pellets			
			23.0			Teflon pipe between 73.5' to 79.7'
			Filter Pack			
545.6			88.7			
			Well Screen			
535.6			98.7			
			Trap			
			99.7			
			101.6 Boring Depth			

HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-C8A-86 (Beaver Bend LS)			Date well screen was set: 4/3/87
~630.8			+2.5			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting Screen – 116.1'
			156.5'			
			Bentonite Pellets			Teflon Pipe between 106.6' + 182.0'
			159.0'			110 Lo Well # WES-3-C8A-86 is located ~ 40' E-SE of the original deep well # WES-3-C8-86
			Filter Pack			Note: Original deep well drilled ~ 5' from WES-3-C8A-86 was grouted back through the well screen by mistake. Surface evidence for the original deep well ("WES-3-C8-86) was removed + the riser pipe was grouted to the surface. Well # WES-3-C8A 86 was drilled w/a RR Bit. 4" PVC casing was set to a depth of 106.0' in the Elwren Sandy to seal off the upper Beech Creek water zone. 6" PVC casing was set to a depth of 20.0' first to seal of the Golconda. The lower water zone (in the Beaver Bend LS) was encountered between 170.5 + 180.5'.
			171.0			
			Well Screen			
			181.0			
			Trap			
			182.0			
			186.0' Boring Depth			

ENG FORM ... PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED: — COMPLETED:
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-CBP2-E6 (Beech Creek Ls)			Date well screen was set: 11/26/86
629.7			+2.5			
627.2			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen – 71.3'
			35.0			
			Bentonite Pellets			
			39.5			
						Teflon pipe between 64.5 to 101.0'
			Filter Pack			
537.2			90.0			
			Well Screen			
527.2			100.0			
			Trap			
			101.0			
			101.6 Boring Depth			

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

ES-3-0413

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE: STARTED / COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No. WES-8AP3-86 (Golconda/Haney LS)			Date well screen was set: 4/5/86
~630.8			+2.5			
~628.3			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen – 17.0'
			9.0			
			Bentonite Pellets			
			12.5			Teflon pipe – 9.5' to 20.5'
			Filter Pack			
			14.5			
			Well Screen			
			19.5			
			Trap			
			20.5			
			20.5 Boring Depth			

ENG FORM 1836 | PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number)
5. NAME OF DRILLER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE
10. SIZE AND TYPE OF BIT
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN | DISTURBED | UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE | STARTED | COMPLETED
17. ELEVATION TOP OF HOLE
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-C9-86 (Beaver Bend LS)			Date well screen was set: 12/5/86
603.2			+2.5			
601.3			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen – 89.0
			138.0			
			Bentonite Pellets			
			141.0			Teflon pipe between 81.0' to 156.0'
			Filter Pack			
456.3			145.0			
			Well Screen			
446.3			155.0			
			Trap			
			156.0			
			162.8 Boring Depth			

HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-C9P2-86 (Beech Creek Ls)			Date well screen was set: 12/7/87
604.0			+2.5			
601.5			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting Screen – 43.0'
			10.0			
			Bentonite Pellets			
			13.0			Teflon pipe between 37.2' to 73.0'
			Filter Pack			
539.5			62.0			
			Well Screen			
529.5			72.0			
			Trap			
			73.0'			
			73.0' Boring Depth			

HOLE NO.

DRILLING LOG	DIVISION US Navy	INSTALLATION Crane In.	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-C10-87 (Beech Creek Ls)			Date well screen was set: 1/22/87
608.4			+2.5			
605.9			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen – 47.0
			17.0			
			Bentonite Pellets			Teflon pipe between 40.7' to 77.0'
			20.0			
			Filter Pack			
539.0			66.0			
			Well Screen			
529.0			76.0			
			Trap			
			77.0			
			78.8' Boring Depth			

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-C11-86 (Beech Creek Ls)			Date well screen was set: 1/28/87
592.8			+2.5			
590.3			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen – 35.2
			10.0			
			Bentonite Pellets			
			13.0			
						Teflon pipe between 32.4 to 58.5'
			Filter Pack			
542.8			47.5			
			Well Screen			
532.8			57.5			
			Trap			
			58.5			
			59.5 Boring Depth			

ENG FORM ... PREVIOUS ARE OBSOLETE | PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-C12-E6 (Beech Creek LS)			Date well screen was set: 2/3/87
587.6			+2.5'			
585.1			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen – 37.0'
			10.0			
			Bentonite Pellets			
			12.0			Teflon pipe between 34.0 to 50.0'
			Filter Pack			
546.1			39.0			
			Well Screen			
536.1			49.0			
			Trap			
			50.0			
			51.2' Boring Depth			

ENG FORM 2088 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-C13-86 (Beech Creek Ls)			Date well screen was set: 2/9/87
618.2			+2.5			
615.7			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting Screen – 59.0
			18.0'			
			Bentonite Pellets			
			21.0			Teflon pipe between 50.8' – 81.2'
			Filter Pack			
545.5			70.2			
			Well Screen			
535.5			80.2			
			Trap			
			81.2			
			83.2' Boring Depth			

PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
~643.2			Well No: WES-3-C14-86 (Beech Creek Ls)			Date well screen was set: 2/20/87
			+2.5			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen – 85.0'
			40.0'			
			Bentonite Pellets			Teflon Pipe from 80.1' to 115.5
			46.0'			
			Filter Pack			
			104.5'			
			Well Screen			
			114.5'			
			Trap			
			115.5'			
			115.5' Boring Depth			

ENG FORM ... PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number)
5. NAME OF DRILLER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE
10. SIZE AND TYPE OF BIT
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN | DISTURBED | UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE | STARTED | COMPLETED
17. ELEVATION TOP OF HOLE
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No.: WES-3-C15-80 (Beech Creek LS)			Date well screen was set: 2/26/87
~621.2			+2.6			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen - 62.0'
			34.0			
			Bentonite Pellets			
			38.0			Teflon pipe between 44.1 to 99.5'
			Filter Pack			
			88.5			
			Well Screen			
			98.5			
			Trap			
			99.5			
			101.1 Boring Depth			

PROJECT | HOLE NO.

[redacted] No. WES-3-C15P3-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	16. DATE HOLE — STARTED — COMPLETED
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-C15 P3-86 (Golconda / Haney Ls)			Date well screen was set: 4/1/86
~620.7			+2.5			
~618.2			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting Screen – ~7.0'
			9.0			
			Bentonite Pellets			
			11.5			
			Filter Pack			Teflon pipe – 4.6 to 21.6'
			15.6			
			Well Screen			
			20.6			
			Trap			
			21.6			
			22.0 Boring Depth			

PROJECT HOLE NO.

DRILLING LOG

DIVISION	
INSTALLATION	
SHEET OF SHEETS	
1. PROJECT	
2. LOCATION (Coordinates or Station)	
3. DRILLING AGENCY	
4. HOLE NO. (As shown on drawing title and file number)	
5. NAME OF DRILLER	
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	
7. THICKNESS OF OVERBURDEN	
8. DEPTH DRILLED INTO ROCK	
9. TOTAL DEPTH OF HOLE	
10. SIZE AND TYPE OF BIT	
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	
12. MANUFACTURER'S DESIGNATION OF DRILL	
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED / UNDISTURBED
14. TOTAL NUMBER CORE BOXES	
15. ELEVATION GROUND WATER	
16. DATE HOLE	STARTED / COMPLETED
17. ELEVATION TOP OF HOLE	
18. TOTAL CORE RECOVERY FOR BORING %	
19. SIGNATURE OF INSPECTOR	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No.: WES-3-C16-86 (Beech Creek LS)			Date well screen was set: 3/12/87
~643.1			2.5			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting Screen – 123.4
			93.0			
			Bentonite Pellets			Teflon pipe between 118.5' to 157.0'
			98.0			
			Filter Pack			
			146.0			
			Well Screen			
			156.0			
			Trap			
			157.0			
			157.0 Boring Depth			

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-C17-86 (Beech Creek LS)			Date well screen was set: 3/19/87
~696.6			+2.5			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting Screen – 131.4
			84.0			
			Bentonite Pellets			
			89.0			Teflon pipe between 123.5 to 149.5
			Filter Pack			
			138.5			
			Well Screen			
			148.5			
			Trap			
			149.5			
			149.5 Boring Depth			

ENG FORM ... PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-C18-86 (Golconda/Honey LS)			Date well screen was set: Apr 1987
~625.6			+2.5			
623.1			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen - 4.6
			5.0			
			Bentonite Pellets			Teflon Pipe - 3.0 to 21.5'
			8.0'			
			Filter Pack			
			15.5			
			Well Screen			
			20.5			
			Trap			
			21.5			
			22.5 Boring Depth			

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

WES-3-C19-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-C19-86 (Beech Creek Ls)			Date well screen was set: 5/8/87
650.9			+2.5			
648.4			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting Screen – 72.5
			55.0			
			Bentonite Pellets			Teflon pipe from 55.6 to 121.8'
			62.0			
			Filter Pack			
			110.8			
			Well Screen			
			120.8			
			Trap			
			121.8			
			122.5 Boring Depth			

HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-C19P3-86 (Golconda/Haney Ls)			Date well screen was set: 5/13/86
650.5			+2.5			
648.0			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen - 32.0'
			25.0			
			Bentonite Pellets			
			29.5			Teflon Pipe from 27.0 to 43.0'
			Filter Pack			
			37.0			
			Well Screen			
			42.0			
			Trap			
			43.0			
			44.0 Boring Depth			

PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-CLO-86 (Beach Creek Ls)			Date well screen was set: 5/24/87
~6474			+2.5			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting Screen – 89.0'
			56.0			
			Bentonite Pellets			Teflon Pipe – 83.0 – 119.0'
			59.5			
			Filter Pack			
			108.0			
			Well Screen			
			118.0			
			Trap			
			119.0			
			120.0 Boring Depth			

HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number)
5. NAME OF DRILLER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE
10. SIZE AND TYPE OF BIT
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN | DISTURBED | UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE | STARTED | COMPLETED
17. ELEVATION TOP OF HOLE
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No.: WES-3-C21-86 (Beech Creek)			Date well screen was set: 5/28/87
~642.3			+2.5			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen – 85.0
			57.0			
			Bentonite Pellets			
			61.5			Teflon Pipe – 80.0 to 119.4
			Filter Pack			
			108.4			
			Well Screen			
			118.4			
			Trap			
			119.4			
			123.0 Boring Depth			

PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-C21 P3-86 (Golconda / Honey Ls)			Date well screen was set: 5/29/87
~642.5			+2.5			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting Screen –
			21.0			
			Bentonite Pellets			
			25.0			Teflon pipe – 28.6 - 39.6
			Filter Pack			
			33.6			
			Well Screen			
			38.6			
			Trap			
			39.6			
			41.0 Boring Depth			

HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-C22-86 (Golconda/Haney)			Date well screen was set: 6/4/87
~618.1			+2.5			
~615.6			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen –
			7.0'			
			Bentonite Pellets			
			9.0			Teflon pipe – 5.0 – 16.0'
			Filter Pack			
			16.0			
			Well Screen			
			15.0			
			Trap			
			16.0			
			16.5 Boring Depth			

HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-C23-86 (Golconda/Haney			Date well screen was set: 6/9/87
~619.1			+2.5			
~616.6			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen –
			3.0			
			Bentonite Pellets			
			5.0			
			Filter Pack			Teflon Pipe – 3.5 to 14.5'
			8.5			
			Well Screen			
			13.5			
			Trap			
			14.5			
			15.5 Boring Depth			

PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-C24-86 (Beech Creek fm)			Date well screen was set: 6/16/87
553.8			+2.6			
551.2			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen – 13.8
			10.0'			
			Bentonite Pellets			
			15.0'			
						12.0 to 28.0' – Teflon Pipe
			Filter Pack			
			22.0			
			Well Screen			
			27.0			
			Trap			
			28.0			
			28.2' Boring Depth			

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-C25-86 (Beech Creek Ls)			Date well screen was set: 6/18/86
597.5			+2.5			
595.0			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen – 44.4
			7.5			
			Bentonite Pellets			
			10.5			
						Teflon Pipe – 39.4 to 70.7'
			Filter Pack			
			59.7			
			Well Screen			
			69.7			
			Trap			
			70.7			
			70.7 Boring Depth			

ENG FORM ... OBSOLETE | PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number)
5. NAME OF DRILLER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE
10. SIZE AND TYPE OF BIT
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE — STARTED — COMPLETED
17. ELEVATION TOP OF HOLE
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-C26-86 (Beech Creek LS)			Date well screen was set: 8/3/87
641.1			+2.5			
638.6			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting Screen – 78.0'
			42.0'			
			Bentonite Pellets			Teflon Pipe From 73.7' to 105.0'
			46.0			
			Filter Pack			
			94.0'			
			Well Screen			
			104.0			
			Trap			
			105.0			
			105.7 Boring Depth			

ENG FORM ... PREVIOUS EDITIONS OBSOLETE — PROJECT — HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
604.64			Well No: WES-3-C27-86 (Beech Creek Ls)			Date well screen was set: 8/14/87
			+2.5			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen – 55.4'
			15.0			
			Bentonite Pellets			
			18.0			
			Filter Pack			Teflon pipe – 50.5 to 71.5'
			60.5			
			Well Screen			
			70.5			
			Trap			
			71.5			
			73.3 Boring Depth			

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-C28-86 (Beach Creek Ls)			Date well screen was set: 8/22/87
613.56			+2.16			
611.4			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting Screen - 60.6
			10.0			
			Bentonite Pellets			
			15.0			Teflon Pipe - 55.0 to 76.0'
			Filter Pack			
			65.0			
			Well Screen			
			75.0			
			Trap			
			76.0			
			77.1 Boring Depth			

PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-C29-86 (Beech Creek Ls)			Date well screen was set: 9/1/87
798.53			+2.5			
796.03			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen – 243.0
			215.0			
			Bentonite Pellets			
			221.0'			
						Teflon pipe – 237.5' to 278.5'
			Filter Pack			
			267.5			
			Well Screen			
			277.5			
			Trap			
			278.5			
			278.8 Boring Depth			

HOLE

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-C30-86 (Beech Creek Ls.)			Date well screen was set: 9/17/87
779.71			+2.5'			
777.21			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen - ?
			~~Bentonite Pellets~~ None			
			188.0			
			Filter Pack (Pool filter sand)			Teflon Pipe set between 210.1 to 261.5'
			250.5			Note: First attempt to set well was a failure - hole caved before sand was set. The entire riser pipe and screen was drilled out w/a R.R. bit. A second well screen and riser pipe assembly was set in the same boring.
			Well Screen			
			260.5			
			Trap			
			261.5			
			263.6 Boring Depth			

PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET - OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-C31-86 (Beech Creek Ls)			Date well screen was set: 11/1/87
792.93			+2.5'			
790.43			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen –
			200.0			
			~~Bentonite Pellets~~ fine "Pool" filter sd			
			205.0			
						Teflon Pipe – 216.0' to 266.0'
			Filter Pack Colorado coarse sd			
			255.0			
			Well Screen			
			265.0			
			Trap			
			266.0			
			267.2 Boring Depth			

PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-C32-86 (Beech Creek LS)			Date well screen was set: 11/14/87
711.78			+2.5			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen – 151.0
			112.0			
			Bentonite Pellets			
			117.0			Teflon Pipe – 144.0 – 175.0
			Filter Pack			
			164.0			
			Well Screen			
			174.0			
			Trap			
			175.0			
			176.9' Boring Depth			

HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET - OF SHEETS

1. PROJECT
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number)
5. NAME OF DRILLER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE
10. SIZE AND TYPE OF BIT
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE — STARTED — COMPLETED
17. ELEVATION TOP OF HOLE
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-C33-86 (Beech Creek Ls)			Date well screen was set: 11/31/87
786.01			+2.5			
783.51			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen -
			191.0			
			~~Bentonite Pellets~~ None (used fine pool filter sd)			
			195.0			
						Teflon Pipe 218.5 to 249.5'
			Filter Pack Colorado Sd			
			238.5			
			Well Screen			
			248.5			
			Trap			
			249.5			
			249.8 Boring Depth			

PROJECT — HOLE NO.

WES-3-B1-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-B1-86 (Alluvium)			Date well screen was set: 6/19/87
505.37			+2.5			
502.87			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen - ~6.0'
			4.0			
			Bentonite Pellets			
			6.0			
			Filter Pack			Teflon pipe - 2.5 to 13.5
			7.5			
			Well Screen			
			12.5			
			Trap			
			13.5			
			23.3 Boring Depth			

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 3-B2	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-B2-86 (Little Sulphur Creek Alluvium)			Date well screen was set: 6/27/87
504.65						
502.15			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen – ~5.0'
			3.0'			
			Bentonite Pellets			
			5.0'			
						Teflon pipe – 4.6 to 15.6'.
			Filter Pack			
			9.6'			
			Well Screen			
			14.6'			
			Trap			
			15.6'			
			15.8' Boring Depth			

PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number) 3-B3	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-B3-86 (Little Sulphur Creek Alluvium)			Date well screen was set: 6/29/87
505.53			+2.5			
503.03			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen – ≈6.0'
			3.0			
			Bentonite Pellets			
			5.0			Teflon pipe – 3.5 to 14.5'
			Filter Pack			
			8.5			
			Well Screen			
			13.5			
			Trap			
			14.5			
			14.5 Boring Depth			

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number)
5. NAME OF DRILLER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE
10. SIZE AND TYPE OF BIT
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE — STARTED — COMPLETED
17. ELEVATION TOP OF HOLE
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-B4-86 (Little Sulphur Creek Alluvium)			Date well screen was set: 6/30/87
507.27		+2.5				
503.77		0.0'	Ground surface			
			Grout mixture			Water level just Prior to setting screen - ~7'
		5.0				
			Bentonite Pellets			
		7.0				Teflon pipe - 4.5 - 15.5'
			Filter Pack			
		9.5				
			Well Screen			
		14.5				
			Trap			
		15.5				
		16.5	Boring Depth			

HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-85-86 (Little Sulphur Creek Alluvium)			Date well screen was set: 7/1/87
508.01			+2.5			
505.51			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen – ~7.0
			3.0			
			Bentonite Pellets			
			6.0			Teflon Pipe – 4.0 to 15.0'
			Filter Pack			
			9.0			
			Well Screen			
			14.0			
			Trap			
			15.0			
			15.0 Boring Depth			

PROJECT | HOLE NO.

[redacted] 3-3-86-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number)
5. NAME OF DRILLER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE
10. SIZE AND TYPE OF BIT
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE — STARTED — COMPLETED
17. ELEVATION TOP OF HOLE
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WBG 3-86-86 (Alluvium)			Date well screen was set: 7/2/87
509.87			+2.5			
507.37			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen – ~7.0'
			3.0			
			Bentonite Pellets			
			6.0			Teflon Pipe – 2.5 to 13.5
			Filter Pack			
			8.0			
			Well Screen			
			13.0			
			Trap			
			13.5			
			13.5 Boring Depth			

[redacted] 3-3-87-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No.: WES-3-87-86 (Alluvium)			Date well screen was set: 8/4/87
511.15			+2.5			
508.65			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen – ~8.0'
			2.0			
			Bentonite Pellets			
			3.0			
			Filter Pack			Teflon pipe – 4.0 to 10.0'
			4.0			
			Well Screen			
			9.0			
			Trap			
			10.0			
			10.5 Boring Depth			

PROJECT | HOLE NO.

[redacted] WES-3-88-86

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	16. DATE HOLE — STARTED — COMPLETED
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-88-86 (Alluvium)			Date well screen was set: 8/5/87
513.92			+2.5			
511.42			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen – ~9.0'
			2.0			
			Bentonite Pellets			
			4.0			
			Filter Pack			Teflon Pipe – 6.0 to 12.0'
			6.0			
			Well Screen			
			11.0			
			Trap			
			12.0			
			12.5 Boring Depth			

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No.: WES-3-B9-86 (Alluvium)			Date well screen was set: 8/7/87
516.34			+2.5			
513.84			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting Screen – ~9.0'
			2.5			
			Bentonite Pellets			
			4.0			Teflon pipe – 5.5 to 11.5'
			Filter Pack			
			5.5			
			Well Screen			
			10.5			
			Trap			
			11.5			
			12.0 Boring Depth			

PROJECT | HOLE NO.

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			Well No: WES-3-810-86 (Beech Creek Ls)			Date well screen was set: 10/22/87
562.67			+2.5			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting Screen – 50.5'
			8.0			
			Bentonite Pellets			
			10.0			
			Filter Pack			Teflon pipe – 43.5 to 58.5'
			48.5			
			Well Screen			
			58.5			
			Trap (No trap)			
			58.7 Boring Depth			

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.